

**BASIC FEATURES HYDROCHEMICAL PROCESSES IN
RESERVOIRS OF INDUSTRIAL FISHING RIVER BASIN LEVEL IN
Vinnytsia region**

V. P. BABAN', postgraduate*

**I. P. GAMALII, Candidate of Geographical Sciences, docent
Belotserkovsky national agrarian university**

Carried out hydrochemical analysis of water reservoirs fishery basin of the Southern Bug Vinnytsia region. On the basis of hydrochemical data obtained in the laboratory, determined the level of pollution of water reservoirs studied organic and inorganic compounds and its impact on the fish fauna.

According to the research, we found that of the representative bodies of water are clean Staroprilutskoy (top) and Serbinovsky reservoir, hydrochemical parameters were within normal limits or have a slight excess of the MPC. Most polluted nitrites and ammonium salt appeared new reservoir. Thus, higher concentrations of organic and inorganic compounds in water indicate significant contamination of reservoirs investigated. This, in turn, affects the quality of fish products, and therefore poses a risk to human health and life. Thus, the solution to the problem of water quality reservoir fishery Southern Bug Vinnytsia region can be carried out on a new level thanks to the environmental management of reservoirs based on the experience of basin water resources management.

Reservoir pool Southern Bug, fishery, the maximum allowable rate, hydrochemical indicators.

The continuous growth of human impacts on ecosystems, in particular water, leads to zabrudnennnya of organic and inorganic substances. The consequences of economic activity is changing the qualitative and quantitative indicators of water environment reservoirs. Exceeding the maximum permissible concentration (MPC) of chemicals dumped into the water, affecting product quality breeding.

A characteristic feature of the basin of the Southern Bug, which makes it stand out among other major rivers, it is a very large over-regulation. In the pool has more than 8,000 artificial ponds, their total volume is about 1.5 km³, which is almost runoff in shallow availability of 95% a year [1]. Recent studies of reservoirs (Romanenko VD, Yatsyk AV, Chernyavskaya AP, Zakorchevna NB et al.) Are devoted to assessing their ecosystems hydrochemical indicators and related primarily integrated water use. Instead,

* Supervisor - Candidate of Geographical Sciences, Associate Professor I.P. Hamaliy.

remain neglected medium and small industrial fishing reservoir, located in the district. Southern Bug and its tributaries (p. Gums, p. Reeve, p. Snyvoda, p. Rovok).

As a result of anthropogenic load for most of these reservoirs reduce water surface area and volume was due to siltation and waterlogging of the upper [1, 2]. It also led to changes in the hydrological, hydrochemical and hydrobiological regimes of reservoirs. Consequently, the urgent issue of industrial fishing reservoirs water quality.

This situation requires a systematic hydro-chemical research and analysis.

The purpose of research is to study the characteristics of hydrochemical processes of industrial fishing reservoir basin of the Southern Bug Vinnytsia region.

Materials and methods of research. The study used field and laboratory methods, the analysis of stock and literature. Also, during take into account the direction of Ukraine on European integration and obtaining competitive products breeding. Therefore, while benchmarking using MPC maximum allowable values of water quality for fisheries reservoirs of Ukraine and the EU Directive [3, 4].

Hydrochemical samples were taken in summer 2014 by conventional methods [5, 6]. Samples were treated in the basin laboratory monitoring water and soil in the "Southern Bug River Basin Water Management Administration" in. Winery [6, 7, 8].

Results and discussion. Great Basin of the Southern Bug overregulation and delayed inventory reservoirs region result in a reduction of water surface area reservoirs. According to the Department of Water Resources oblvodgosp Vinnytsia region reservoirs last inventory was conducted in 1999-2000. And clarify options for most ponds happened over twenty years [1].

This, in turn, indicates that as a result of prolonged use of most reservoirs is abandoned. They quickly grow shallow, zabolochuyutsya, overgrown aquatic vegetation, which leads to deterioration sanitary condition of water bodies, including hydro-chemical indicators that directly affect the fish fauna reservoirs. Not only continued operation affects the hydrochemical parameters change, but also pollutants that come from wastewater for household, industrial and silskohospodarskoho origin of enterprise-water consumers. A number of reservoirs, including new reservoir has ruined the water's edge to coastal protection strips and it is also the cause of the acceleration of planar flushing of farmland and pollutants.

Investigated industrial fishing reservoir related to the type of channel and flood waters. They owned matchmaker "Vinnytsyarybhosp" - Staroprylutske (lower) Staroprylutske (top), Lozova, Voronivetske and Pikovskiy (bottom) of the reservoir; Bar JV "Progress" - a new, Harmakske; Serbynivskoyi owned by the village council - Serbynivske reservoir [1, 2].

These ponds are among the most claimed for fish productivity (Pikovskiy (lower) - 1900 kg / ha Staroprylutske (lower) Staroprylutske (top) - 1670 kg / ha) [9].

Analysis of the data showed that all investigated waters permanganate oksyenyuvanist water exceeded MPC by 3-4 times (Pikovskiy (lower) Staroprylutske (lower)) and was higher than figures BSK5, indicating that water pollution by organic substances. Exceptions were only Staroprylutske (lower) and Serbynivske reservoir where water oksyenyuvanist permanganate was within normal limits, and rates BSK5 had significant excess of MPC Ukraine and the standards were within acceptable by European (Table. 1).

The concentration of suspended solids and ammonium salt in these reservoirs was in the normal range, and only in the new reservoir recorded a slight excess of MPC ammonium salt 0.05 mg / dm³.

All representative bodies of water nitrite concentration exceeded MPC by 3 times - Staroprylutske (lower) Staroprylutske (top); 6 times - Lozova, Pikovskiy (bottom); 10-11 times - Harmakske, Voronivetske, Serbynivske and New water reservoir of nitrite concentration reached a mark of 2.56 mhNO₂ / dm³, which at 32 times the rate of 0.08 mhNO₂ / dm³. Increased concentration of nitrite indicates the intensity of the decomposition of organic matter and delay oxidation NO⁻² to NO⁻³, which clearly points to water pollution [10].

Dissolved in water nitrites have very high toxicity. By entering nitrite in blood hemoglobin to methemoglobin oksyenyuyut who is unable to carry oxygen. Nitrite concentrations of about 1 mg / dm³ cause the death of fish [11].

Also, the water reservoir New MPC recorded a slight deviation from the norm is 0.52 mg / dm³fosfativ to 0.61 mg / dm³, which indicates washout phosphate fertilizers from farmland. Phosphorus content in water is seasonal fluctuations and depends on the ratio of intensity of photosynthesis and biochemical decomposition of organic matter [10].

The pH environment is important for the formation of the chemical composition of water, its purification process, ensuring living conditions of flora and fauna reservoirs. In particular, lower pH enhances the solubility of carbonates, sulfides, phosphates, heavy metals, migration and increasing their availability for assimilation by living organisms, as well as poisoning. Most fish is optimal pH = 6,7-8,6. This figure depends on factors such as water temperature, organic matter content, the activity of living organisms, etc. [10].

1. Results of hydrochemical analysis of water reservoirs of industrial fishing pool Southern Bug Vinnytsia region

Indicator	GDC for fisheries reservoirs, OBUV № 12-04-11 09.08.90 p.	GDC for fisheries reservoirs, Directive 78/659 / EC carp	Reservoir							
			Old Pryluky (lower)	Old Pryluky (top)	Serbynivske	New	Garmakske	Lozova	Pikovskiy (lower)	Voronivetske
Air temperature, ° C	–	–	20,0	20,0	18,0	28,0	28,0	24,0	31,0	31,0
Water temperature, ° C	28	28 10*	25,0	24,0	22,0	25,0	25,0	26,0	30,0	29,0
Hydrogen index, pH	6,50–8,50	6,0–9,0	8,6	7,7	8,08	7,4	8,2	8,6	8,6	8,2
Transparency, sm	–	–	15	10	20	15	20	8	15	20
Smell, point	–	–	2	2	0	5	0	2	2	4
Turbidity, precipitate	–	–	–	+	–	+	–	–	–	+
Impurities film	–	–	–	–	–	–	–	–	–	–
Blooming water	–	–	–**	+**	–**	–**	–**	+**	+**	–**
Suspended solids, mg/dm ³	20,0	≤25	13,0	14,0	12,0	14,0	15,0	15,0	13,0	12,0
Ammonium salt (NH ₄ ⁺), mg/dm ³	0,5	0,8	0,18	0,33	0,15	0,55	0,16	0,20	0,16	0,15
Nitrites (NO ₂ ⁻), mgNO ₂ /dm ³	0,08	–	0,29	0,27	0,94	2,56	0,87	0,48	0,49	0,90
Permanganate oxidation, mgO ₂ /dm ³	20	–	61,8	19,0	15,2	36,1	57,2	54,9	82,3	27,6
BSK ₅ , mg/dm ³	2	≤6	18,4	5,8	4,4	11,3	18,05	16,75	27,2	8,65
BSK _n , mg/dm ³	3,00–6,00	–	24,5	7,7	5,9	15,0	24,0	22,3	36,2	11,5
Phosphates (PO ₄ ³⁻) / phosphate ion, mgPO ₄ /dm ³	0,52/0,17	–	0,05	0,08	0,43	0,61	0,31	0,04	0,09	0,14

«–» - standard is not defined;

* – temperature during reproduction;

–** not observed; +** observed.

Given that research conducted in the summer, namely in July, when the air temperature reached the mark + 31° C, and water +30 ° C, pH values were within normal limits MCL Ukraine and EU countries. Comparing pH for filling reservoirs, which accounted for 60-80 years of the twentieth century. and the value obtained in 2014 (Fig. 1) revealed a positive trend compliance with the terms of the owners of water reservoirs.



**Fig. 1. Dynamics of pH (pH) of industrial fishing reservoir basin of the Southern Bug Vinnytsia region:
 1 - Staroprylutske (lower); 2 - Staroprylutske (top);
 3 - Lozova; 4 - Voronivetske; 5 - Pikovskiy (bottom); 6 - Serbynivske; 7 - New; 8 – Harmakske**

Another important indicator is the Hydro importance of transparency, the MPC is not standardized norms of Ukraine and the EU for the purposes of fish farming, but what determines the biochemical processes that require insolation (primary production, photolysis) [10]. When analyzing indicators of transparency in previous years (60-80 years of the twentieth century.) And current research, it was observed lack of transparency from 8 to 20 cm (for Snellenom) for the required water layer at least 30 cm in all representative bodies of water (Fig. 2). According transparency indicators obtained during the filling reservoirs were between 40 to 55 cm [9].



Fig. 2. The evolution of industrial fishing reservoirs transparency pool Southern Bug Vinnytsia region:
1 - Staroprylutske (bottom); 2 - Staroprylutske (top); 3 - Lozova; 4 - Voronivetske; 5 - Pikovskiy (bottom); 6 - Serbynivske; 7 - New; 8 – Harmakske

Conclusions. According to the research we determined that the representative bodies of water is the cleanest Staroprylutske (top) and Serbynivske reservoirs, hydro-chemical parameters were within normal limits or have a slight excess of the MCL. The most polluted nitrite and ammonium salt is new reservoir.

Thus, elevated concentrations of organic and inorganic compounds in the water indicate significant pollution of water bodies studied. This in turn affects the quality of fish products, and therefore a danger to human health and life.

Thus, the problem of water quality industrial fishing reservoirs Southern Bug Vinnytsia region can be carried to a new level through environmental management ponds on the experience of basin water management. In particular, to: technical work on clean water from sludge accumulated at the expense of increased depth of reservoirs, restore coastal protection strips within the protection zones around bodies of water, whose purpose is to create conditions of natural surface cleaning wastewater.

Список літератури

1. Гавриков Ю. С. Водний фонд Вінницької області: [Довідник] / Ю. С. Гавриков, О. М. Коник. – Вінниця, 2006. – 144 с.
2. Річний звіт про діяльність басейнового управління водними ресурсами річки Південний Буг з питань управління і контролю за раціональним використанням і охороною вод та відтворенням водних ресурсів за 2013 р. – Вінниця, 2013. – 224 с.
3. Директива Ради 78/659/ЕС від 18 червня 1978 року про якість прісних вод, які потребують захисту та поліпшення умов для підтримки сприятливих умов для життя риб. [Електронний ресурс]. – Режим доступу: <http://www.cleanwater.org.ua/ru/legislation/eu-directives/>.
4. Гранично допустимі значення показників якості води для рибогосподарських водойм. Загальний перелік ГДК і ОБРВ шкідливих речовин для води рибогосподарських водойм: [№ 12–04–11 чинний від 09–08–1990]. – К: Міністерство рибного господарства СРСР, 1990. – 45 с.
5. Алекин О. А. Основы гидрохимии / О. А. Алекин. – Л.: Гидрометеоздат, 1970. – 444 с.
6. НД 33-1.1-17-2010. Інструкція з відбору і підготовки проб води та ґрунту для проведення вимірювань в лабораторіях.
7. Якість води. Відбирання проб. Частина 2. Настанови щодо методів відбирання проб. Показчик та огляд (ISO 5667-2:1991, IDT): ДСТУ ISO 5667-2:2003. – [Чинний від 2004-07-01] – К.: Держспоживстандарту України, 2003 р. – 12 с. (Національний стандарт України).
8. Гідросфера. Відбір проб для визначення складу та властивостей стічних та технологічних вод. Основні положення. КНД 211.1.0.009-94. – [Чинний від 1994-12-28]. Затверджено міністерством охорони навколишнього природного середовища та ядерної безпеки України, 1994.
9. Водохозяйственные паспорта водохранилищ Винницкой области. – Киев: «Укргіпроводхоз», 1985.
10. Жемеров О. О. Оцінка якості поверхневих вод суші: Методичний посібник для студентів-географів вищих навчальних закладів / О. О. Жемеров, В. Г. Доц. – Харків: ХНУ ім. В. Н. Каразіна, 2011. – 48 с.
11. Бессонов Н. М. Рыбохозяйственная гидрохимия / Н. М. Бессонов, Ю. А. Привезенцев. – М.: Агропромиздат, 1987. – 159 с.

Осуществлен гидрохимический анализ воды водохранилищ рыбохозяйственного назначения бассейна Южного Буга Винницкой области. На основе гидрохимических данных, полученных в лабораторных условиях, определен уровень загрязнения воды исследуемых водоемов органическими и неорганическими соединениями и его влияние на ихтиофауну.

По результатам исследований, мы определили, что из репрезентативных водоемов чистыми являются Староприлуцкой (верхнее) и Сербиновское водохранилища, гидрохимические показатели которых были в пределах нормы или имели незначительное превышение ПДК. Наиболее загрязненным нитритами и аммонием солевым оказалось Новое водохранилище. Итак, повышенные концентрации органических и неорганических соединений в воде указывают на значительное загрязнение исследуемых водоемов. Это, в свою очередь, влияет на качество рыбной продукции, а соответственно представляет опасность для здоровья и жизни человека. Таким образом, решение проблемы качества воды водохранилищ рыбохозяйственного назначения Южного Буга Винницкой области можно осуществлять на качественно новом уровне благодаря рациональному природопользованию водоемов с учетом опыта бассейнового управления водными ресурсами.

Водохранилище, бассейн Южного Буга, рыбохозяйственное назначение, предельно допустимый коэффициент, гидрохимические показатели.

**FARMER ECOCOMPLEX AS A BASIS OF DEVELOPMENT
FARMER' COMPLEXES RURAL DEVELOPMENT AS THE BASIS
AGRICULTURAL AREAS**

***R. M. BEZUS, Candidate of Economic Sciences, Associate Professor
of Finance Dnepropetrovsk State Agrarian University of Economics***

S. V. KORNIJEVSKI, postgraduate *

***Dnipropetrovsk Regional Institute of Public Administration of the
National Academy of Public Administration under the President of
Ukraine***

The article stated that the government is focusing focuses on the problems of agricultural production, but it does not solve the problems of the village. The resulting large agricultural producer now leaves aside the problem of social development of rural areas. It is noted that in the past decade, more than half of agricultural GDP in Ukraine are produced by the personal farms because these entities are able to revive the Ukrainian village based on the high-tech environmental systems.

***Agriculture, agricultural holdings, rural development,
agricultural production structure, personal farm, farms***

Given the significant contribution of agriculture to the overall GDP of Ukraine and significant rural population structure in Ukraine, as well as the complexity of social problems in rural areas Ukrainian regions, forecasting and planning of regional development is necessary to assess the real situation of this sector in Ukraine. Evaluation of efficacy and is promising the course of development of agrarian sector of Ukrainian economy is not possible without comparisons with global trends.

Problems of socio-economic development of rural areas devoted to the works of famous Ukrainian scientists: VG Andriyчук, O. Borodina [2], OG Pins, VP Horovoho, LV Moldovans IV Prokop, MK orlat, VK Tereshchenko, KI Yacoub and others.

Among recent publications should be noted Azhaman of IA [1] P. Voytovych [8] A. V.Zbarskoyi [3] AV Nikulina [4] T. Nikulina [4], O . S. Senyshyna [6] A. Sikora [7] G. Cherevko [8].

The aim - assessment of the agroindustrial complex of Ukraine and the socio-economic development of rural areas. To achieve this goal it is necessary to solve the problem on a review of current global trends in the village to provide proposals for solving the problems in this area.

At the beginning of 2010 for the valuation of Ukraine took 1st place in the world with exports of sunflower oil, 2 nd - canola and barley, 5th - corn, 6th - sunflower seeds, 7th - wheat, 9- that - soy. However, livestock

Ukraine is not included even twenty world exporters. However, the general economic indicators do not reflect trends in the distribution of the benefits of increasing agricultural production and exports.

Although there are some rural pockets that even with European requirements can be considered successful, the overall picture is not encouraging. On the reforms of the 1990s in the newly independent states of the former Soviet Union advisors promoted the success of agrarian transformation depends on the speed of transfusion assets from inefficient collective and state farms to the new effective owners. These owners would have become family farms. No one even suggested that the formation of the new owners will lead to the seizure of land large capital holdings and excessive concentration of economic power in the agricultural sector.

The Government of Ukraine, despite the dynamic change of political elites, throughout the period of agrarian transformations contributed to the creation and development of big business in agriculture. In the old stereotypes imposed by the public perception that it is large enterprises, controlling hundreds of hectares of land that can "pull" the stagnation of agriculture can provide high quality manufactured products and food security, increase export potential and so on. Instead of family-based economic role is part-time, as they were in the pre-reform period, although in the last decade more than half of agricultural GDP in Ukraine is produced in the sector and the subsidiary farms.

Holding structure is significant risk associated with structural distortions in the economy of the country and in socio-economic, demographic and environmental development of the village.

A small class of small and medium-sized commercial farmers and small and medium enterprises on processing agricultural products, operating in parallel with the agricultural holdings, are unlikely to survive in a recent attack on land rights and their monopoly power in agricultural markets and politics.

The lack of real government support of small and medium-sized manufacturer in the agricultural sector is also contributing to the holding position in agriculture. This increases the threat of food self-sufficiency of the country, because it is small and medium businesses are able to support the economy and the population in conditions of financial instability or a new crisis. The export orientation of large agrarian capital destabilize domestic supply, causing shortage of certain types of food and raw materials. For Ukraine's membership in the WTO prohibits quantitative restrictions on exports, so the best way of filling the domestic food market was to increase prices. This situation provokes food inflation, falling purchasing power, which affects the structure and quality of consumption and may increase the incidence of "supply shocks", with which Ukraine is now facing increasingly.

But the greatest danger for the country lies in the field of rural development, because agriculture - the production is not only agricultural production but also the social benefits that are no less important than the food and agricultural raw materials. The World Bank argued that public goods and unstrained prices for factors of production are key terms of macroeconomic regulation of elemental concentration in agriculture in transition countries.

It can be argued that this structural deformation state agriculture caused systemic degradation is happening in the rural society of Ukraine. Significantly reduced employment, wages kept low, formed a large stratum of the unemployed and the self-employed in private households. During the period of agrarian transformations in social services in rural areas is constantly shrinking [2].

Statistics show a steady decrease in the number of rural residents and their migration to the city. Thus, since 1991 the share of rural population decreased from 32.5 to 31.2%, and the city - in accordance rose from 67.5 to 68.8% [1].

Note that rural areas are characterized by high levels of economically inactive population. In 2012. in Ukraine with 12.1 million. economically inactive people (those who are neither employed nor unemployed) aged 15-70 years 3.3 mln. people (or 27.2%) was the population living in rural areas. Almost every second person is economically inactive among the rural population are pensioners, every fourth person is classified as students and pupils. [6]

According to one study of the dynamics of the main indicators of efficiency of social workers should contribute to the fight against unemployment - wage levels in rural areas - it is 3.5 times lower than wages in industry and economy in general. If in 1990 the ratio of wages in rural areas to its size in the industry and the economy as a whole was 83.4 and 95.1%, respectively, in 2004-2014. It did not exceed 47.2 and 54.3%. Thus, Ukraine is agriculture industry with the lowest wages.

The income level of the rural population does not allow them to provide even simple reproduction of production, causing the shadow employment, increased migration of farmers to the big cities or abroad [4].

From 2008 to 2011, the rural population decreased by 531.7 thousand. People, the number of settlements - 54 in number of secondary schools decreased by 1,053 units. (in rural areas), hospital - at 312 health posts - in 2745, libraries - 242 units [7, 8].

To help resolve these problems and public policy of rural development. Thus, one of the main regulations, which aims to ensure the development of rural areas, is State Program on development of Ukrainian village until 2015. Analysis of performance gives reason to believe that the set program objectives were not met. If the development of agriculture

financed 79% of the planned amount, the social development of the Ukrainian village was funded at only 14.1% of the planned amount [8].

By concentrating the focus on the problems of agricultural production, the government does not solve the problems of the village. Agricultural producers now leaves aside the problem of social development of rural areas. Scarce, as a rule, the funds for this purpose in local budgets do not affect the territorial utvoryuvalni processes in the country. That is, today the village created an urgent situation - "producer wants, the community can not", which has become increasingly manifest itself in the form of conflict.

Despite the fact that total output c / agricultural production in Ukraine in recent years shows a general upward trend it has not yet reached the volume of 1990.

Grafting of total agricultural production is primarily due to the growing share of crop production, which is now significantly exceeds the share of livestock in total production. Livestock in Ukraine has lost its commodity form, the number of cows, sheep and goats in Ukraine minimized. The situation was partly stabilize individual farms.

It should make note that changing patterns of agricultural production for grain production, in addition to reducing livestock production has significant impact on such components as problems nourished Ukrainian population, problems of rural employment in the villages and cities of regional importance, which mostly housed primary processing of agricultural products, as well as private land conservation for future generations.

Agricultural Ukraine, despite a large enough total production did not fully ensure the population of Ukraine a full set of food.

As can be seen from Table 1 for nutrition Ukrainian extremely lacks sufficient production of beef, milk, plodovoyahidnoyi products. These are the industries that create jobs and promotes expanding value-added agricultural production per hectare of arable land.

1. Calculation of the indicator adequacy of food consumption (per person per year kilograms) [5].

Products	Rational rate (calculated MoH Ukraine)	Actual consumption in 2009 (State Statistics Committee)	Indicator sufficiency consumption
Bread and bakery products (in terms of flour)	101,0	111,7	1,11
Meat and meat products (in terms of meat)	80,0	49,7	0,62
Including beef	31,1	9,8	0,32
Milk and dairy products (in terms of milk)	380,0	212,4	0,56
Fish and fish products	20,0	15,1	0,76
Eggs (pcs.)	290	272	0,94
Vegetables and melons	161,0	137,1	0,85
Fruits, berries and grapes	90,0	45,6	0,51
Potato	124,0	133,0	1,07
Sugar	38,0	37,9	0,99
Vegetable oil of all kinds	13,0	15,4	1,19

Based on Table 2, you can see how big may increase milk and meat production, even without taking into account the possible export. This increase livestock production would not only improve employment in rural areas, but also to stop the process of land degradation.

**2. Actual (2010) nor necessary production dairy
thousand tons [5]**

Product	Actual production			The need for standards by the MoH	Deficit to normal consumption
	Agricultural companies	Farm' population	Total		
Milk	2217	9032	11249	17480	-6231
beef	105	323	428	1440	-1012

After targeting large agricultural producers almost exclusively on grain farming not only resulted in reduction in livestock, but also to a sharp reduction of organic fertilizers in Ukrainian black soil, that already in the medium term can have negative consequences. At the recommended rate of one head of cattle for 1 ha of arable land in Ukraine we have five times fewer cattle [5, P. 400 - 402].

The combination of subsistence agriculture or family farm functions of land and property owner, manager and executor of all works directly stimulates interest in obtaining the final results. Named small forms of management can significantly save costs related to the organization and

management of production processes. Since they do not share revenues on profits and wages, there is room for maneuver between accumulation and consumption, which have businesses other forms. Advantages of personal and family farms and that in production, if necessary, can participate and their disabled members - pensioners, teenagers, contributing maneuvering labor during seasonal and adverse weather conditions. These forms management guarantee employment to young heirs, contribute to their formation, they are organically inherent ecological functions, as OSG and family farm is also a place of work and area of residence of its owner.

A crisis socio-economic situation and the lack of state support for social resettlement settlement network, go today to meet the interests of the rational model farmers almost impossible [3].

The economy of the village is based on European forms of family management. Family farms for centuries demonstrated their effectiveness and the possibility of adapting to changes in internal and external institutional environments. Therefore, the present European institutional space development of agriculture and rural areas largely focused on achieving long-term, cost-effective development of family farming, while maintaining the natural foundations of life and ensuring economic and social protection of all segments of the rural population.

Conclusions. Agricultural production Ukraine despite the demonstration of continuous growth and rapid concentration of production in agricultural holdings, has not yet reached the volume of 1990. The structure of agricultural production for the past 20 years much has changed, due to a significant decrease in livestock and berry. Keeping a certain balance consumption of animal fats provided mainly individual farms. A significant decrease in livestock led to no ability of agriculture to provide the population of Ukraine in full range of necessary food, reduced employment in rural areas. There is significant erosion and a general decline in the quality of agricultural land in most regions, including through the introduction of the almost complete absence of soil organic fertilizers. Agricultural production has significant opportunities for development using the capacity and the Internal Market (unmet demand) in meat and dairy and fruit products. Therefore, the establishment of a farm and private farms in Ukraine tech ekokompleksiv contribute to solving these problems.

Список літератури

1. Ажаман І. А. Розвиток соціальної сфери села як чинника залучення трудових ресурсів до аграрної галузі / І. А. Ажаман // Наука й економіка. – 2013. – т. 2, Вип. 4. – С. 157 – 162.
2. Бородіна О. М. Інституційний розвиток сільського господарства та села України і Росії та його гармонізація з європейською політичною практикою / О. М. Бородіна // Економіка України. – 2012. – № 11. – С. 48 – 61.
3. Збарська А. В. Соціально-економічний розвиток українського села / А. В. Збарська // Науковий вісник Національного університету біоресурсів і природокористування України. Серія: Економіка, аграрний менеджмент, бізнес. – 2014. – Вип. 200 (1). – С. 139 – 144.
4. Нікуліна О. В. Розвиток українського села: проблемний аспект / О. В. Нікуліна, Т. М. Нікуліна // Науковий вісник Національного університету біоресурсів і природокористування України. Серія: Економіка, аграрний менеджмент, бізнес. – 2014. – Вип. 200 (2). – С. 205 – 209.
5. Регіональний розвиток та державна регіональна політика в Україні: стан і перспективи змін у контексті глобальних викликів та європейських стандартів політики. Аналітичний звіт. – К : Проект ЄС «Підтримка політики регіонального розвитку в Україні», 2014. – 452 с.
6. Сенишин О. С. Соціальний розвиток села як умова досягнення продовольчої безпеки України / О. С. Сенишин // Науковий вісник Львівського державного університету внутрішніх справ. серія економічна. – 2014. – Вип. 1. – С. 92 – 102.
7. Сікора О. Збереження та розвиток людського потенціалу села / О. Сікора // Аграрна економіка. – 2014. – Т. 7, № 1 – 2. – С. 73 – 80.
8. Черевко Г. Вплив заходів державної антикризової політики на соціальний розвиток українського села / Г. Черевко, П. Войтович // Аграрна економіка. – 2013. – Т. 6, № 3 – 4. – С. 4 – 9.

В статтє определено, что государство сосредотачивает основное внимание на проблемах производства сельскохозяйственной продукции, но это не решает проблемы села. Образованный крупный товарный сельскохозяйственный производитель сейчас остается в стороне проблем социального развития сельских территорий. Акцентируется внимание на том, что за последние десятилетия больше половины сельскохозяйственного ВВП в Украине производится в секторе частных сельских и фермерских хозяйств, поэтому именно эти формы хозяйств способны на основе высокотехнологических экокомплексов возродить украинское село.

Агропромшленний комплекс, агрохолдинги, сельское развитие, структура сельхозпроизводства, собственное сельское хозяйство, фермерские хозяйства

UGC: 60:664.2.033:663.93
METHANE FERMENTATION OF POMACE WASTES GENERATED IN
CEREAL COFFEE PRODUCTION

© **J. BOHDZIEWICZ, Ph.D., D.Sc. (Eng.), Professor**
Silesian University of Technology in Gliwice
J. CEBULA, Ph.D., D.Sc. (Eng.), Associate Professor
The University of Bielsko-Biala
K. PIOTROWSKI, Ph.D., D.Sc. (Eng.), Assistant Professor
Silesian University of Technology in Gliwice
P. SAKIEWICZ, Ph.D. (Eng.)
Silesian University of Technology in Gliwice
L. PRZYWARA, Ph.D. (Eng.)
The University of Bielsko-Biala
T. PIMONENKO, Ph.D (Econ.)
Sumy State University

Batch methane fermentation of pomace wastes from cereal coffee production was experimentally studied. Data were elaborated with modified Gompertz kinetic model. The 10-time increase in reactor load 5-50 g/dm³ corresponds to proportional growth of maximal biogas yield H_{max} from 421.94 to 4119.37 cm³ and growth of maximum process rate R_{max} from 1.0745 to 10.7379 cm³/h. Unit reactor yield (for 1 g of raw mass, dry mass and dry organic mass) decreases, however, with increase in reactor load within 5-30 g/dm³ range while unit maximum process rate turned out to be practically load-independent.

Cereal coffee, pomace wastes utilization, biogas, batch methane fermentation kinetics, modified Gompertz model

According to Food and Agriculture Organization of the United Nations (FAO) 1/3 of the world's food produced is lost in a food chain. In many countries this food is landfilled or incinerated with organic fraction of municipal wastes for energy recovery. These biowastes can be also subject of fermentation resulting in production of convenient energy carriers as: biogas, hydrogen, ethanol or biodiesel [1].

Biogas can be also manufactured in co-fermentation of natural coffee wastes with animal metabolic products. In mesophilic conditions during 8 months of fermentation about 60% of organic substance can be transformed [2]. Natural coffee wastes can be also used for biogas production independently [3,4]. During fermentation of natural coffee wastes many interesting compounds is produced like alcohols, esters, aldehydes, terpenes

© J. BOHDZIEWICZ, J. CEBULA, K. PIOTROWSKI, P. SAKIEWICZ,
L. PRZYWARA, T. PIMONENKO

as well as volatile organic acids [5], proteins and fats [1], polyphenols, tannins and caffeine [6].

Cereal coffee is one of the most often used food industry products. It is manufactured based on various cereals, complemented with other plants like chicory and sugar beets according to specific needs for appropriate taste results [7]. It can be regarded as a substitute of natural coffee characterized by high caffeine level. During its production bioorganic wastes are generated which should be utilized according to sustainable development rules, considering also economical aspects and constraints. Considering production level in a large (World or country) scale, proper utilization of these wastes is a serious problem. Optimal utilization should consider its direct conversion into energy (e.g. cogeneration of heat and electricity) or biochemical transformation route into convenient energy carriers (biomethane, biohydrogen).

Possible thorough characteristic of solid wastes from cereal coffee production is crucial for methane fermentation of these substances. Carbohydrates, proteins, fats and plant fibres content is important for determination of the biogas yield and process kinetics. Modern spectroscopy techniques seem to be useful for cereal coffee biowastes biodegradability determination [8].

In the accessible literature some examples of practical developing of residuals from cereal coffee production are reported. However, use of these biowastes mainly as a co-substrate in various energetic applications (as biomass for co-incineration with coal) is reported [9–11]. In consequence of biomass thermal decomposition (pyrolysis, gasification) some corrosion problems arise, practically inhibiting further application of this energetic technology. An alternative, ecological approach can be methane fermentation process of these wastes, classified as organic recycling [9]. Technological wastes from cereal coffee production can be also used as a fraction of multicomponent biomass substrates. Nevertheless, final methane production effects are reported for the complex mixture as a whole, without more detailed information of the effect's subdivision into each component (its intrinsic contribution). This way one can notice in literature practically lack of reliable data concerning individual contribution of the cereal coffee postproduction wastes to methane production, crucial for objective evaluation of its applicability in this promising energetic application.

Objective of the Paper. Main purpose of the presented study was laboratory investigation of anaerobic fermentation potential of residuals and wastes from cereal coffee production line (mainly pomace wastes), as well as making experimental insight into anaerobic fermentation process kinetics (batch variant), which is the basis for biogas plant design and economic evaluation of its performance.

Presentation of the Research. Thermostated (38°C, external water bath) glass laboratory reactors especially designed for anaerobic fermentation processes research (Fig. 1), of working volumes 1 dm³ were used. Inoculum and: 5, 10, 20, 30 and 50 g, appropriately, of mechanically disintegrated pomace wastes from cereal coffee production line (Fig. 2-3) were used as a basic reactor loads. Analytically determined composition of research object (5 samples for statistical verification) is presented in Table 1. In defined time lags global volume of the produced biogas was systematically registered followed by current analysis of its composition. Detailed presentation of experimental methodology and plant construction is presented elsewhere [12].



Fig. 1. Experimental plant for methane fermentation tests of cereal coffee wastes



Fig. 2. Photo of cereal coffee wastes before anaerobic digestion (raw substrate)

The experimental results representing batch anaerobic fermentation process effects were registered as cumulative gaseous product volumes, then diminished by intrinsic inoculum contribution to biogas production (comparative parallel tests) and finally subject of kinetic analysis based on modified Gompertz model (1) [13]:

$$H = H_{\max} \exp \left\{ - \exp \left[\frac{R_{\max} e}{H_{\max}} (\lambda - t) + 1 \right] \right\}, \quad (1)$$

reflecting specific sigmoid course of batch fermentation process, with possibility of direct calculation of kinetic process parameters H_{\max} , R_{\max} and λ , where:

H – cumulative biogas volume produced up to time t , cm^3 ; H_{\max} – maximal (asymptotic) H , cm^3 ; R_{\max} – maximum process rate, cm^3/h ; λ – lag phase (incubation) time, h ; t – process time, h .

1. Cereal coffee postproduction wastes (pomace wastes) – analytical determination of samples composition before anaerobic fermentation tests

No.	Dry mass fraction [%]	Organic mass fraction [%]	Inorganic mass fraction [%]	Moisture fraction [%]	Organic fraction in wet mass [%]
1	22.814	97.031	2.969	77.186	22.137
2	21.247	97.092	2.908	78.753	20.729
3	22.280	97.135	2.865	77.72	21.641
4	21.975	97.143	2.857	78.025	21.347
5	23.283	97.218	2.782	76.717	22.635
Mean:	22.320	97.124	2.876	77.680	21.698

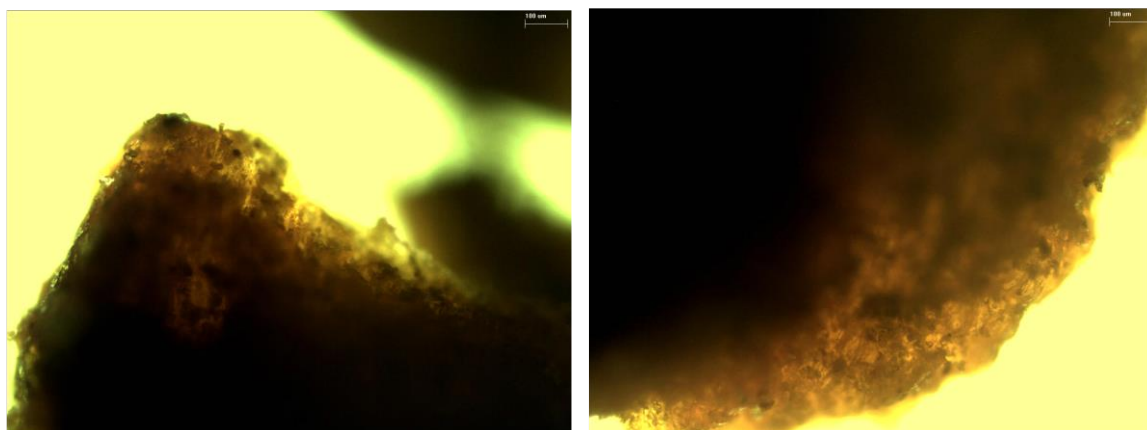


Fig. 3. Microscope images of cereal coffee wastes before anaerobic digestion (raw substrate) (optical microscope OLYMPUS CH30, magnification 10×)

Recalculated with kinetic model (1) experimental data (nonlinear regression) are presented in Table 2 in a form of: H_{\max} , R_{\max} and λ for various reactor loads (5–50 g/dm^3 of reactor working volume). In Table 3 the data recalculated for 1g of raw mass (unit reactor load), 1g of dry mass and 1g of dry organic mass, appropriately, are presented for comparison. From the data analysis one can conclude that with the increase in reactor load from 5 to 50 g/dm^3 increase in maximal cumulative biogas volume produced (asymptotic sigmoid model (1) prediction) increases from 421.94 up to

4119.37 cm³. In the same time maximum process rate increases from 1.0745 up to 10.7379 cm³/h.

2. Maximal cumulative biogas volume produced, maximum process rate and lag phase (incubation) time for reactor loads 5–50 g/dm³ – experimental data elaborated with modified Gompertz model

Reactor load [g/dm ³]	<i>R</i> ²	<i>H</i> _{max} [cm ³]	<i>R</i> _{max} [cm ³ /h]	<i>λ</i> [h]
5	0.998	421.94	1.0745	35.08
10	0.998	826.13	2.1512	46.93
20	0.998	1648.82	4.2962	47.06
30	0.998	2414.19	6.4118	46.01
50	0.998	4119.37	10.7379	47.06

Both quantities are roughly load-dependent since 10-time increase in reactor load results in nearly 10-time growth both in *H*_{max} and *R*_{max}. Increase in lag phase (incubation) time *λ* from ca. 35 h (Table 2, No. 1) up to 46–47 h (No. 2–5) can be observed, however it may be partly attributed to experimental error effect. Analysing data from Table 3, representing unit yield and unit conversion rate, some additional information can be gathered. With the increase in reactor load from 5 to 30 g/dm³ unit maximal yield, based on 1g of raw mass, decreases (84.39 → 80.47 cm³/g). One can thus conclude, that higher reactor load with pomace wastes from cereal coffee production line corresponds to systematically decreasing conversion yield. Similar conclusions can be drawn in respect to unit yields representing 1g of dry mass (378.08 → 360.54 cm³/g) and 1g of dry organic mass (389.28 → 371.22 cm³/g), respectively. Analyzing the *R*_{max} data in Table 3 one can conclude, that maximal unit process rates vary only insignificantly in all three cases, thus it can be assumed that these are load-independent. Considering data from Table 3 one can also conclude, that from 1 Mg of raw cereal coffee postproduction wastes (pomace biowastes) it is possible to obtain from 84.39 to 80.47m³ (mean 82.46m³) of biogas depending on reactor load applied (5 – 30 kg/m³). From 1Mg of dry mass and 1Mg of dry organic mass these yields vary from 378.08 to 360.54 m³ (mean 369.45 m³) and from 389.28 to 371.22 m³ (mean 380.39 m³), appropriately.

3. Maximal unit cumulative biogas volume produced and maximal unit process rate – data from Table 2 recalculated for: 1g of raw mass, 1g of dry mass and 1g of dry organic mass

Recalculated for:

No	1g of raw mass			1g of dry mass			1g of dry organic mass		
	R^2	H_{max} [cm ³ /g]	R_{max} [cm ³ /g/h]	R^2	H_{max} [cm ³ /g]	R_{max} [cm ³ /g/h]	R^2	H_{max} [cm ³ /g]	R_{max} [cm ³ /g/h]
1	0.998	84.39	0.2149	0.998	378.08	0.9628	0.998	389.28	0.9913
2	0.998	82.61	0.2151	0.998	370.13	0.9638	0.998	381.09	0.9924
3	0.998	82.44	0.2148	0.998	369.36	0.9624	0.998	380.30	0.9909
4	0.998	80.47	0.2137	0.998	360.54	0.9576	0.998	371.22	0.9859
5	0.998	82.39	0.2148	0.998	369.12	0.9622	0.998	380.05	0.9907
Mean:		82.46	0.2147		369.45	0.9618		380.39	0.9902

Conclusions. Batch anaerobic fermentation of pomace wastes from cereal coffee production was investigated. Based on modified Gompertz model process kinetics was elaborated. Increase in reactor load 5-50 g/dm³ corresponds to maximal biogas yield from 421.94 to 4119.37 cm³ and maximum process rate from 1.0745 to 10.7379 cm³/h. Unit reactor yield decreases with the increase in reactor load 5-30 g/dm³ (84.39 → 80.47, 378.08 → 360.54, 389.28 → 371.22 cm³/g, for 1g of raw mass, 1g of dry mass and 1g of dry organic mass, respectively). Maximal unit process rate turned out to be load-independent. The data can be used in a batch biogas plant design or economic evaluation of its loading strategy.

Reference List

1. Kiran E. U. Bioconversion of food waste to energy / Trzcinski A. P., Ng W. J., Liu Y. // : A review. - *Fuel* **134** 2014 -P. 389–399.
2. Corro G. Generation of biogas from coffee-pulp and cow-dung co-digestion: Infrared studies of postcombustion emissions / L. Paniagua, U. Pal, F. Banuelos, M. Rosas // *Energy Conversion and Management*. – 2013–P. 471–481.
3. Murthy P. S. Sustainable management of coffee industry by-products and value addition / Murthy P. S., Naidu M. M. // *Resources, Conversion and Recycling*. – 2012. – P.45–58.
4. Kyung-Won J. Two-stage UASB reactor converting coffee drink manufacturing wastewater to hydrogen and methane. / K. Dong-Hoon, L. Myung-Yeol, S. Hang-Sik // *Int. J. Hydr. Energy*. – 2012. – P. 7473–7481.
5. Bonilla-Hermosa V. A. Utilization of coffee by-products obtained from semi-washed process for production of valuable-added compounds. / W. F. Duarte, R. F. Schwan // *Bioresource Technolog.* – 2014. – P. 142–150.
6. Orozco A. L. Biotechnological enhancement of coffee pulp residues by solid-state fermentation with *Streptomyces*. / M. I. Pérez, O. Guevara, J. Rodríguez, M. Hernández, F. J. González-Vila, O. Polvillo, M. E. Arias // Py-GC/MS analysis, *J. Anal. Appl. Pyrolysis – 2008 – p.* 247–252.

7. Worobiej E. Kawy zbożowe – charakterystyka i właściwości przeciwutleniające / K. Relidzińska // Bromat. Chem. Toksykol., – 2011 – XLIV(3) –P. 625–629.
8. Lasteur M. Alternative methods for determining anaerobic biodegradability: A review. / V. Bellon-Maurel, C. Gonzalez // Process Biochemistry – 2010. – 45. –P. 431–440.
9. Biernat K., Technologie energetycznego wykorzystania odpadów / P. L. I. Dziolak, Samson-Bręk // Studia Ecologiae et Bioethicae UKSW. – 2011. – 9(2) – P. 103–129.
10. Rajczyk K. Wpływ zwiększonej ilości biomasy w paliwie na jakość powstających popiołów lotnych / E. Giergiczny, A. Jarocka // Scientific Works of Institute of Ceramics and Building Materials – 2012 – 5(11). – P. 88–100.
11. Ściążko M. Zalety i wady współspalania biomasy w kotłach energetycznych na tle doświadczeń eksploatacyjnych pierwszego roku współspalania biomasy na skalę przemysłową / J. Zuwała, M. Pronobis // Energetyka i Ekologia. 2006. – P. 207–220.
12. Bohdziewicz J. Kinetyka chemiczna fermentacji metanowej makuchu rzepakowego. / K. Piotrowski, J. Cebula // Ekoenergetyka – Biogaz. Wyniki badań, technologie, prawo i ekonomika w rejonie Morza Bałtyckiego, edited by: A. Cenian, J. Gołaszewski, T. Noch, Wydawnictwo Gdańskiej Szkoły Wyższej. Gdańsk, 2012. – P. 24–27.
13. Wang J. Kinetic models for fermentative hydrogen production: / W. Wan //A review, Int. J. Hydr. Energy. – 2009 – 34. –P. 3313 – 3323.

У статті наведено результати експерименту метанового бродіння кавових відходів. Експериментальні дані були оброблені за допомогою кінетичної моделі Гомперца.

З'ясовано, що збільшення у 10-разів навантаження реактора 5-50 г/дм³ призводить до пропорційного зростання виділення біогазу H_{max} від 421,94 до 4119,37 см³. Також відбувається прискорення швидкості процесу виділення біогазу R_{max} від 1,0745 до 10,7379 см³/год. Результати свідчать, що продуктивність одного реактора (на 1 г сирої, сухої і сухої органічної мас) зменшується, однак, встановлено, що зі збільшенням навантаження реактора в 5-30 г/дм³, діапазон швидкості процесу практично не змінюється, тобто не залежить від навантаження.

Зернова кава, утилізація відходів, біогаз, метанове бродіння, кінетика, модифікована Гомперц модель

В статье представлены результаты эксперимента метанового брожения кофейных отходов. Экспериментальные данные были обработаны с помощью кинетической модели Гомперца.

Определено, что увеличение в 10 раз нагрузки реактора 5-50 г/дм³ приводит к пропорциональному росту выделения биогаза H_{max} от 421,94 до 4119,37 см³. Также, происходит ускорение процесса выделения биогаза R_{max} от 1,0745 до 10,7379 см³/ч.

Результаты свидетельствуют, что производительность одного реактора (на 1 г сырой, сухой и сухой органической масс) уменьшается, однако, установлено, что с увеличением нагрузки реактора в 5-30 г/дм³, диапазон скорости процесса практически не меняется, то есть не зависит от нагрузки.

Зерновой кофе, утилизация жмыховых отходов, биогаз, метановое брожение, кинетика, модифицированная Гомперц-модель.

QUALITY EVALUATION CONDITIONS FOR MUSHROOMS SHAPKOVYH ENVIROMENT AND MODERN BIOTECHNOLOGICAL PROCESSES

***O. A. Boyko, Candidate of Biological Sciences
National University of Life and Environmental Sciences of Ukraine***

The research results of quality of Basidiomycetes mushrooms grown in various conditions of external environment are given in this article. Thus considerable attention was given to mushrooms in natural biocenoses of Polissya, Forest-steppe and other ecological biocenoses. Their spreading, targeted studies were performed with the assessment of quality of different types of mushrooms involved in biotechnological processes at various levels of complexity. Ttraditional and modern molecular-biological methods for studying the mushrooms growth and development, mycelium quality , spores morphology conducting diagnosis of bacteria, viruses and fungi, which often reduces the basidiomycetes yield on 55-100 %.

Basidiomycetes, biotechnological processes, bacteria, viruses, producers, environmental conditions, biochemicals

To date period of mushrooming in Ukraine arose several problems to quality of raw mushrooms for various industries: food, pharmaceutical, biotechnological direction [1]. Given that mushroom production should be included in the overall national economic structure [5], which has more than 96 public and private specialized companies, there is a complex problem of assessing the quality of fruiting bodies of fungi in various conditions of cultivation.

A major threat to the cultivation of basidiomycetes is a complex disease, which sometimes actually controlled only by their appearance - habit fruiting bodies. This migration is often the primary mycelium from latent infection to full-fledged fungi researchers observed only for complete formation of fruiting bodies. These mushrooms have: local brown spots, blackening shapynok full deformation and rotting fruit bodies, washiness legs, "crater" local cavity, etc. [2].

It noted that basidiomycetes in natural biocenoses (Shatsky National Park, Polesie and transition area to the forest-steppe Zhytomyr region, "Ismail Islands» Odesa oblast and others) have fewer types of infections caused by pathogens of various taxonomic groups than those grown in biotechnology processes. Thus they become carriers of pathogens that are

"abandoned" because of the soil, irrigation system, the use of raw materials plants and pumping air mass.

It's revealed that mushrooms in open ground are sorbents toxins, radionuclides, cosmic dust, small remnants of meteorites, which in turn may be the enigmatic "nanobacterium" [3]. Whereas with mushrooms under certain conditions, released ten milligrams of purified "spherical" viruses, and even more is possible to obtain a concentrated bacterial suspension raises the possibility of using such fungi in forming drugs and stimulants of growth and development of crops, the use of fruiting bodies of certain species for food purposes.

It should be noted that the quality of fungi based on their central diagnostic control pathogens of various taxonomic groups in Ukraine is almost not made. Moreover, often for different reasons industrials grow mushrooms poor quality. Also investigated, for example the identification of specific virus fungi (MVX) for various reasons, sometimes difficult to carry out based on molecular methods for its detection. However, the virus is able to reduce the quality of the fruit bodies [6].

The aim of research was directed to the appropriate control infections in basidiomycetes who were involved in biotechnological processes (transformed environment) and those that are common in natural ecological community. This work included different methodological approaches, the development of which is used in mycology, virology and microbiology. For these studies, we used a number of targets, which were based on the development of new methods of diagnosis of pathogens, studying growth and development of fungi species [3].

Materials and methods of research. The material served basidiomycetes diverse studies that were common in different climatic regions [5] and the types of fungi involved in production. The latter include: different types of mushrooms, oyster mushroom, tinder varnished, raincoat ribbed, *Suillus bovinus* (grid) and others. By defining common diseases of mushrooms in% used the famous formula applied production workers:

$$p = \frac{n \times 100}{N},$$

where p - distribution; N - total number of fruiting bodies; n - the number of affected fruit bodies.

Mushrooms were collected and monitored in terms of production and in different climatic zones within 10 years or more. The study area was divided into 10 plots (10 m² each). In industrial and laboratory determined: morphology, size, color of spores in shapynkah symptoms, external status legs mushrooms (especially basal part), the state of samples of mushrooms, soil cover surrounding plants.

For in-depth study of samples of fungi and plants involved in the work: nutritional environment modeling objects (healthy) mushrooms, electronic and fluorescent microscopy, electrophoresis structural proteins specific RNA containing viruses that have been identified based on known

methods; ELISA method Uhterloni, biological testing for indicator plant, titration of bacteriophages on agar layers (Grace); for the release of biochemical compounds mushroom growth stimulants and Development ("boa", "Bioekofunhe -1") crops used fruiting bodies and mycelia on the basis of quality indicators that were developed by us in the diverse problems [2,4].

Recently, experiments with fungi of various taxonomic groups we have developed and applied a method of rapid detection of pathogens. The method consists in the fact that the object contrast salts of heavy metals occurs directly in the cell shapynky, legs, a layer of mycelium with further study of the object in the electron microscope [3]. The method is widely used in specialized laboratories. He, as reflected in our experiments can be used to identify bacteriophages in aharovanomu layer while studying fahoterapiyi.

The paper also used the phenomenon of color change spores in some species of basidiomycetes for the destruction of the conditions of latent infection. As our research shows this phenomenon clearly visible especially in different kinds of mushrooms.

Results. Analysis of the quality of mushrooms (Basidiomycetes) based on diverse experiences allows to draw some conclusion on the results.

It's revealed that this group of fungi is extremely sensitive to environmental factors, at which fungi pathogens affects different taxonomic groups. In the production environment basidiomycetes require deeper multidimensional analyzes that are able to bring specialists producers to increase yield and quality of fruit bodies. Growth and development of fungi in a transformed environment shows that the appearance of fungi infections often begin with uncontrolled inoculum (mycelium). Under these conditions in fungi "programmed" reduction in yield 1,5-3,0 times. In natural biocenoses different types of fungi in less infected with pathogens than those involved in biotechnology.

Note that basidiomycetes have "their" pathogens that have occurred in the evolution and such that are listed in biotechnological processes mushrooming as a result of biological contamination. In our opinion the first to include: virus type with a cubic symmetry ("Sphere"), which affects mushrooms, oyster mushroom, which include a group of viruses (Totiviridae); bacterium *Pseudomonas fluorescens* (biom. G - syn. *tolaasii*). Provided also short bacteriophage tail shoot (Podoviridae); microscopic fungi *Mycogone pernicioso*, *Verticillium fungicola* and others.

It remains partly mysterious falling into the workflow growing mushrooms potyvirus, poteksvirusu, STM, karlavirusu and other pathogens (see. Table).

The results of different methods of pathogen detection in assessing the quality of mushrooms

Тест	Об`єкт дослідження	Результати
ІФА	плодові тіла печериць (часто при ґрунтовій поверхні)	ВТМ, потівірус, карлавірус
Експрес-метод (див. метод)	плодові тіла грибів (печериці, глива звичайна та їх міцелій, козяк (решітка) та ін.	різні патогени та їх фрагменти (бактерії, фаги (<i>Podoviridae</i>), мікроскопічні гриби, віруси – рабдоподібні, бацилоподібні, паличкоподібні)
Електрофорез структурних білків	печериці	РНК-вмісний вірус (<i>Totiviridae</i>)
Ухтерлоні	<i>Helix pomatia</i> після харчування на інфікованому ВТМ подорожнику та печериці	«придорожній» ізолят – ВТМ (Tobamovirus)
Рослини-індикатори	ніжки плодових тіл грибів в зоні ґрунту	реакція на ВТМ – некрози на <i>Datura stramonium</i> ; поті вірус – <i>D. metel</i> – хлоротичність; карлавірус – <i>Nicotiana debney</i> – хлоротичні некрози; потексвірус – в основному хлоротичність на <i>D. stramonium</i>

Conclusions. Thus, basidiomycetes during their growing pathogens affects different taxonomic groups that significantly reduce the quality and yield of mushrooms. For productive fruiting bodies should use healthy seed. For the purpose of disease prevention measures is necessary to combat pathogens, timely diagnosis of pathogens, culling sick fruiting bodies, the use of biological agents antypatohennyh ("BOA"), selection of disease resistant species and strains of fungi.

Список літератури

1. Бухало А. С. Высшие съедобные базидиомицеты в чистой культуре / А. С. Бухало // – К.: Наук. думка, 1988. – 180 с.
2. Бойко О. А. Екологія та діагностика вірусних хвороб печериць / О. А. Бойко. – К.: Фітосоціоцентр, 1999. – 24 с.
3. Бойко О. А. Морфологія та структурні особливості патогенів *Basidiomycetes* / О. А. Бойко, Т. П. Шевченко, А. А. Бойко // Мікробіологічний журнал. – 2013. – Т.75. - №3. – С. 54-59.
4. Пат. 53983 Україна, АОІС 21/00 СО5F 11/00. Композиція біохімічних речовин для стимуляції продуктивності та захисту від хвороб сільськогосподарських рослин / О. А. Бойко, М. Д. Мельничук, А. Л. Бойко, І. П. Григорюк, В. О. Дубровін – № u201004473 – заявка 16.04.2010; опубл. 25.10.2010, Бюл. №20.
5. Циліурік А. В. Грибы лесных биоценозов / А. В. Циліурік, С. В. Шевченко – К.: Выша школа. Атлас, 1989. – 256 с.
6. Іванова Т. В. Ідентифікація міковірусів печериці двоспорової (*Agaricus bisporus* (J.Lge) Imbach) / Т. В. Іванова // III Всеукраїнська наук. – практ. конф. студ., аспір. та молод. Вчених «Біотехнологія: звершення та надії», 15-16 травня 2014. – м. Київ, 2014. – С.26-27.

В работе поданы результаты исследования качества грибов базидиомицетов, выращенных в различных условиях внешней среды. При этом значительное внимание было уделено грибам природных биоценозов Полесья, Лесостепи и других экологических биоценозов их распространение. Целенаправленные исследования были выполнены с оценкой качества различных видов грибов, которые выращивались в биотехнологических процессах различного уровня сложности. В опытах применялись традиционные и современные молекулярно-биологические методы изучения роста и развития грибов, качества мицелия, морфологии спор, проведения диагностики бактерий, вирусов и микроскопических грибов, которые часто снижали урожай базидиомицетов на 55-100 %.

Базидиомицеты, биотехнологический процесс, бактерии, вирусы, продуценты, экологические условия, биохимические вещества

The research results of quality of Basidiomycetes mushrooms grown in various conditions of external environment are given in this article. Thus considerable attention was given to mushrooms in natural biocenoses of Polissya, Forest-steppe and other ecological biocenoses. Their spreading, targeted studies were performed with the assessment of quality of different types of mushrooms involved in biotechnological processes at various levels of complexity. Traditional and modern molecular-biological methods for studying the mushrooms growth and development, mycelium quality ,

spores morphology conducting diagnosis of bacteria, viruses and fungi, which often reduces the basidiomycetes yield on 55-100 %.

Basidiomycetes, biotechnological processes, bacteria, viruses, producers, environmental conditions, biochemicals

i

**MICROFLORA ANALYSIS OF SOIL FOR MICROBOIOLOGICAL AGENTS IN AGROCENOSSES
Solanum Tuberosum L. B YMOBAX KARPAT**

**V. V. BORODAI, Candidate of Biological Sciences,
National University of Life and Environmental Sciences of Ukraine,
T. V. DANILKOVA, applicant *, Head of methodological prediction State Phytosanitary Inspection
Lviv region,
V. A. KOLTUNOV, doctor of agricultural sciences, professor
Kyiv National Trade and Economic University**

Application of biological preparations Fitotsid, Planriz, Diazofit and Fosfoenterin for preplant seed tubers and spraying of the plants during the growing season contributed to the reduction in the density of the soil pathogens of the genus Fusarium and Alternaria in 1,8-3,6 times, increasing the total number of bacteria, micromycetes Trichoderma spp. The combined using of Planriz and Reed Gold compared to one fungicide was more effective.

***Solanum tuberosum* L., phytopathogenic fungi, microbiological preparations**

Special conditions Carpathians, in Ukraine as the only exogenous complex, characterized by different altitudinal location within a small area, recently widely used by Ukrainian scientists to intensify breeding potatoes [4]. Despite significant advances in this direction, the problem of preserving the quality of propagating material remain relevant. One of the main reasons that lower commodity quality tubers and cause great losses during transportation and storage is the destruction of potato pathogens [4, 5, 7]. Using modern technologies of microbiological agents can increase plant resistance to pathogens, productivity and product quality and promotes recovery agrocnosis from harmful chemicals [1, 3, 5, 7]. Malovychenymy are the impact of biologics on changes in soil pathogens agrocnoses potato (*Solanum tuberosum* L.).

The aim of research was to study the characteristics of soil microbial groups for potato growing under the influence of biological products and mixtures Planryz drugs Planryz + + Diazofit FMB. To achieve the goal task was to conduct a comparative assessment of the value nesporovyh and sporoutvoryuvalnyh bacteria, actinomycetes, fungi pathogenic and saprophytic conditions in Carpathians Lviv region during the early growing varieties Treasury and middle grade Lily depending on processing biological products, timing of planting.

Materials and methods of research. The study was conducted during 2009-2012. Studied the biological Planryz - based on the bacteria *Pseudomonas fluorescens* strain AR-33, 2.0 l / ha Diazofit (active substance - bacteria *Agrobacterium radiobacter*, 0,2 l / ha) Fosforoenteryn - biological products based phosphorus bacteria *Enterobacter nimipressuralis* 32-3 (FMB- fosfomobilizator 0.2 l / ha). As a biological control used Fitotsyd (based on *Bacillus subtilis*, 1 l / ha), chemical - Rydomil Gold MTS68 WG, 2,5 l / ha. Drugs tubers treated before planting, before laying on storage and during budding - plants. Experiments carried out by the first (27-30 April) and second (12-15 May) terms of landing. To study the microflora of the soil, the method of successive dilutions soil suspension took on elective nutrient medium further records colonies, studying morphological and cultural properties of selected isolates [1, 6]. Statistical analysis of the data was performed by the computer program Excel.

Results. Members of the genus *Fusarium* and *Alternaria* were the most common among pathogenic Micromycetes spring before planting the tubers, including saprophytes - *Penicillium* spp., *Aspergillus* spp., Predstavnyky genus *Trichoderma* (Table 1, 2). The use of microbiological agents Fitotsydu, Planryzu, Diazofitu and Fosforoenterynu helped reduce infectious load (ie the number of the genera *Fusarium* and *Alternaria*) in the soil for growing potatoes compared with control in Lily grade average in 1,2-2,7 times, sort Treasury - in 1,3-3,6 times. Investigated biological Planryz and the mixture Planryzu, Diazofitu and Fosforoenterynu basically proved effective for biological control Fitotsyd.

Increased pesticide load leads to reduction in the number of eco-trophic groups of microorganisms, greatly changing the ratio between them, resulting in a violation of functional connections in Agrosystem, reduced soil biological activity [7]. The number of pathogens *Alternaria* and *Fusarium* fungicide for use of the chemical in the soil Rydomil Gold slightly decreased compared to controls (respectively 3,5-6,0 thousand. / G to 4,1-7,7 thousand. / G in control). Biologicals Planryz that used in a mixture with chemical fungicide Rydomil Gold MC, improved efficiency of the latter, while the number of pathogens in the soil during the growing variety Lily dropped on average for the first period of landing in 1.3-1.5 times by second - in 2,4-2,9 times, sort Treasury - in 1,4-2,4 times.

Chemical fertilizers can be used in rotation to enhance supressyvnosti in relation to soil pathogens.

Supressyvny soil associated with active development of saprotrophic microorganisms, such as fungi of the genus *Trichoderma* spp., producing antibiotics and hydrolytic enzymes able to inhibit the growth of pathogens [3, 5, 7]. Analysis showed increasing soil microorganism pool *Micromycetes Trichoderma* spp. for the use of biologics.

Conclusions. The use of microbiological agents *Fitotsydu*, *Planryzu*, *Diazofitu* and *Fosforoenterynu* in the Carpathian Lviv region helped reduce infectious load (ie the number of the genera *Fusarium* and *Alternaria*) in the soil during the cultivation of potatoes. When combined use *Planryzu* and *Rydomilu Gold MC* observed decrease of pathogens in comparison with other fungicide.

Список літератури

1. Тихонович И. А. Биопрепараты в сельском хозяйстве. (Методология и практика применения микроорганизмов в растениеводстве и кормопроизводстве) / И. А. Тихонович, А. П. Кожемяков, В. К. Чеботарь [и др.]. – М.: Россельхозакадемия, 2005. – 154 с.
2. Бородай В. В. Ефективність застосування біопрепаратів при вирощуванні картоплі залежно від строків садіння, ґрунтового-кліматичної зони в умовах Львівської області // В. В. Бородай, Т. В. Данілкова, В. А. Колтунов // Новітні технології вирощування сільськогосподарських культур: зб. наук. Праць – В.14 – К., 2012. – с. 141-145.
3. Волкогон В. В. Біопрепарати комплексної дії при вирощуванні картоплі / В. В. Волкогон, С. Б. Дімова // Вісн. аграр. науки. — 2005. — №10. — С. 29-32.
4. Бондарчук А.А. Картопля: вирощування, якість, збереженість /А. А. Бондарчук, В. А. Колтунов, О. А. Кравченко [та ін.];УААН, Ін-т картоплярства. – К.: Вид. компанія “КИТ”, 2009. – 232 с.
5. Курдиш І. К. Перспектива застосування мікробів-антагоністів у захисті агроєкосистем від фітопатогенів / І. К. Курдиш // Сільськогосподарська мікробіологія: зб. наук. праць. – Чернігів: ЦНТЕІ, 2011. – Вип.13. – С. 23-41.
6. Методы почвенной микробиологии и биохимии / Под ред. Д. Г. Звягинцева // М.: МГУ, 1991. – 304 с.
7. Патика В. П. Екологічні основи застосування біологічних засобів захисту рослин як альтернативи хімічним пестицидам / В. П. Патика, Т. Г. Омелянець // Агроєкологічний журнал. – 2005. – № 2. – С.21–24.

Применение биопрепаратов Фитоцида, Планриза, Диазофита и Фосфоэнтерина для предпосадочной обработки семенных клубней и последующего опрыскивания растений в период вегетации способствовало снижению плотности в почве возбудителей рода Fusarium и Alternaria в 1,8-3,6 раза, увеличению общего количества бактерий, микромицетов Trichoderma spp. Совместное применение Планриза и Ридомила Голд оказалось более эффективным.

Solanum tuberosum L., фитопатогенные микромицеты, микробиологические препараты

**1. The impact of biologics on soil microflora during the growing season potatoes
(sort Skarbnitsa, Skolivckiy area, Karpaty, Lviv region, 2009-2011 pp.)**

Number of microorganisms in 1 g ground, x 10 ³ KYO/g											
Version of experiment	Total	Sproro-forming bacteria	Non sproro-forming bacteria	Actino-mycetes	Мікроміцети						
					Total	Alter-naria sp.	Fusa-rium sp.	Tricho-derma sp.	Peni-cillium sp.	Asper-gillus spp.	
1 term planting											
Before planting tubers		245,1	18,4	203,1	11,0	12,6	3,8	2,0	3,7	1,9	1,2
During budding	Control (without treatment)	429,7	27,1	363,0	16,1	23,5	6,8	4,1	7,2	3,8	1,6
	Biological control (Fitotsyd)	438,3	29,2	376,3	18,3	14,5	3,7	2,8	6,6	1,4	0,0
	Chemical control, Gold Rydomil	302,4	15,4	256,5	13,4	17,1	5,6	4,1	2,2	2,9	2,3
	Planriz	481,0	23,1	423,6	19,1	15,2	1,9	2,0	8,1	0,9	2,3
	Planryz + Diazofit +FMB	481,9	27,6	420,0	20,7	13,6	2,8	2,0	7,3	1,5	0,5
	Planryz + Rydomil Gold MLQ 68 WG	432,4	15,8	384,0	17,5	15,1	2,8	2,9	5,6	1,4	2,4
	HIP ₀₅	0,21	0,10	0,11	0,07	0,05	0,01	0,03	0,01	0,02	0,03
2 term planting											
Before planting tubers		212,2	12,1	181,2	10,4	8,5	2,3	1,5	3,2	1,2	0,3
During budding	Control (without treatment)	402,4	24,1	340,5	17,0	20,8	5,2	3,6	6,9	3,5	1,6
	Biological control (Fitotsyd)	444,1	25,3	384,1	22,3	12,4	3,1	2,3	5,7	1,1	0,2
	Chemical control, Gold Rydomil	311,2	14,3	271,5	11,3	14,1	5,0	3,6	1,4	2,4	1,7
	Planriz	463,2	22,3	405,1	21,5	14,3	1,9	2,0	8,1	0,0	2,3
	Planryz + Diazofit +FMB	474,1	23,0	413,9	23,0	14,2	3,8	2,8	6,4	1,1	0,1
	Planryz + Rydomil Gold MLQ 68 WG	408,4	15,5	364,2	17,3	11,4	2,2	2,5	3,6	1,0	2,1
	HIP ₀₅	0,14	0,18	0,09	0,10	0,11	0,09	0,04	0,02	0,03	0,05

**2. The impact of biologics on soil microflora during the growing season potatoes
(sort Lileya, Skolivckiy area, Karpaty, Lviv region, 2009-2011 pp.)**

Number of microorganisms in 1 g ground, x 10 ³ КУО/g											
Version of experiment		Total	Sproro- forming bacteria	Non sproro- forming bacteria	Actino- mycetes	Мікроміцети					
						Total	<i>Alter- naria sp.</i>	<i>Fusa- rium sp.</i>	<i>Tricho- derma sp.</i>	<i>Peni- cillium sp.</i>	<i>Asper- gillus spp.</i>
1 строк садіння											
Before planting tubers		231,1	13,4	194,5	12,3	10,9	3,5	1,9	2,2	2,6	0,7
During budding	Control (without treatment)	315,8	25,1	256,1	14,7	19,9	6,2	4,1	3,3	4,1	2,2
	Biological control (Fitotsyd)	425,6	29,3	367,0	17,2	12,1	5,1	1,9	3,0	2,1	0,0
	Chemical control, Gold Rydomil	289,9	20,1	239,3	13,8	16,7	6,0	3,5	0,3	2,7	4,2
	Planriz	422,2	25,3	371,2	14,3	11,4	2,3	2,9	3,1	3,1	0,0
	Planryz + Diazofit +FMB	475,8	24,9	421,3	20,4	9,2	2,8	0,0	3,4	3,0	0,0
	Planryz + Rydomil Gold ML 68 WG	380,5	24,7	326,5	13,7	15,6	4,1	3,2	2,1	3,8	2,4
	HIP ₀₅	0,15	0,10	0,11	0,09	0,03	0,02	0,01	0,04	0,02	0,01
2 строк садіння											
Before planting tubers		269,0	15,6	231,0	12,4	10,0	2,7	1,6	1,5	1,8	2,4
During budding	Control (without treatment)	474,1	31,2	412,7	13,8	18,4	7,7	5,1	2,2	1,5	1,9
	Biological control (Fitotsyd)	483,3	29,8	423,8	17,6	12,1	3,8	3,8	2,6	1,9	0,0
	Chemical control, Gold Rydomil	397,3	21,6	349,0	13,4	13,3	5,4	4,1	1,5	0,0	2,3
	Planriz	515,6	30,3	454,8	16,2	15,3	4,4	2,9	2,8	3,3	1,9
	Planryz + Diazofit +FMB	489,2	32,1	423,6	19,9	13,6	4,3	3,5	2,6	2,7	0,5
	Planryz + Rydomil Gold	417,3	24,7	367,1	15,5	10,0	2,7	2,1	1,8	1,6	1,8
	HIP ₀₅	0,17	0,11	0,16	0,11	0,08	0,02	0,01	0,03	0,02	0,03

**DETERMINATION OF THE DYNAMIC PROPERTIES OF THE CEREAL
LAYER IN HD CONVECTIVE EFFECTS**

***D. A. BUDNIKOV, Candidate of Technical Sciences
FGBNU VIECH (c. Moscow)***

Implementation of energy saving process postharvest processing of grain due to the construction of automatic control systems for the effective operation of which requires knowledge of the behavior of the material being processed under the influence factors used. The absence of these data leads to a waste of energy, as well as the decline in the quality of the final product. In this case, drying is often one of the most processes in the production of cereals. This study aimed at obtaining the dynamic properties of the grain mass during drying by electromagnetic waves.

Microwave-convective drying, postharvest handling, dynamic properties, identification.

For the construction of optimal designs of energy-saving facilities for drying agricultural products need to have an understanding of the dynamic properties of the treated object. The absence of these data leads to a waste of energy, and reduce the quality of the final product. Thus, the information that the drying is one of the most energy intensive processes in the production of grain that determines the relevance of the study.

Studies on the dynamic properties of granular materials during the drying process are conducted to a particular plant type. So now there are data obtained for the mine dryers, active ventilation systems and other [1-5]. The researchers obtained dynamic characteristics, and regression models for the large number of crops. Scientists of the University of California and the Western Regional Research Center (USA) shows the dependence to describe the process of drying rice varieties different in a thin layer [4]. Ongoing studies [2-5], can judge that for the development of control systems of drying equipment necessary to conduct a detailed study of different cultures under the influence of the whole variety of existing factors affecting grain material in the drying process. Of great interest is the use of microwave-convection effects, although data on the behavior of the grain layer in such a treatment is not yet complete. This is due to the fact that the installation of this type has not yet been widely used due to low productivity, increased requirements for the qualification of staff, etc.

The purpose of research - to provide the dynamic properties of the grain layer in a microwave-convective impact and purpose of the article - to show the results obtained in the microwave convection drying. In this grain

layer acts as the control object, and expressed in some form information about the most important characteristics of a model object.

The cereal layer as the control object is a dynamic object, i.e. object, whose output depends not only on the current values of the input signal, but also from their values at the previous times.

Materials and methods of research. Analysis of dynamic characteristics was performed for a fixed grain dense layer subjected to the effects of convection microwave. Scheme of laboratory setup is shown in Fig. 1. Position the following parameters: the size of the zone of microwave and convective effects, filled with grain $200 \times 200 \times 300$ mm, power = 900W magnetron Pc, a filtration rate of air through the grain layer $V = 0.6$ m / s. Experimental conditions: outdoor temperature (drying agent) $T = 18 \square S$, the crops - wheat, grain moisture content of the material $W = 12 \div 20\%$ in increments of 2%; Ventilation is carried out continuously, the impact of microwave field was carried out in pulsed mode (5 SHF on, 10 off). The specific power of the electromagnetic field dissipated at a particular point, is determined depending on initial moisture content of the processed material. The response as a function of the selected temperature of the grain material.

To determine the power density at a particular point has been developed "Apparatus for determining the specific power of the electromagnetic field of the microwave emitted into the grain bed" (Fig. 2).

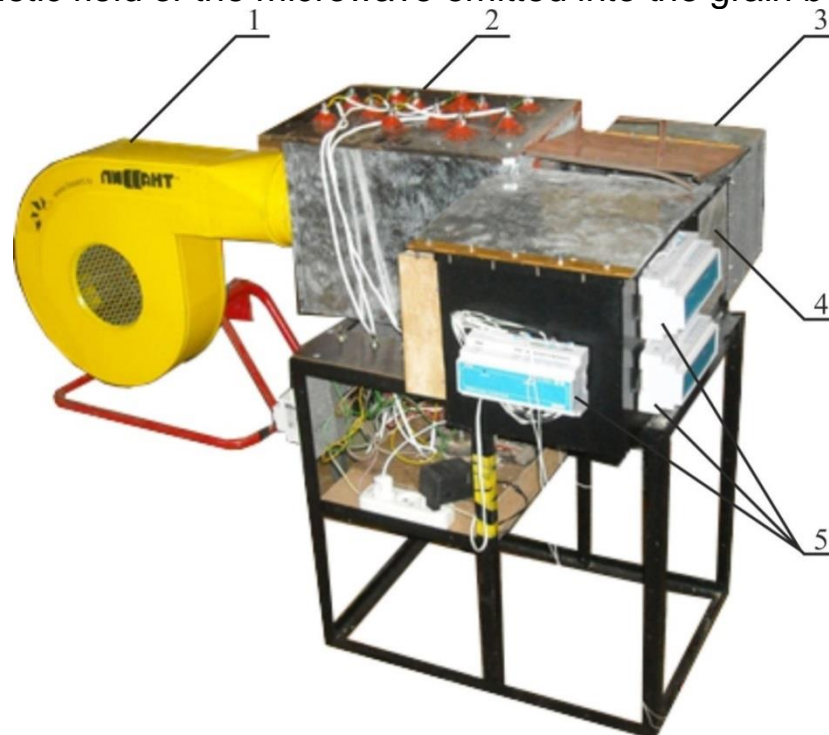


Fig. 1. Laboratory installation: 1 - blowing fan; 2 - unit heaters; 3 - magnetron; 4 - zone convection microwave exposure; 5 - signal acquisition modules

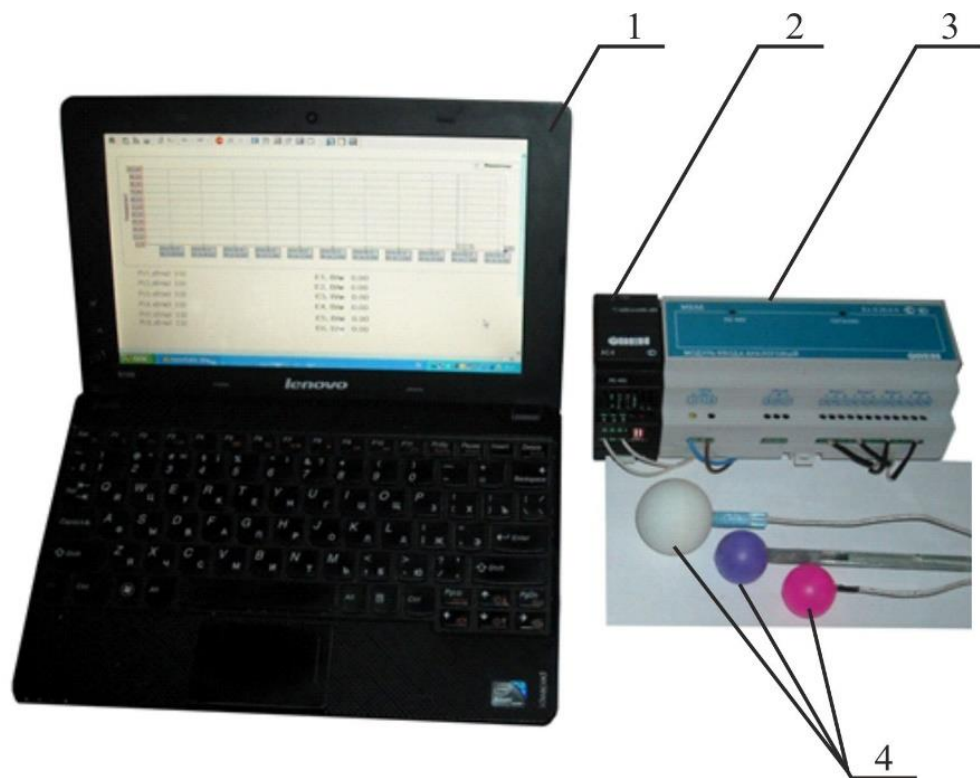


Fig. 2. Apparatus for determining the specific power of the electromagnetic field of the microwave emitted into the grain layer:

- 1 - PC, which implements the algorithm of measurement;**
- 2 - interface converter;**
- 3 - input module signals (up to 8 sensors);**
- 4 - Sensors**

Fig. 3 shows the arrangement of the temperature sensors during the experiment. The distances between adjacent sensors equal to $L = 50$ mm, the horizontal distance to the input screen of the microwave field was made of 70 mm, $A = 70$ mm $B = 45$ mm. Theoretical background of the scheme described in [6-7].

Processing the results of experiments conducted in Matlab package using System Identification Toolbox. The experimental data were recorded in csv - file format, which is supported by Matlab for data import. Then carried out a preliminary processing of the signals of the object, the removal of any DC component and ask the data range. For the analysis of parametric models were constructed (parametric model) of ARX-model (AutoRegressive with eXternal input) of different levels according to the procedures described in [8-11].

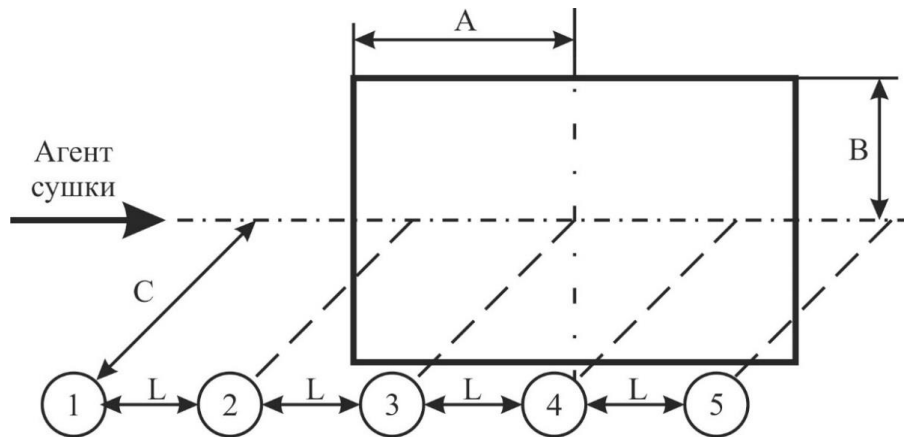


Fig. 3. Scheme of the sensors

The results of research. An example of the measurement results is shown in Fig. 4.

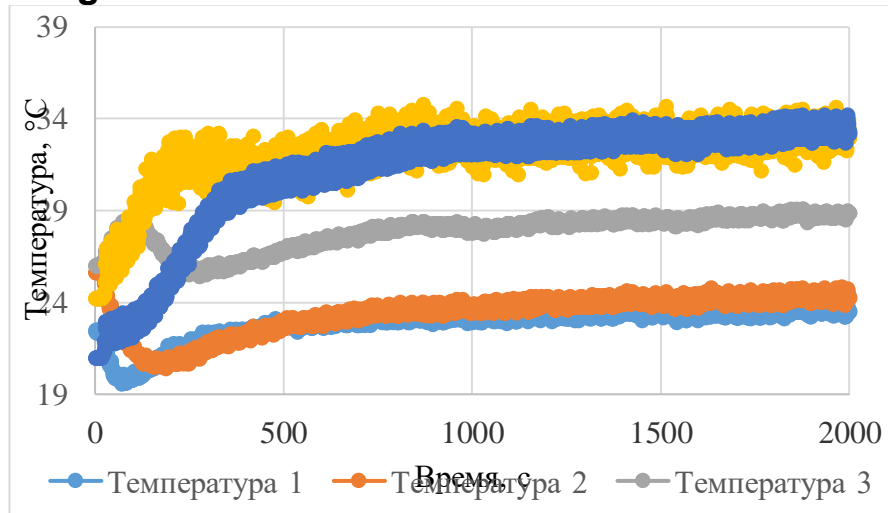


Fig. 4. Results of the experiment at W = 18%

ARX-the model can be represented as:

$$A(z)y(t)=B(z)u(t)+e(t), \quad (1)$$

or in expanded form:

$$y(t)+a_1y(t-1)+\dots+a_ny(t-n)=b_1u(t)+b_2u(t-1)+\dots+b_nu(t-m)+e(t), \quad (2)$$

Further analyzes were polynomial transfer functions. General view of the transfer function of a Process Models is:

$$G(s) = \frac{Kp}{1+Tp1\cdot s} \cdot e^{-Td\cdot s}. \quad (3)$$

Example coefficients for it is shown in Table 1.

At the final stage of the order we assessed the parametric model, comparison of models and assess their adequacy. Models describing the dynamic properties of the layer during microwave wheat convective effects resulting from analysis of the experimental data partially shown in Table 2.

1. Coefficients Process Models for grain layer

W,%	№ of sensor	Kp	Tp1	Td
16	1	0,54795	935,59	23,935
16	2	0,68909	527,15	11,765
16	3	0,048423	189,0945	12,523
16	4	0,12185	121,3217	0
16	5	0,945976	217,8842	27,169

EXAMPLE transfer functions obtained for cereal layer is shown in Table 3.

2. Results polynomial analysis in System Identification Toolbox

W, %		Type of model		
№ of sensor		arx441	arx332	
arx223				
12	1	$A(z)=1-1,287z^{-1}+0,429z^{-2}-0,2159z^{-3}+0,09211z^{-4}$ $B(z)=0,0006701z^{-1}-0,0003012z^{-2}-0,0002491z^{-3}-0,0005811z^{-4}$	$A(z)=1-1,342z^{-1}+0,430z^{-2}-0,07237z^{-3}$ $B(z)=0,0001748z^{-2}-0,0002074z^{-3}-0,0006489z^{-4}$	$A(z)=1-1,336z^{-1}+0,3525z^{-2}$ $B(z)=0,0001427z^{-3}-0,0006153z^{-4}$
12	2	$A(z)=1-1,346z^{-1}+0,5244z^{-2}-0,2514z^{-3}+0,09399z^{-4}$ $B(z)=0,00003436z^{-1}-0,00003296z^{-2}-0,00002616z^{-3}-0,00007604z^{-4}$	$A(z)=1-1,373z^{-1}+0,498z^{-2}-0,1049z^{-3}$ $B(z)=0,00005863z^{-2}-0,001846z^{-3}-0,00008234z^{-4}$	$A(z)=1-1,322z^{-1}+0,3444z^{-2}$ $B(z)=0,0003183z^{-3}-0,00007325z^{-4}$
12	3	$A(z)=1-1,344z^{-1}+0,555z^{-2}-0,2907z^{-3}+0,09358z^{-4}$ $B(z)=0,00004234z^{-1}+0,00000724z^{-2}-0,00001376z^{-3}-0,00003747z^{-4}$	$A(z)=1-1,436z^{-1}+0,5824z^{-2}-0,1334z^{-3}$ $B(z)=0,00002683z^{-2}-0,00001128z^{-3}-0,00003976z^{-4}$	$A(z)=1-1,447z^{-1}+0,4596z^{-2}$ $B(z)=0,00000177z^{-3}-0,00003852z^{-4}$
12	4	$A(z)=1-0,92z^{-1}+0,08925z^{-2}-0,02725z^{-3}+0,1844z^{-4}$ $B(z)=0,00004234z^{-1}+0,00000724z^{-2}-0,00001376z^{-3}-0,00003747z^{-4}$	$A(z)=1-1,279z^{-1}+0,7614z^{-2}-0,4598z^{-3}$ $B(z)=0,0005334z^{-2}-0,0002439z^{-3}-0,0003656z^{-4}$	$A(z)=1-1,507z^{-1}+0,5321z^{-2}$ $B(z)=0,0001467z^{-3}-0,0003056z^{-4}$
12	5	$A(z)=1-1,4z^{-1}+0,5588z^{-2}-0,2327z^{-3}+0,07647z^{-4}$ $B(z)=0,0001911z^{-1}-0,00009827z^{-2}-0,00001106z^{-3}-0,0001852z^{-4}$	$A(z)=1-1,39z^{-1}+0,5242z^{-2}-0,1315z^{-3}$ $B(z)=0,0002345z^{-2}-0,0000083z^{-3}-0,0001699z^{-4}$	$A(z)=1-1,35z^{-1}+0,3521z^{-2}$ $B(z)=0,0002023z^{-3}-0,00008896z^{-4}$
14	1	$A(z)=1-1,546z^{-1}+0,9718z^{-2}-0,6814z^{-3}+0,3435z^{-4}$ $B(z)=0,0004318z^{-1}-0,0001135z^{-2}-0,001354z^{-3}-0,0001852z^{-4}$	$A(z)=1-1,507z^{-1}+0,7711z^{-2}-0,1947z^{-3}$ $B(z)=0,0003982z^{-2}-0,001739z^{-3}+0,0003682z^{-4}$	$A(z)=1-1,404z^{-1}+0,4886z^{-2}$ $B(z)=0,001329z^{-3}+0,0003492z^{-4}$
14	2	$A(z)=1-1,578z^{-1}+0,9435z^{-2}-0,5145z^{-3}+0,2326z^{-4}$ $B(z)=0,00005526z^{-1}-0,0001168z^{-2}-0,00004932z^{-3}+0,00005697z^{-4}$	$A(z)=1-1,543z^{-1}+0,7708z^{-2}-0,1599z^{-3}$ $B(z)=0,0000728z^{-2}-0,0001106z^{-3}+0,00005382z^{-4}$	$A(z)=1-1,476z^{-1}+0,5656z^{-2}$ $B(z)=0,0001585z^{-3}+0,00000815z^{-4}$
14	3	$A(z)=1-1,58z^{-1}+0,907z^{-2}-0,4388z^{-3}+0,1849z^{-4}$ $B(z)=0,0002176z^{-1}-0,0002239z^{-2}-0,0000742z^{-3}-0,000001471z^{-4}$	$A(z)=1-1,45z^{-1}+0,4891z^{-2}+0,01823z^{-3}$ $B(z)=0,00005608z^{-2}-0,00009498z^{-3}+0,000005342z^{-4}$	$A(z)=1-1,451z^{-1}+0,5081z^{-2}$ $B(z)=0,0000952z^{-3}+0,00000253z^{-4}$
14	4	$A(z)=1-1,625z^{-1}+1,051z^{-2}-0,5935z^{-3}+0,1857z^{-4}$ $B(z)=0,000008551z^{-1}-0,00008586z^{-2}+0,00008378z^{-3}-0,00008606z^{-4}$	$A(z)=1-1,571z^{-1}+0,8917z^{-2}-0,3065z^{-3}$ $B(z)=0,00006331z^{-2}+0,00005635z^{-3}-0,00007751z^{-4}$	$A(z)=1-1,441z^{-1}+0,4636z^{-2}$ $B(z)=0,00000345z^{-3}-0,00005538z^{-4}$
14	5	$A(z)=1-1,69z^{-1}+1,148z^{-2}-0,661z^{-3}+0,2059z^{-4}$ $B(z)=0,0005479z^{-1}-0,0006393z^{-2}-0,0002432z^{-3}-0,0004197z^{-4}$	$A(z)=1-1,64z^{-1}+0,9801z^{-2}-0,3386z^{-3}$ $B(z)=0,0008764z^{-2}-0,0003862z^{-3}-0,0004756z^{-4}$	$A(z)=1-1,499z^{-1}+0,5046z^{-2}$ $B(z)=0,001124z^{-3}+0,000003138z^{-4}$

3. The transfer functions for the cereal layer

W,%	№ sensor	Transmission function
18	1	$\frac{0,0007082s + 0,00002612}{s^3 + 0,1965s^2 + 0,01082s + 0,00003605}$
18	2	$\frac{0,0003572s + 0,00000001305}{s^3 + 0,09751s^2 + 0,003184s + 1,281 \cdot 10^{-16}}$
18	3	$\frac{0,0002381s + 0,000004202}{s^3 + 0,1103s^2 + 0,003803s + 0,00004475}$
18	4	$\frac{0,00195s + 0,0000001137}{s^2 + 0,01233s + 6,368 \cdot 10^{-8}}$
18	5	$\frac{0,003081s + 0,0001449}{s^3 + 1,155s^2 + 0,05545s + 0,0001584}$
20	1	$\frac{0,001013s + 0,00001706}{s^3 + 0,5045s^2 + 0,0134s + 0,00002328}$
20	2	$\frac{0,1657s + 0,0003007}{s^3 + 363,9s^2 + 1,901s + 0,00225}$
20	3	$\frac{0,000119s + 0,00000001928}{s^3 + 0,03695s^2 + 0,0014s + 6,386 \cdot 10^{-10}}$
20	4	$\frac{0,0002665s + 0,000007215}{s^3 + 2,489s^2 + 0,03218s + 0,00004237}$
20	5	$\frac{0,0008347s + 0,00003231}{s^3 + 0,3773s^2 + 0,01553s + 0,00003815}$

Conclusions

1. Dynamic properties of grain material vary in thickness from moving in the direction of ventilation at equal values of specific power of the electromagnetic field.
2. Conduct identification of the grain layer, as an object of management, provides a wide range of characteristics: transition, polynomial, frequency, etc.
3. In carrying out the identification of the object you want to monitor the qualitative assessment to determine the most simple relationship with sufficient accuracy describes the process under study.
4. In most cases, the qualitative description (better than 5%) of the cereal layer behavior in the description of the transfer function using ARX-model requires third degree equation.

Список литературы

1. Андрианов Н. М. Идентификация динамических характеристик зерновых сушилок / Н. М. Андрианов // Успехи современного естествознания. – 2003. – № 8 – С. 14-17.
2. Olmos A. Dynamic optimal control of batch rice drying process / A. Olmos, I. Trelea // Drying Technology. – 2002. – 20(7). – P. 1319-1345.

3. Moravej M. K. Investigation of Some Effective Parameters on the Fluidized Bed Grain Dryers / M. K. Moravej // Iranica Journal of Energy & Environment. – 2013 – 4. (4): P. – 391-397.
4. Prakash B. Modeling Moisture Movement in Rice, Advanced Topics in Mass Transfer, / B.Prakash, Z. Pan // Prof. Mohamed El-Amin (Ed.).
5. Bhadra R. Characteristics of Distillers Wet Grains Under Varying Condensed Distillers Solubles and Drying Temperature / R. Bhadra, K. Rosentrater, K. Muthukumarappan, S. Kannadhasan // American Society of Agricultural and Biological Engineers. – 2011. Vol. 27(5). – P. 777-786.
6. Будников Д. А. Поглощение электромагнитного поля СВЧ сельскохозяйственными материалами // Д. А. Будников // Вестник ВИЭСХ. -2013. – №2 (11). – С. 38-40.
7. Будников Д. А. Исследование динамических свойств зернового слоя при СВЧ-конвективном воздействии / Д. А. Будников // Теоретический и научно-практический журнал ФГБНУ ВИЭСХ "Инновации в сельском хозяйстве" – М.: ФГБНУ ВИЭСХ, 2014. – №4(9). – С. 94-98.
8. Льюинг Л. Идентификация систем [Теория для пользователя] / Л. Льюинг – М.: Наука, 1991.
9. Дейч А. М. Методы идентификации динамических объектов / А. М Дейч // – М.: Энергия, 1979. – 240 с.
10. Кашьяп Р. Л. Построение динамических стохастических моделей по экспериментальным данным / Р. Л. Кашьяп, А. Р. Рао – М.: Наука, 1983. – 384 с.
11. Дьяконов В. MATLAB. Анализ, идентификация и моделирование систем. [Специальный справочник] // В. Дьяконов – Питер. – 2001. – 448 с.

Здійснення енергозберігаючого процесу післязбиральної обробки зерна пов'язане з побудовою систем автоматичного керування, для ефективної дії яких необхідна наявність знань про поведінку оброблюваного матеріалу під дією використовуваних факторів. Відсутність цих даних веде до перевитрати енергоресурсів, а також зниження якості кінцевої продукції. Однак сушіння часто є одним з найбільш найенергоємніших процесів за виробництва зернових. Це дослідження спрямоване на отримання динамічних властивостей зернової маси за сушіння під дією електромагнітних хвиль.

НВЧ-конвективна сушка, післязбиральна обробка, динамічні властивості, ідентифікація.

**WATER RESEARCH ANTIMICROBIAL PROPERTIES OF PLANT
EXTRACTS *Galega orientalis* (Lam.)**

**V. V. VLIZLO, Doctor of Veterinary Science, Professor, Academician of
NAANU**

Institute of animal biology NAAN of Ukraine

**L. M. DARMOGRAI, doctor of agricultural sciences, professor
National University of Lviv**

Veterinary Medicine and Biotechnology them. SZ Gzhytsky

**M. V. GONCHAR, Doctor of Biological Sciences professor
Institute of Cell Biology NAN of Ukraine**

It was first conducted testing on antimicrobial activity of Galega orientalis (Lam.) on the growth pure cultural of bacteria gram positive (Micrococcus luteus), gram negative (Escherichia coli XL1, DH5) and yeasts (Saccharomyces cerevisiae W303). The material for the study was dried vegetative mass Galega orientalis (Lam) in the phase of budding and early flowering. As a result of the experiment was revealed that 20 % concentration of aqueous extract of this plant had inhibitory effects on the growth of pure cultures of bacteria and yeast. It has proved possible relationship between the antimicrobial activity of the extract of this plant and bloating of the rumen in ruminants.

Galega orientalis (Lam), water extract, Escherichia coli, Micrococcus luteus, Saccharomyces cerevisiae

In the scientific world, the search for new and more consistently-strong antimicrobial action of components of natural origin in contrast to existing synthetic antibiotics and enhance microbiological purity of food, feed additives. According to the publication of domestic and foreign authors is considerable interest in the study of antimicrobial activity unconventional but promising agriculture, one of which is Galega orientalis (Lam.), Which belongs to the perennial legumes [1, 3, 4, 5, 6].

The use of natural substances with antimicrobial action, is very important due to several issues: the microorganisms no resistance to them and the possible long-term use; not cause harmful (negative) effect on humans and animals; due to its braking action on unwelcome flora can be used in food, because food production is not allowed to use synthetic antibiotics (except peptide antibiotic nizynu).

The aim of research was to test the possible antimicrobial activity of water extracts of Galega orientalis (Lam) on the model of pure cultures of

bacteria, Gram-positive (*Micrococcus luteus*), Gram-negative (*Escherichia coli* XL1, DH5) and yeast (*Saccharomyces cerevisiae* W303).

Materials and methods of research. The material for the study served dried vegetative mass of plants in the phases of budding and early flowering. In experiments using Endo environment for the growth of gram-negative bacteria and medium LB, which grow both gram-positive and gram-negative bacteria and wort-agar for yeast. Research conducted at the Institute of Cell Biology NAS of Ukraine, Department of Analytical Biotechnology.

Prepared 10% and 20% extract preparation (dried grass) for boiling and infusion within 10-15 hours. Extracts cold sterilized by filtration. Then the surface of the agar medium cup applied to 0.1 ml of the studied extract and planted lawn of the culture. All experiments were performed on 10 control and 10 experimental cups. Analyzed the appearance of colonies on 2-3-rd day after sowing at + 30 ° C (yeast) and in the first day - at + 35-37 ° C (bacteria), research comparing options of control (without entering extract).

Obtained in experiments biometric digital data processed using the computer program "Statistica" among MS Office 2003. The results of the average values considered statistically significant * - $P < 0.05$, ** - $P < 0.01$, *** - $P < 0.001$.

Results. During the period of the experiment it was observed that the drug culture in the studied concentration of 10% (in terms of initial weight of the dried plant) virtually no effect on the growth of gram-positive and gram-negative bacteria and yeast. Due to increasing concentrations of aqueous extract 20% found that in Petri dishes in the control group grew 540 ± 15 colonies of bacteria *E. coli* strain XL1, and in addition to the research 20% of the drug *Galega orientalis* (Lam.) There were less than 110 colonies. Thus, growth inhibition observed data bacteria by 20.0% ($P < 0.001$) compared with control cups. Inter-group differences for this indicator is statistically significant. The results of testing the antimicrobial activity of the study drug are shown in Figures 1-7.

The growth of colonies of *Escherichia coli* cultures of pure strain XL1 control and experimental groups are depicted in Fig. 1.

Fig. 2 observed effect of aqueous extract halehy eastern growth of bacteria strain of *E. coli* (XL1). In research cups colonies growing less strain compared with the control that clearly confirm the inhibitory effect of water extract of culture studied.

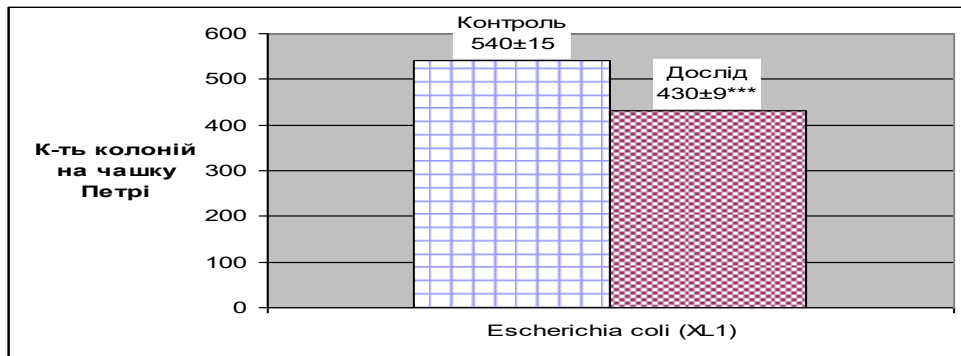


Fig. 1. Effect of 20% extract of Galega orientalis (Lam.) On the growth of pure culture of gram-negative bacteria E. coli XL1

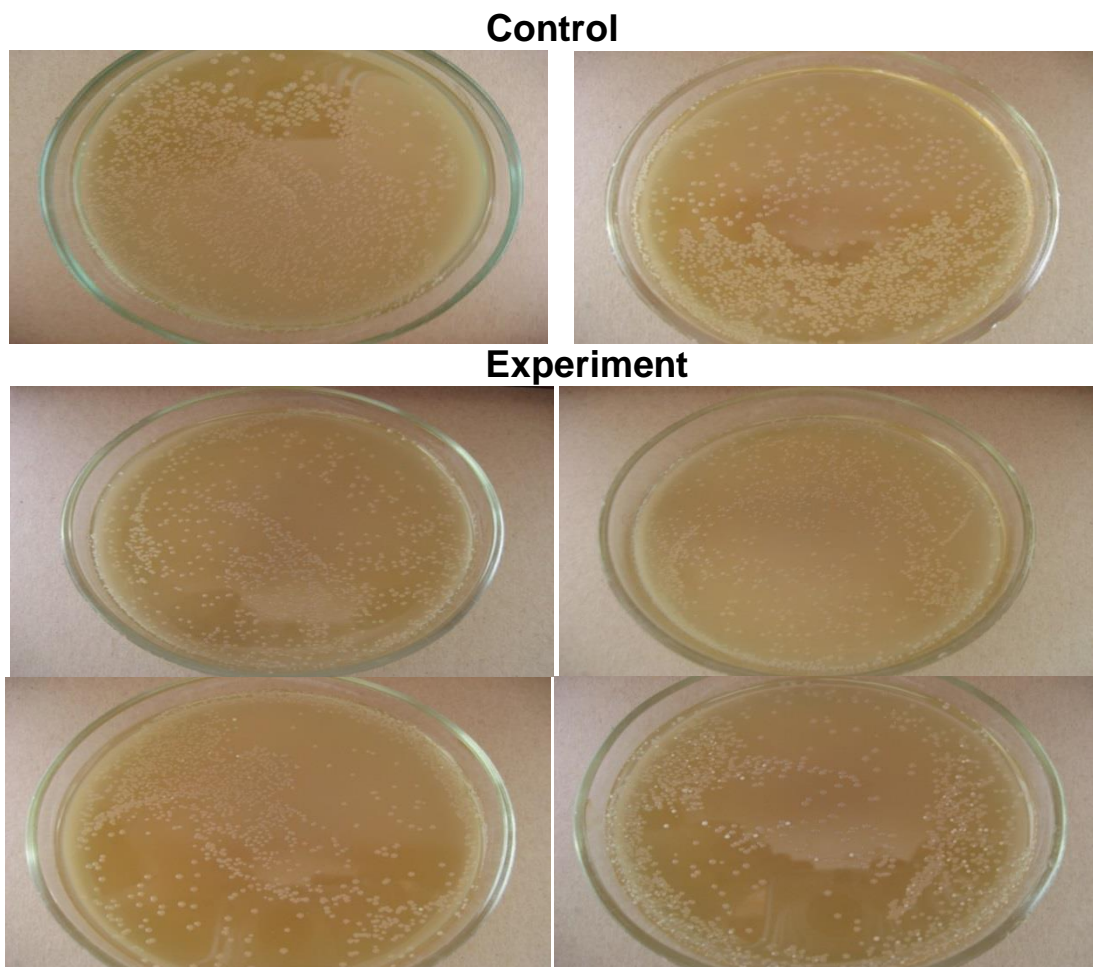


Figure 2. Petri dishes of the control and experimental groups E. coli (XL1)

In studying the antimicrobial activity of 20% aqueous extract of Galega orientalis (Lam.) On the growth of Gram-negative bacteria E. coli strain DH 5 turned out that the research cups were 117 colonies less than in controls. In percentage, this means 30% ($P < 0.001$) inhibition of bacterial growth.

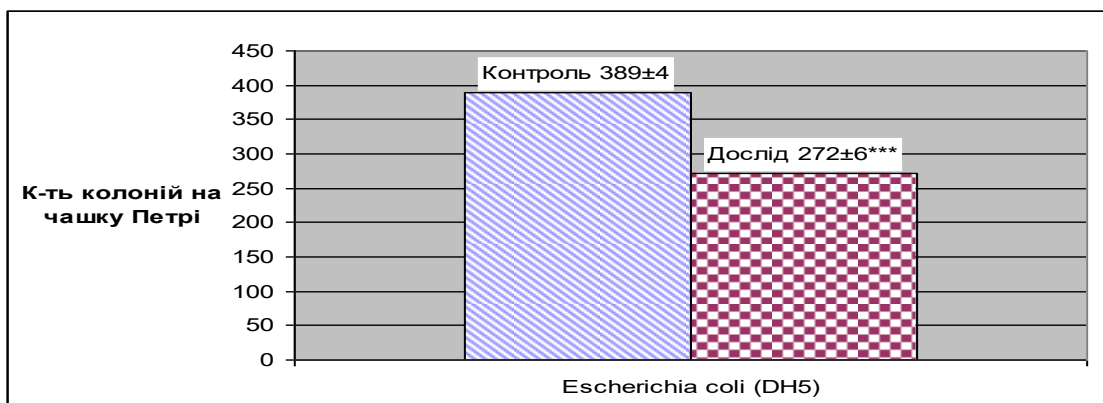


Fig. 3. Impact of 20% extract of Galega orientalis (Lam.) On the growth of pure culture of gram-negative bacteria E. coli DH 5

Conducted microbiological studies indicate that the antibacterial effect of the study drug for gram-positive bacteria M. Luteus was slightly lower. Found that 20% -vyy aqueous extract of Galega orientalis (Lam) inhibits the growth of these microorganisms by 12.0% (P <0.05) compared with control.

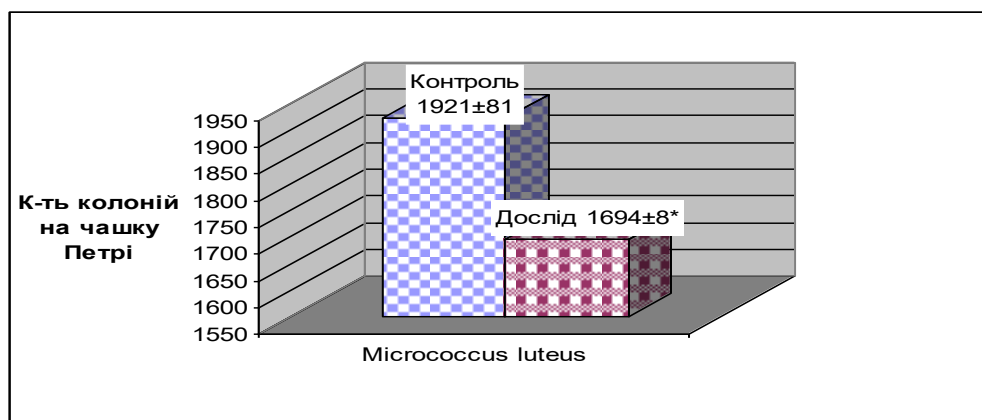
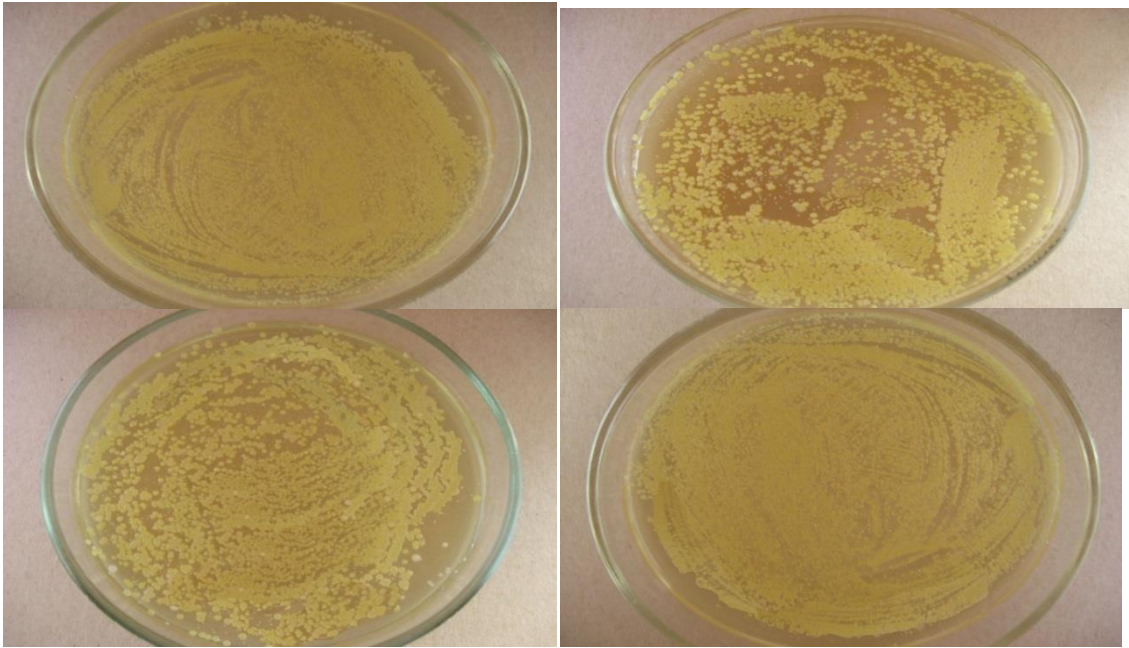


Fig. 4. Impact of 20% extract of Galega orientalis (Lam) on the growth of pure culture of gram-positive bacteria M. Luteus

Fig. 5 shows the growth of Gram-positive bacteria Micrococcus luteus on the background of the aqueous extract halehy east.

Fig. 5 clearly see fewer bacteria colonies in petri dishes research and, consequently, greater bacterial effect of aqueous extract halehy eastern growth of pure cultures of Gram-positive microorganisms. The quantitative difference in the colonies between control and experimental cups was 227. Found a negative effect of water extract of Galega orientalis (Lam.) On the growth of eukaryotic organisms - yeast Saccharomyces cerevisiae strain W303. It was found that the number of cups of experimental colonies was 30.5% (P <0.01) lower compared with the control.

Control



Experiment

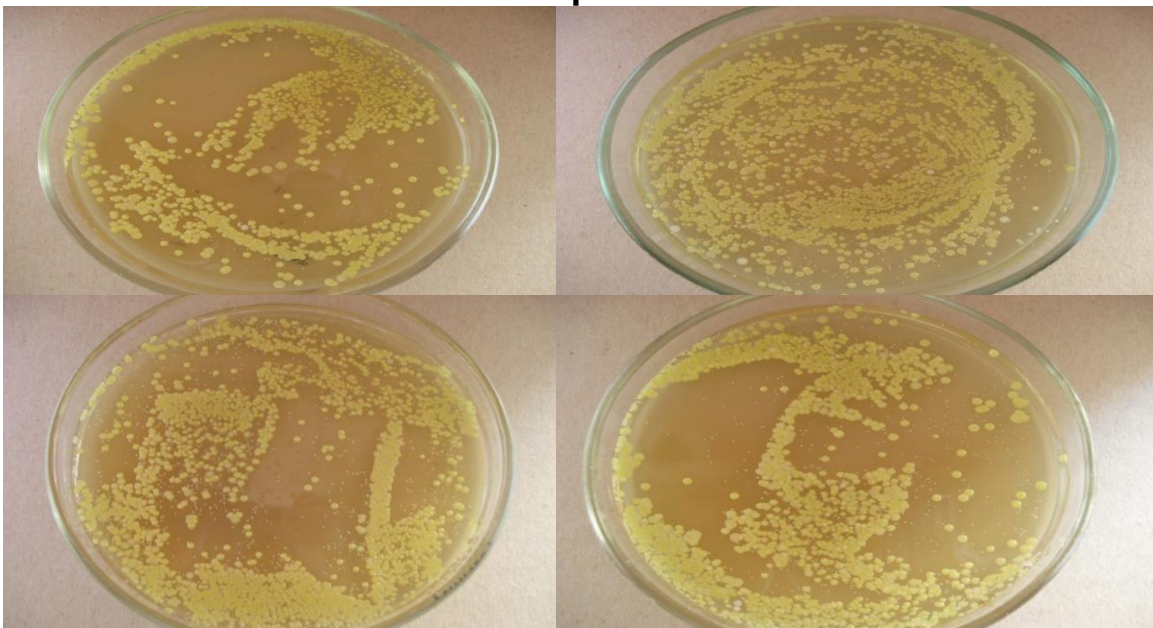


Fig. 5. Petri dishes of control and experimental groups *Micrococcus luteus*

Fig. 5 shows antimicrobial activity influence 20% of the drawing east halehy growth of pure cultures of yeast *Saccharomyces cerevisiae* strain W 303. In experimental petri dishes colonies of yeast number was less than the control, confirming inhibitory effect on the growth of oriental halehy these microorganisms.

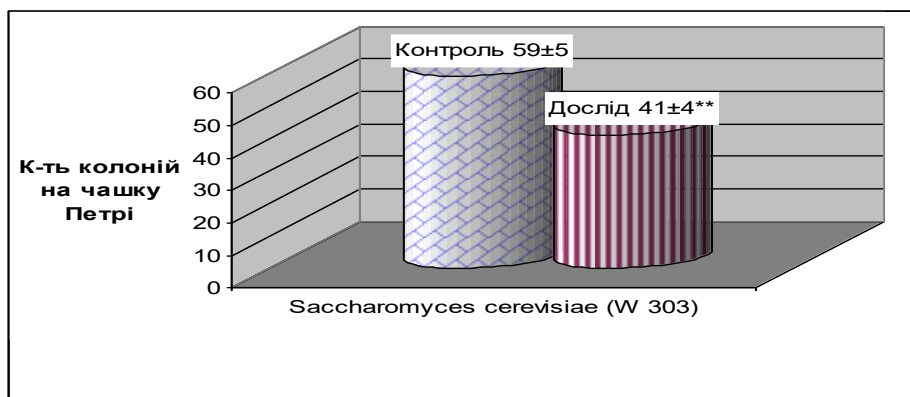


Fig. 6. The braking effect of 20% extract of Galega orientalis (Lam) on the growth of pure culture yeast *S. cerevisiae* W 303

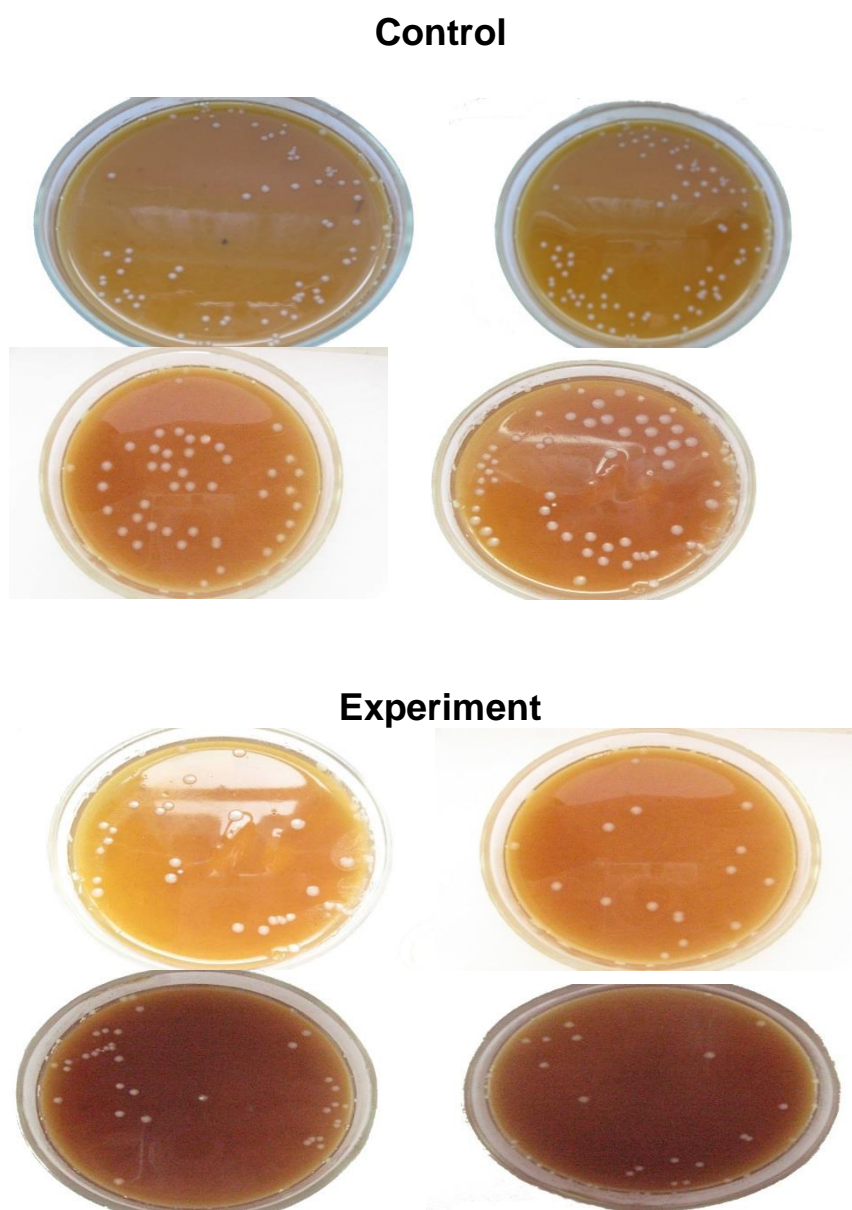


Fig. 7. Petri dishes of control and experimental groups *Saccharomyces cerevisiae* (W 303)

It should be noted that in all cases the addition of experimental studies of the drug *Galega orientalis* (Lam) did not alter the morphology of the colonies tested strains.

Conclusions. Consequently, the results of researches allow to note a slight antimicrobial effect of 20% aqueous extract of *Galega orientalis* (Lam) on the growth of pure cultures of gram-negative and gram-positive bacteria and yeasts. This fact can be used in food industry as an antimicrobial agent of natural origin, to ensure the preservation and microbiological purity products, and suggests that the lack tympani in animals fed this plant may be related to the inhibition of microbial growth.

Список літератури

1. Дармограй Л. М. Фітохімічне вивчення вмісту біологічно активних речовин та тестування антимікробної активності галеги східної (*Galega orientalis* (Lam)) / Л. М. Дармограй / Наук. Вісник Львівського національного університету ветеринарної медицини та біотехнологій ім. С. З. Ґжицького. – Львів, 2009. – Т. 11, № 3 (42). – Ч.2. – С. 239-242.
2. Estrada A. Isolation and evaluation of Immunological adjuvant activities of saponins from *Polygala senega* L. / A. Estrada // Comparative Immunology. Microbiol. Infect. Dis. 23. – 2000. – P. 27 - 43.
3. Irobi O. N. Antimicrobial activity of the bark of *Bridelia ferruginea* / O.N. Irobi // Int. J. Pharmacog. 34. – 1994. – P. 87-90.
4. Olorundare E. E. Antibacterial properties of leaf extract of *Cassia alata* / E. E. Olorundare // Biol. Res. Com. 4. – 1992. – P. 113-117.
5. Sibanda T. In vitro antibacterial regimes of crude aqueous and acetone extracts of *Garcinia kola* seeds. / T.Sibanda // J. Biol. Sci. 8(1). – 2008. – P. 149-154.

Впервые проведено тестирование возможной антимикробного действия Galega orientalis (Lam) на рост чистых культур бактерий грам-положительных (Micrococcus luteus), грамотрицательных (Escherichia coli XL1, DH5) и дрожжей (Saccharomyces cerevisiae W303). Материалом для исследования служила высушенная вегетативная масса Galega orientalis (Lam) в фаз бутонизации и начала цветения. В результате эксперимента установлено, что 20 %-я концентрация водного экстракта данного растения имеет ингибирующее влияние на рост чистых культур бактерий и дрожжей. Обоснованно возможную взаимосвязь между антимикробной активностью экстракта этого растения и невозникновением тимпани у коров.

***Galega orientalis* (Lam), водный экстракт, антимикробное действие, Escherichia coli, Micrococcus luteus, Saccharomyces cerevisiae**

IMPACT ANALYSIS OF COMPLEX TRAFFIC ON THE ATMOSPHERE AIR IN KHMELNYTSKY REGION

**S. C. VOZNUK, Specialist Category II love Urban Planning,
Architecture and Housing**

Kamenetz-Podolsk District State Administration

**L. S. SHELUDCHENKO, candidate of technical sciences Podolsky
State Agricultural and Technical University**

In article examines the impact of emissions from road transport complex on the air in the Khmelnytsky region. Proposed the technique of generalized integral multivariable assessment to determine the level of degradation of ambient air pollutant emissions caused by the activities of the transport network.

Road-transport complex, roadside territory, the exhaust gases of vehicles, multivariable integral evaluation

Motor transport complex in modern society is one of the most essential criteria development. Strong and efficient functioning of transport is a prerequisite for high economic growth, improving quality of life.

In recent years the number of cars in Ukraine has increased significantly and now has more than 7.0 million. Cars. However, roads Ukraine do not meet European standards for many indicators. Virtually no road category with multi-movement at high speeds. The length of high-speed highways European type in Ukraine is only 280 km. Low freight operational performance roads lead to low operational speed of vehicles and the high cost of fuel and lubricants. Fuel consumption and emissions of harmful substances from exhaust gases to the atmosphere by 30% higher than those in developed countries. The process of raising the level of car ownership and increasing the density of roads leading to increase in their influence ekodestruktyvnoho a large scale. [3, 4].

The impact of road transport sector on the environment is one of the urgent ecological problems, which adversely affects the environment and requires immediate resolution.

Road network as complex engineering structures are subject to natural and man-made structures and certain ekoheosystemy leads to disruption of the natural landscape, changing the flow regime of surface and ground water, which increases erosion and degradation of soil cover and so on. Changing landscapes due to Motor-Road construction leads to disruption averaged wind speeds and changing its direction, which leads to

the change of microclimate, and, consequently, ecosystem structure elements adjacent to highways.

Overall impact of roads and vehicles, manifested in all forms: chemical (ingredient), physical (energy or parametric), biological (biocenotical) landscape destruktivnyi (statsialno-destruktivna) [6].

The largest man-made impact in roadside space undergo natural ecosystems that are in conditions inhrediyentnoho pollution (mikrozona chemical exposure). Almost 90% of heavy metals that enter the environment, accumulate soil, natural waters migrate, and later absorbed by plants and incorporated into the food chain, which is unacceptable for the cultivation of agricultural products. Maximum load of this type of pollution falls on roadside strips and adjacent lands, which in most cases used as agricultural [1, 2]. Proved that heavy metals varies in inverse proportion to the distance in relation to this index as expensive. Contamination with heavy metals characteristic of the surrounding areas along the roads from 50 to 200 m, while in the roadside area formed the so-called "the land zone" adjacent to the edge of the roadway and have a width of 10 m. The width of the zone "edge effect" usually increases depending on the category of road, saturation of motor vehicles, working life, which leads to an increase in areas with disrupted ecosystems. These lands contents of pollutants exceed the maximum allowable concentration of ten times, making these areas unfit for grazing, hay and cultivation of agricultural products.

Materials and methods of research. State building codes Ukraine DBN.A.2.2-1-2003 determine the construction and operation of motor networks as objects that are highly hazardous (Nos. 16 and 22 DBN.A.2.2-1-2003 Annex E). Therefore, a program of analytical studies provided the definition of generalized multiparameter integrated assessment of air quality caused by the operation of the transport network Khmelnytsky region by the following features: air emissions most common pollutants from mobile sources, the total such as dust, sulfur dioxide, nitrogen dioxide, carbon monoxide .

For numerical multiparameter generalization heoekosystemu information about all its properties should be presented in an intensive way. An intense form of numerical expression of a property (signs) system provides relativity of its numerical expression (dimensionless form) on specific rules or chosen (pre-set) the base value of the same properties set in extensive form (as an absolute value of a defined dimension). Thus, if the definition of absolute (extensive) values varying limits (maximum and minimum) examining the properties of any numerical values for the same property in intensive form to be determined outside of 0 to 1. In this case, functionally integrated property by a certain group individual features of the system is defined as:

$$\left\{ \begin{array}{l} K = f(X_1^+ \dots X_a^+; X_{a+1}^- \dots X_b^-; Y_{b+1}^+ \dots Y_c^+; Y_{c+1}^- \dots Y_d^-; X_{d+1}^0 \dots X_m^0; \\ Y_{m+1}^0 \dots Y_n^0; Z_{n+1} \dots Z_k); \end{array} \right.$$

(1)

where: \bar{X}^+ - the numeric value of positive properties;

\bar{X}^- - negative numerical value properties;

\bar{X}^0 - numeric value properties with bilateral constraints;

\bar{Y}^+ - discrete numeric value of positive properties;

\bar{Y}^- - discrete numeric value of negative properties;

\bar{Y}^0 - discrete numeric value properties with bilateral constraints;

Z_i - scores numerical values;

f – function generalization properties that must meet in this case the following requirements:

$$\begin{cases} \frac{df}{d\bar{X}_a^+} > 0; & (a = 1; \dots; a); \\ \frac{df}{d\bar{X}_b^-} < 0; & (b = a + 1; \dots; b); \end{cases} \quad (2)$$

In practice, to determine the numerical estimates d (intensive form) of certain properties of the system (2) uses a narrower class of functions is kept to a double exponential function (so-called scale "desirability"):

$$d_i = e^{-e^{-R_i'}} = \exp[-\exp(-R_i')], \quad (3)$$

where R_i' - values of parameters $\bar{X}^+, \bar{X}^-, \bar{Y}^+, \bar{Y}^-$, normalized to the range $\langle -3 \dots +3 \rangle$

This function is defined by a double exponential function for the evaluation of continuous and discrete positive and negative characteristics, and to assess the properties with bilateral restraint it looks like exponential, exponential function (Fig. 1).

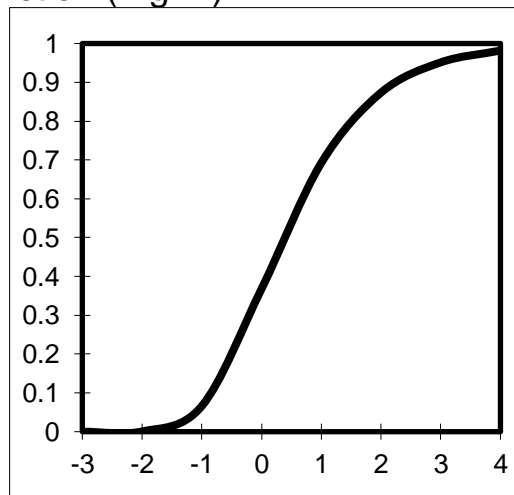


Fig. 1. Double exponential function

The final generalization of numerical parameters (ratings) d_i certain properties of the system of averaging is performed by using the geometric mean:

$$D = \sqrt[q]{\prod_{i=1}^q d_i} = \sqrt[q]{d_1 \times d_2 \times d_3 \times \dots \times d_q}, \quad (4)$$

where D – generalized (integrated) rating system

To establish the ecological state of air quality under the influence of stationary and mobile sources used the scale of the transformation under anthropogenic impact developed OM Adamenko (Table. 1).

1. The scale air pollution

Generalized assessment Δ	Ecological conditions
$\geq 0,96$	Favorable
0,65 - 0,95	Satisfactory
0,4 – 0,65	Strained
$\leq 0,4$	Complex

The results of the integrated evaluation multiparameter stationary and mobile sources are presented in Table 2 and summarized in Table 3.

2. The results of the integrated evaluation multiparameter Khmelnytsky region for indicators of pollutant emissions as of 2014

City, area	Emissions from stationary sources		The emissions of mobile sources	
	Absolute value ths. tons	Rating	Absolute value ths. tons	Rating
м. Хмельницький	0,22	0,93	14,1	0,001
м. Нетишин	0,01	0,95	1,72	0,91
м. Кам'янець-Подільський	0,08	0,91	3,95	0,79
м. Славута	0,50	0,90	1,48	0,91
м. Шепетівка	0,19	0,93	2,02	0,90
м. Старокостянтинів	0,19	0,93	1,81	0,91

Білогірський р-н	0,01	0,95	0,90	0,94
Віньковецький р-н	0,01	0,95	0,61	0,95
Волочиський р-н	0,08	0,94	1,55	0,92
Городоцький р-н	0,07	0,94	1,37	0,93
Деражнянський р-н	0,01	0,94	0,88	0,94
Дунаєвецький р-н	0,06	0,94	1,52	0,92
Ізяславський р-н	0,06	0,94	1,42	0,93
Кам'янець-Подільський р-н	3,43	0,001	1,43	0,93
Красилівський р-н	0,02	0,95	1,79	0,91
Летичівський р-н	0,11	0,94	1,06	0,94
Новоушицький р-н	0,03	0,95	0,62	0,95
Полонський р-н	0,11	0,94	1,35	0,93
Славутський р-н	0,02	0,95	0,61	0,95
Старокостянтинівський р-н	0,10	0,95	0,63	0,95
Старосинявський р-н	0,02	0,95	0,47	0,95
Теофіпольський р-н	0,13	0,94	0,89	0,94
Хмельницький р-н	0,32	0,93	1,10	0,94
Чемеровецький р-н	0,05	0,95	1,11	0,94
Шепетівський р-н	0,07	0,95	0,72	0,95
Ярмолинецький р-н	0,08	0,95	0,69	0,95

Conclusions. Thus, the structure of the air pollution in the Khmel'nitsky region dominant factor is the motor complex. Analysis of the multiparameter Generalized assess the levels of air pollution in cities and districts of Khmel'nitsky region indicates a satisfactory state of air quality. Difficult status as an integral assessment corresponds to 0.03 m. Khmel'nitsky and Kamenetz-Podolsk district, purportedly high levels of both stationary and mobile sources of emissions.

3. Generalized (integrated) Multiparameter assessment of air pollution Khmel'nitsky region

City, area	Evaluation from stationary sources	Evaluation from mobile sources	Summarized (integrated evaluation)
m. Khmel'nitsky	0,93	0,001	0,03
m. Netishyn	0,95	0,91	0,93
c. Kamenets	0,91	0,79	0,85
m. Slavuta	0,90	0,91	0,91
m. Shepetivka	0,93	0,90	0,91
m. Starokostyantyniv	0,93	0,91	0,92

Belogorsky district	0,95	0,94	0,94
Vinkovetsky district	0,95	0,95	0,95
Volochisskiy district	0,94	0,92	0,93
Gorodok district	0,94	0,93	0,93
Derazhniansky district	0,94	0,94	0,94
Dunaevsk district	0,94	0,92	0,93
Izyaslavskii district	0,94	0,93	0,93
Kamenetz-Podolsk district	0,001	0,93	0,03
Krasylivsky district	0,95	0,91	0,93
Letichevsky district	0,94	0,94	0,94
Novoushitskiy district	0,95	0,95	0,95
Mr. Polonsky	0,94	0,93	0,95
Salavat district	0,95	0,95	0,95
Starokonstantinovsky district	0,95	0,95	0,95
Starosynavskyy district	0,95	0,95	0,95
Teofipolske district	0,94	0,94	0,94
Khmelnitsky district	0,93	0,94	0,93
Chemerovetskiy district	0,95	0,94	0,94
Shepetivka district	0,95	0,95	0,95
Yarmolinetskiy district	0,95	0,95	0,95

Список літератури

1. Адаменко О. М. Екологічний аудит територій / О. М. Адаменко, Л. В. Міщенко. – Івано-Франківськ: Факел, 2000. – 342 с.
2. Васик Л. С. Моніторинг транскордонного переносу забруднюючих речовин у штучних ландшафтах автошляхової мережі / О. М. Бахмат, Л. С. Васик, І. А. Шелудченко // Зб. наук. праць Подільського державного аграрно-технічного університету “Сучасні проблеми збалансованого природокористування — Кам’янець-Подільський, 2009. – вип. IV. С. 101–103.
3. Кавтарадзе Д. Н. Автомобильные дороги в экологических системах (проблемы взаимодействия) / [Д. Н. Кавтарадзе, Л. Ф. Николаева, Е. Б. Поршнева и др.] – М.: ЧеРо, 1999. – 240 с.
4. Сльоз А. М. Аналіз рівнів екологічної небезпеки автодорожньої мережі / А. М. Сльоз, Л. С. Шелудченко // Збірник наукових праць ПДАТУ «Сучасні проблеми збалансованого природокористування». – 2013. – с. 215-217.
5. Шелудченко Б. А. Методологія досліджень екосистем / Б. А. Шелудченко. – Кам’янець-Подільський: ПДАТУ, 2008. – 110 с.
6. Ямборак Р. С. Інженерна екологія. Ч. 9. Хімічна екологія / Р. С. Ямборак, Б. А. Шелудченко, І. А. Шелудченко, за ред. Б. А. Шелудченко. – Кам’янець-Подільський: ФОП Сисин О. В., 2011. – 164 с.

В работе рассмотрены вопросы влияния выбросов дорожно-транспортного комплекса на атмосферный воздух в Хмельницкой области. Предложена методика обобщенной интегральной многопараметрической оценки для определения уровня деградации атмосферного воздуха выбросами загрязняющих веществ, вызванных деятельностью автотранспортной сети.

Дорожно-транспортный комплекс, придорожные территории, выхлопные газы автотранспорта, интегральная многопараметрическая оценка

ECOVILLAGE AS NEW ECO CULTURAL CENTER UKRAINE

O. I. GARMASH *postgraduate **,
P. V. PISARENKO, *Doctor of Agricultural Sciences*
Poltava State Agrarian Academy

The article deals with the phenomenon of ecovillage as new eco cultural centers. The notion of eco-village; Ukrainian ecovillage compared with Western counterparts. Served list ekoposelen operating in Ukraine.

Ecovillage, intentional community, sustainable development

Modern society is in production and consumption involved in such amount of matter and energy, which is hundreds of times greater than the biological needs of man. This leads to disruption of the ecological balance and, consequently, to the environmental crisis. "Club of Rome", characterized the problem: "The main enemy of humanity is man. In search of a new unifying enemy we came to the idea that pollution, the threat of global warming, shortage of drinking water and famine is precisely this enemy. Taken together, these terrible phenomena are just such a threat, which can only confront together. However, treating these threats as a common enemy, should clearly separate cause and effect. All these threats are generated by human intervention in natural processes, so they can be overcome only by changing human attitudes and behavior. □ The real enemy is the man himself "[4].

Currently humanity is accountable to the choice of which way to determine the possibility of its survival and development. This way Ecodevelopment □ ecologically oriented social and economic development. Humanity must move its economy from non-renewable to renewable resources and technologies □ those that do not pollute the environment. Therefore, the idea of eco-village as an island, whose main task - to preserve and restore natural resources, where each of us can take part in the salvation of our planet and do something useful for their land is extremely relevant today. In Ukraine there is a real chance to become one of the leading countries of the world, because not every state has a combination of climatic and human resources of this quality, and not every nation has the natural love of the earth, to nature.

Although the idea of creating alternative settlements in which people would be economically, ecologically and socially independent and there would be in harmony with nature, without causing her harm, is not new, the

first eco-village originated only in the 80s of the twentieth century. Well-known foreign researchers of this issue is Robert Gilman [2], D. Christian [5] L. Walker. In Ukraine ecovillage appeared in the early nineteenth century and is little known ecosocial phenomenon. Among Russian researchers studying this question: IP Kulyasov AA Kulyasova [6], AV Shubin [10] I. Markovkin, IV Zadorin [3] and its independent research group zircon [8, 9]. In Ukraine, the issue deals with PV Pisarenko EA Bardakova [1] T. efficiently.

The aim of the study. Since the phenomenon ecovillage in Ukraine appeared recently and very little literature that would adequately reveal the contents of this issue for a wide range of readers, primarily, our goal was a detailed examination of the main features of ecovillage comparable specificity Ukrainian ecovillage with Western counterparts and providing ekoposelen list of existing in Ukraine.

Research results. According to the definition of the Global Ecovillage Network (GEN), ecological settlements (eco-village) – a traditional or alternative settlement, created for regional integration of environmental, economic, social and cultural dimensions of sustainable development in order to restore the social and natural environment [11].

Ecovillage referred to alternative settlements which have appeared in the world in the 1960s, during the rise of social and ecological crisis as a reaction to the inhumane and environmentally unsustainable system of relations in modern society [6].

For the first time the term 'ecovillage' was introduced by Robert Gilman, which provides such characteristics as settlement:

1. The human scale (this, in which everyone in the community know each other while everyone feels that may affect the direction of the community scale shall not exceed 500 people);
2. The settlement with all characteristics of human activity to be represented in a balanced proportion;
3. Human activities safely integrated into the environment;
4. Supports healthy human development;
5. It may well exist indefinitely [2].

While eco-village began to emerge 50 years ago, needs and opportunities are so new that the company has not yet had time to realize them. They grow out of the needs and opportunities caused by:

- New environmental constraints (due to high population density and technology)
- New technology (a better understanding of ecosystems to a branched channels of communication, from the effective use of technologies for renewable resources to new forms of social organization)новим рівнем свідомості, який включає глобальне знання, накопичене за мільйони років історії життя на цій маленькій планеті в безмежжі Всесвіту) [2].

Russian researchers from the research group zircon are the following principles of ekoposelen:

- Organic farming □ use of sustainable technologies of processing (eg permaculture principles). Do not use chemicals and pesticides on the territory of the settlement;
- Sustainable forest management and reforestation multicultural;
- Minimizing energy consumption, as reflected in the construction of energy-efficient housing, renewable energy, energy saving household;
- The desire for autonomy and independence from external supplies to complete self-sufficiency;
- Among residents ekoposelen common practice systems such as vegetarian food, raw food diet, veganism;
- Most people ekoposelen usually follow a healthy lifestyle, which includes tempering, active exercise, positive life attitude. Also, in the territory ekoposelen not welcome smoking, drinking and rough language until their complete prohibition. [9]

According to the classification of the Global Ecovillage Network (GEN), select:

- 1) Economist like Auroville in South India, the Federation of Damanhur in Italy and Nimbin in Australia;
- 2) Village ecovillage like Gaia Asociación in Argentina and Huehuecoyotl, Mexico;
- 3) Permakulturni places, including Crystal Waters in Australia, Cochabamba in Bolivia and Barus in Brazil;
- 4) Projects of urban renewal, such as Los Angeles EcoVillage and Hrustyaniya in Copenhagen;
- 5) Educational centers like Findhorn Foundation in Scotland, Centre for Alternative Technology in Wales and Ecovillage Training Center in Tennessee. [7]

Russian scientists Shubin AV and Kulyasov IP, classifying environmental settlement on the dynamics of settlement and release:

- 1) The emergence of the initiative group on creating eco-village;
- 2) Proton ecovillage (initiative group, which already has land and housing, but the members of the group in place has lived only a few people);
- 3) eco-village (relocation of the bulk of the settlers);
- 4) Mehaekoposelennya (eco-city) [6, 10].

Environmental ekoposelentsiv ideas based on the concept of sustainable development. Sustainable development of society requires human needs while preserving the environment, not only for the present but also for future generations. The concept includes 3 components: economic, social and environmental. Environmental aspects are most important for the residents eco-village. Theoretically this means that community members have a thorough knowledge of issues such as environmental protection and sustainable use of natural resources, living in harmony with nature, knowing that the man - a part of nature, not its owner.

Despite the paucity ekoposelen, they solve very specific task, preserving nature, restoring damaged soil, steadily developing, engaging in environmental education. His example, they try to prove that you can live in harmony with nature without destroying, but restoring the habitat most likely future for them.

Ekoposelen phenomenon for Ukraine is the newest phenomenon, because unlike Western countries, our country has never encountered a different kind of commune and alternative settlements, such as the United States. So first environmental settlements emerged in the XIX century and were presented tribal settlements. Movement tribal settlements in Ukraine came from Russia, where he was born in the late 90s of XX century, after the publication of books by Vladimir Megre "Zvenyaschye kedry Russia" [9].

Ukrainian ecovillage compared with Western counterparts, with one hand raised in a much more stringent conditions, being forced to overcome the resistance of the bureaucratic mechanism and the burden of severe laws, but on the other hand, the uncertainty of the general situation in the country and the lack of a clear status of Ukrainian ekoposelen creates opportunities for finding new forms of existence and with the state. [8] Also ekoposelen create a situation in our country is more favorable in the sense that in Ukraine land is much cheaper compared to the US.

In the analysis of American ekoposelen and comparing them with Ukrainian counterparts, we have marked another important difference, which is very motivating creation ecovillage. In Ukraine, eco-village, and in particular Tribal settlements created to become the master, the sole owner of the self-sufficient in their land, which decides all economic and political issues so that nothing depends on the state. In the west, diametrically opposite situation: a long time the Americans imposed the cult of the "strong man", the cult of private property, and it led to when people simply have forgotten how to communicate with each other and are all hostile. And because Americans tend to unite and create such settlements where they could live in together in a circle of associates and relatives, creating an atmosphere of harmony and caring for one another [5].

According to the Information Center Creators tribal villages and tribal settlements Maps Site "settlement. Ru ", today in Ukraine there are 55settlements:

- «Буша», «Дивограй», «Купелія» (Вінницька область);
- «Заорілля» (Дніпропетровська область),
- «Благодатне», «Світанок» (Донецька область);
- «Ружичево», «Омелянівка», «Радужне», «Гранидуб», «Простір Любові», Урочище «Тартак» (Житомирська область),

- «Джерельне», «Луначарське», «Кутузівка» (Запорізька область);
- «Семигір'я» («Кіровоградська область»);
- «Долина джерел», «Весела Слобідка», «Ладославне», «Кедрівка», «Рідне», «Роси» (Київська область);
- «Світле», «Лучисте», «Краснолісся», «Сонячне», «Мудре» (АР Крим);
- «Червонопопівка», «Миколаївка», с. Ковпаки (Луганська область);
- біля с. «Опака» (Львівська область);
- екопоселення на р. Інгул (Миколаївська область);
- «Благодатні Джерела», «Райська Долина», «Радісне» (Одеська область);
- «Джерела», «Долина» (Полтавська область);
- «Білка», «Благодатне», «Милість», «Хилькове» (Сумська область);
- «Веснянка», «Звенигора», «Подол» (Харківська область);
- «Струмочок», «Радісне» (Хмельницька область);
- «Астра», «Малинівка», «Південні Сокольники» (Херсонська область);
- «Буда», «Козацький Хутір» (Черкаська область);
- «Благодать» (Чернівецька область);
- «Долина майстрів», «Медуниця», «Журавлі» (Чернігівська область) [12, 13].

The largest by the number of families can be considered "Valley of the Springs", home to 15 families - about 70 people and is located 56 plots Generic settlement. Other settlements numbering from 2 to 7 families [1].

Obviously, the new way of life leads to new cultural traditions. There is every reason to believe that eco-village will not only centers of spirituality and culture outside the cities, but also new types of culture in society. [3]

That is the spiritual settlement became Auroville, City of Dawn, founded under the auspices of UNESCO. It is the spiritual founder Sri Aurobindo, which extended the idea of creating a form of evolutionary transition of humanity which guided solely by the mind, humanity managed true integrated Consciousness. Auroville - a place where people can live in harmony with ourselves and with others, rejecting all domestic disputes, social conventions, moral contradiction and confrontation of religions.

To participate in the creation of environmental and life settlements, people often must rethink and change their value system. That is why there should be no violence when deciding about life in the village. It is clear that many models of sustainable development practices developed ekoposelen and can be applied as an alternative approach to revitalizing urban

environment of modern cities, and even, perhaps, to create a new paradigm suburb.

Conclusions. So ecovillage - a settlement of people who want to create a model of sustainable (balanced) life. This may be new or restored village settlement. They are an example of a model that combines several core principles: high quality of life, preservation of natural resources, the development of a holistic (holistic) approach to life and person, which in turn implies human ecology homes, involving all members of the settlement to the adoption of common decisions, the use of environmental technologies.

Ukrainian ecovillage have several features in common with foreign eco-village: the creation of self-sustaining ecological, technological, economic and energy-saving cycle life support settlement based on respect for the environment; use of alternative biotechnological systems providing bioutilizatsiyu waste treatment and environmental protection; rational use of natural resources. At the same time, Ukraine Generic settlements are characterized by individualism, while for their Western counterparts inherent collectivism.

If we compare the beginning of the nineteenth century and our years, we have seen a positive trend to more ekoposelen in Ukraine 10 (2005) to 55 (2015) in just 10 years.

Prospects for further work in this direction. Work on this will continue greetings. Develop criteria for evaluating options ecovillage. It is planned to visit most Ukrainian ekoposelen to assess their state of development and create a single register ekoposelen Ukraine.

Список літератури

1. Бардакова О. О. Розвиток зеленого бізнесу на території екологічного поселення в Донецькому регіоні [Електронний ресурс] / О. О. Бардакова – Режим доступу: <http://masters.donntu.edu.ua/2013/feht/bardakova/diss/indexu>.

2. Гилман Р. Экодеревни и устойчивые поселения / Роберт Гилман; [пер. с англ. И. Гончаров, В. Шестаков]. – Москва : Колос, 1991. – 266 с.

3. Задорин И. В. Экопоселения как форма внутренней эмиграции: мотивация и перспективы распространения [Електронний ресурс] / И. В. Задорин // Итоговый комплексный аналитический отчет по результатам исследования (Версия от 27.11.12) – Режим доступу: <http://cyberleninka.ru/article/n/alternativnye-selskie-poseleniya-v-rossii-stihiynaya-vnutrennyaya-emigratsiya-ili-osoznannyi-transfer-v-budushee>

4. Краткий обзор докладов римского клуба [Електронний ресурс] – Режим доступу: <http://val--s.narod.ru/rome1.htm>.

5. Кристиан Д. Творим совместную жизнь или Как вырастить экопоселение и общину вашей мечты [Електронний ресурс] / Диана Кристи; [пер с англ. Д. Ольховой]. – 2001. – 250с. – Режим доступу: <http://www.ecology.md/section.php?section=ecoset&id=13123#.VRqGpfmsWss>

6. Кулясов И. П. Экопоселения – новая форма сельских сообществ в России / И. П. Кулясов, А. А. Кулясова // Экология и жизнь. – 2008. – №10. – С. 20–26.

7. Сайт Глобальной сети Экопоселений [Электронный ресурс] – Global Ecovillage Network (GEN) – Режим доступа: <http://gen.ecovillage.org>.

8. Хомякова А. П. «Экопоселения в России: проблемы и перспективы развития» / А. П. Хомякова – Режим доступа: <http://openc.ru/data/2013/04/09/1233209282/Хомякова-докл.pdf>

9. Циркон. Аналитический обзор экологических поселений России / Исследовательская группа ЦИРКОН. – Москва, 2012. – 54 с. Режим доступа: http://www.zircon.ru/upload/iblock/e76/Jekoposelenija_v_Rossii_Analiticheskij_obzor.pdf.

10. Шубин А. В. Альтернативная община – экзотика или дорога в будущее? [Электронный ресурс] / А. В. Шубин // – Режим доступа: http://old.russ.ru/journal/ist_sovr/98-07-29/shubin.htm.

11. Сайт Глобальной сети Экопоселений – Global Ecovillage Network (GEN) – Режим доступа: <http://gen.ecovillage.org>.

12. Сайт Информационный центр создателей родовых поместий – Режим доступа: <http://pomestja.info/homepage.html>.

13. Сайт Поселения.ру – Режим доступа: <http://poselenia.ru/map>

В статье рассматривается феномен экологических поселений, как новых эко культурных центров. Раскрывается понятие экопоселения; сравниваются Украинский экопоселения с западными аналогами. Приводится список действующих экопоселений на территории Украины.

Экопоселения, альтернативные поселения, экоразвитие, устойчивое развитие

NATIONAL NATURAL PARK "CHEREMOSKY" AND BIOSPHERE RESERVE "MARAMOROSKYI MOUNTAINS"

**V. I. GETMAN, Candidate of Geographical Sciences
Taras Shevchenko National University of Kyiv**

Carpathian Mountains - a great mountain range - which awaits the researchers, the beauty of nature lovers, waiting for geologists, medical scientists who raise a wave of research and transform the Carpathians in the country of the future.

Academician Fersman O.E

In this article accent is made on fact that in the tideway of Pan-European Biological and Landscape Diversity Strategy implementation, The National Natural Park's "Cheremosky" will be part of created transboundary Ukrainian-Romanian environment-oriented reserve of bilateral type "Maramorosky Mountains".

This article characterizes floral diversity of National Natural Park's area "Cheremosky" in cause-and-effect relationship with natural (abiotic) conditions of the south-west part of the Ukrainian Carpathians region. Detailed list of rare flora species consisting of park's vegetative grouping related to the Red Data Book of Ukraine, European Red List is presented and rare cenosises of the Green Data Book of Ukraine is also mentioned.

National Natural Park's "Cheremosky" area is rich in landscape-recreational resources (scenery, humanistic, historical-cultural, landscape-aesthetic, balneological), which are not researched and evaluated enough, it is also indicated in this article.

National natural park, reserve, diversity, flora, vegetation.

Ukrainian Carpathians anciently famous scenic mountain and valley landscapes, valuable mineral waters, numerous monuments of wooden sacred art, cheerful Ukrainian songs and dances, in which so much poetry and beauty. Azure dome majestic peaks, green Carpathian meadows, mountain sun, fresh air filled with the scent of dense forest - dense spruce stands Buchin and dark, narrow valley of the turbulent river of crystal memorable one who traveled the Ukrainian Carpathians, unique for life.

Pristine corners of the nature of these mountains is stored in the natural reserve fund (NRF) - reserves, national parks, preserves and more. Their expansion and improvement is one of the important optimization of

protection of human life, the preservation of landscape and biotic diversity of eco \ her network.

In the Ukrainian Carpathians as most important for Ukraine and Central Europe ekologoznachymomu region has long carried out a consistent policy to establish an adequate system of protected areas, primarily due to territorial and landscape and monolithic representative areas. Currently established fairly clear structure protected areas and facilities, covering almost all the high altitude zone landscape complexes Ukrainian Carpathians - from lowland deciduous-mishanolisovyh to medium-high coniferous forests and subalpine.

Until recently, a kind of "white spot" in the Nature Reserve industry remained south-eastern part of the Ukrainian Carpathians in the upper reaches of the Black and White Cheremosh, which focuses much of the biodiversity of the region and remained the least anthropogenically modified landscapes that define regional environmental situation. It is the most remote places in southwestern Ukrainian (Forested) Carpathian Mountains on the border between Ukraine and Romania, where the area is the north-eastern foothills Maramaroskoho crystalline array - geological core PrakarpatyThat. The main (central) part of it is located within Romania.

Millions of years ago, in the second half of the Paleozoic era, the Hercynian orogenesis (about 350 - 250 million. P. So) here began forming at the site of the Carpathian Mountains geosyncline - seabed giant ancient Tethys Ocean that separated the northern and southern continents of the globe. It rises from the oldest birth Carpathians. Then began and ended in the formation of the Alpine orogenesis (from 25 to 2-1,5 million. G. Ago), the Alps, and Kavkakyh Crimean mountains, the highest of the Himalayas like.

Today's wealth of natural conditions, too biotic diversity, Intergovernmentalism natural complex Maramorosh crystalline array was a prerequisite for the creation of this powerful territorial cast transboundary Ukrainian-Romanian bilateral environmental reserve of "Maramoroskyi mountains" as provided in the framework of the European Strategy for the conservation of biological and landscape diversity. To this end, Romania established Biosphere Reserve (Park) "Maramaroschyny Mountain" area of 168,754 hectares, of which area (river basin Visheu) directly adjacent to the border with Ukraine should be part of the Romanian transboundary reserve. To reserve "Maramoroskyi mountain" will also include Romanian national park "Mount Rodney." The package of documents on the matter submitted to UNESCO, as reported on the Romanian side of the Romanian-Ukrainian seminar held last April in the city. Visheu de Sus funded by the EU under the cross-border project "Biorehio Carpathians".

Geographical proximity predetermined locations within the Romanian Maramaroschyny 14 Ukrainian settlements. They form within Maramures

Ukrainian ethnic territory in a border zone. In the national structure of the population is over 88% are Ukrainian. It is important to the functioning of transboundary conservation reserve.

On the Ukrainian side to enter the territory of the reserve CBR (area - 58,035.8 ha) in the Transcarpathian region and National Park (NNP) "Cheremosky" (area - 7117.5 ha), established by the Decree of the President of Ukraine on December 11, 2009 g. to preserve valuable natural, historical and cultural complexes and objects within Putyla district of Chernivtsi region.

However, to enable cross-border reserve proposed CHYVCHYNY Hrynyavskyy and ridges in the Ivano-Frankivsk region, and ranges Putylli Yarovytsya and land west of the village. Sarata within the Chernivtsi region [1, 4]. The first step in the organization of the Bukovina Reserve was the creation in 1997 Cheremoskoho regional landscape park (RLP) in the area of 6555.8 hectares. It consists of ground Perkalabskoho Forestry Putyla State Forest and several then-farms on the slopes of the ridge Yarovytsya. In 2004 the regional council has decided to expand the territory Cheremoskoho RLP through areas of forest and forestry Putyla Carpathian derzhspetslishospu APC. The total area of 22,103.3 hectares RLP began.

In the natural respect NPP "Cheremosky" located on the territory serednohirya Bukovina Carpathians (Fig. 1). He cluster type and consists of three main sets: Yarovytsko-Chornodilskyy - in the extreme southwest of the Bukovina Carpathians; Maksymetsky array is located to the north and occupies the top of the chain ranges Maksymets - Losova - Ropachel; Rakov array - Shurdyn located in the southern part Pokuts'ka-Bukovina Carpathians (photo 1). Much of the park is concentrated in the origins of the White Cheremosh and includes the territory referred Cheremoshskiy RLP and the adjacent forests.



Photo. Panorama Bukovina Carpathians (photo Oksana Tomnyuk)

In general, the formation of national park "Cheremoskyy" began in 1972, when they were taken under the protection of the cliff to the city and created a large stone geological nature monument of local importance "black deeds" an area of 2.0 hectares. Later, in 1979, the decision of the executive committee of the Chernivtsi area increased to 263.0 hectares, and in 1980 the Council of Ministers of the Ukrainian SSR declared a landscape reserve of national importance.

Results and discussion. The territory of the NPP "Cheremoskyy" features a complex geological structure as it is within, as noted, Maramaroskoho crystalline massif - ancient Hercynian core Carpathians. Metamorphic rock solid rapidly deployed. They are observed within small skladchatist, and various violations of the amplitude of such discharges and pidkydiv.

Park Geomorphological structure closely related to the flow-geology and mining history of the region. The main orographic structures are Rakov submeridional strands - Shurdyn, Maksymets (1345 m) - Losova (1428 m), Yarovytsya - Tomnatyk an altitude of 1,567.4 meters (Yarovytsya g) and Black works - zhupan (an altitude 1480 m).

In the apical part strands Yarovytsya - Tomnatyk preserved ancient surface alignment (peneplain). The relief here has leveled-convex shape and it is available for many types of transport.

Somewhat similar is the relief of Black Ridge works - zhupan divided saddle headwaters. Sarata. There is also a well preserved ancient plateau-like area with minimal deviations. However, the overall look of undulating hilly broken strimchakovymy peaked peaks, most clearly at the tops of small and large stones (1453.6 m) Molochnobratskoho karst massif (1475 m), Saratov (1298 m). Amid slopes include some powerful blocks, vidtorzhentsi [7, 8].

The territory of the NPP "Cheremosky" part of the river basin White Cheremosh, Suceava. The main river is Perkalaba Drenthe, Saratov, Yalovychora, Lopushnia, turtle and others. The river valley is relatively narrow, well-defined lower terraces. Thus, in the valley. Sarata well include high floodplain (up to 2 meters), fragments of the first terrace height of 3-4 m, the second - 6-8 m, the third - 10-12 m.

The soil of the park developed on weathering products of various breeds, so in varying degrees, it turns skeletnist and acidity. In general, the differences between the various common brown mountain-forest soils capacity of 0.3-0.5 m.

In Geobotanical against the National Park "Cheremosky" refers to Chyvchyny-Hrynyavskyh mountains. Dominant position is occupied by pure spruce forests formation of European spruce (*Piceeta albae*). Most of them are almost radical in nature, and there is absolutely fundamental. Basically this option klimatohenny smerechyn. Under conditions of cold humid temperate climate, long snowy winters and short growing season replacing spruce beech (*Fagus sylvatica* L.) and ordinary fir (*Abies alba* Mill.), Forming monodominant group, only sometimes mixed with European pine (*Pinus cembra* L.).

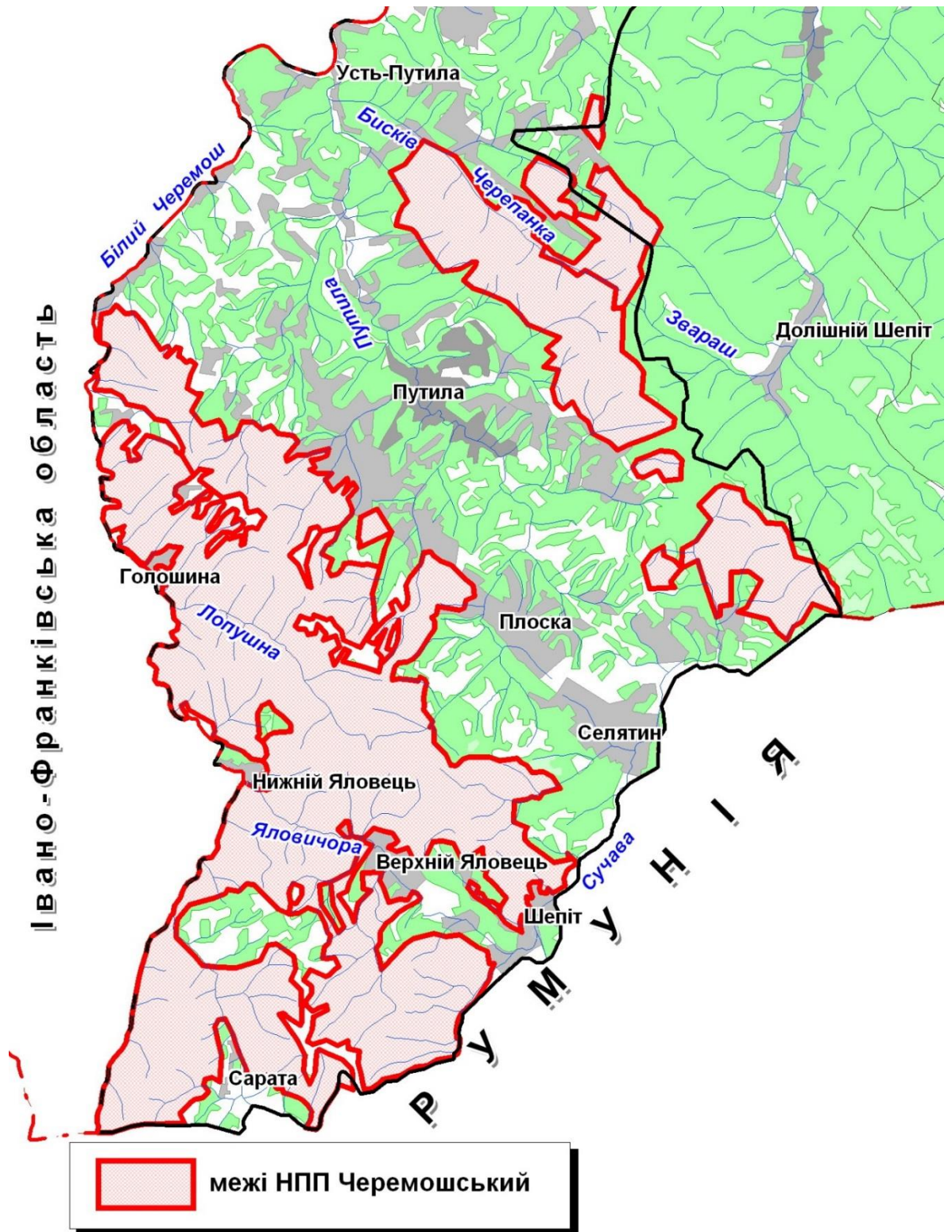


Fig. 1. Location of NNP "Cheremoskyu"

The most valuable in zoological regard are fragments completely indigenous communities cedar-fir forests (*Pineto (cembrae) - Piceetum (abietis) vaccinoso (myrtilli) - hylocomiosum*), which found a large stone on the mountain ridge Black Dil. This rare group of relict character, which spivdominantom acts listed in the Red Book of Ukraine pine. This is its only

habitat in Bukovina Carpathians [6].

It is interesting to note that g Big Stone - one of the most unique phytodiversity cells in the Ukrainian Carpathians and Ukraine in general. There m² 1 accounts for more than 40 species of plants. Big Stone Mountain - habitat of rare plants such as crepis Zhakena (*Crepis jacquini* Tausch) and sosyureya (bitter root) colored (*Saussurea discolor* (Willd.) DC.), Which are found in Ukraine only in the NPP "Cheremosky." Growing here leontopodium alpinum or edelweiss, silk kositsya (*Leontopodium alpinum* Cass.), Which is a symbol for the Hutsul selfless love. [10]

In the formation spruce forests most common group kvasenytsevyh smerechyn Association (*Piceetum (abietis) oxalidoso (acetosellae)*), which are confined to the rich soil of brown more or less gentle slopes. This is the most productive plant communities that form stands classes I-II growth class. Especially valuable are monodominant spruce grouping of associations formed to rendzina-soil on limestone and dolomite. [9]

Also presented at the park and grouping shrub type vegetation. The largest area is occupied chornychnyky (*Vaccinieta myrtilli*). They are mainly secondary in nature and formed in the forest belt of spruce forests in place a short-term derivatives group. In the bilberry plant communities there are such rarities as mountain arnica (*Arnica montana* L.), Heyfeliv saffron (*Crocus heuffelianus* Herb.), Rejected violet (*Viola declinata* Waldst.et Kit.) And others.

The second highest area - grouping meadow type vegetation. Basically it pislyalisovi bows that formed in place following summary of forests and the use of these areas for grazing or hay and confined to vypolozhenyh or slightly declivous slopes.

The most common group formation Kostrytsya red (*Festuceta rubrae*). They are found everywhere and are formed in place of fresh and moist spruce forest types. Most of these groups stands spivdominantom bent or polovytsya thin (*Agrostis tenuis* Sibth.), Which in its environmental requirements Kostrytsya close to the red (*Festuca rubra* L. s. Str.).

On rare species of flora consisting of groups of meadow type of vegetation growing mountain arnica, chyna smooth (*Lathyrus laevigatus* (Waldst et Kit.) Gren.), Cyanosis blue (*Polemonium caeruleum* L.), and listed in the Red Book of Ukraine Orlik blackish (*Aquilegia nigricans* Baumg.), Astantia major (*Astrantia major* L.), Botrychium lunaria (*Botrychium lunaria* (L.), zatinkova sedge (*Carex umbrosa* Host), Carpathian cornflower (*Centaurea carpatica* (Porc.) Porc.), green tongue (*Coeloglossum viride* (L.) C. Hartm.), autumn crocus (*Colchicum autumnale* L.), Heyfeliv saffron (*Crocus heuffelianus* Herb.), palchatokorinnyk sertsenosnyy (*Dactylorhiza cordigera* (Fries) Soo), *Gentiana acaulis* (*Gentiana acaulis* L.), bylynets dovhorohty (*Gymnadenia conopsea* (L.) R. Br.), lily or curly (b. name - royal curls) (*Lilium martagon* L.), Kukushkin tears ovate (*Listera ovata*

(L.) R. Br.), Decorated with orchids (*Orchis signifera* Vest) and burned (*O. ustulata* L.).

The European Red List includes tonkonih Reman (*Poa rehmanni* (Aschers. Et Graebn.) Woloszcz.) And poloninsky primrose (*Primula poloninensis* (Domin) An. Fed.). Zahalnokarpatski endemic - serrated bells (*Campanula serrata* (Kit.) Hendrych) and korolytsya rotundifolia (*Leucanthemum rotundifolium* (Waldst. Et Kit.) DC.) [8].

In the meadows growing south-east-endemic - rejected violet (*Viola declinata* Waldst. Et Kit.), Jaundice Alpine (*Chrysosplenium alpinum* Schur), alpine geraniums (*Geranium alpestre* Schur). East-endemic Marmaroska is cornflower (*Centaurea marmarosiensis*). Rare species are montannymy platanolystyy buttercup (*Ranunculus platanifolius* L.), cloves clusters (*Dianthus compactus* Kit.); decorative endangered - tyrlychnyk ciliary (*Gentianopsis ciliata* (L) Ma). Thus, in the meadow plant communities growing the largest number of rare species, compared with other types of groups [8, 9].

Much of the rarity fitohenofondu contained in the composition of public calcicolous rock groups. Within Bukovyna are known only in the national park. Their presence in the region due to the geological structure, shale outcrops of metamorphic, igneous rocks and fragments of Triassic-Jurassic limestone marble. Last come to the surface in the form of carbonate klipeniv (Big Stone peak hours), or some powerful vidtorzhentsiv-blocks that often occur on the ridge Black Dil.

Quite unique in coenotic and floral respect to national park "Cheremosky" grouping marsh vegetation type. The most common are hanging swamps, which are communities of herb-moss formations. Predominant characteristic southeast of Ukrainian Carpathians group formation sedge paniculate (*Cariceta paniculatae*) [9].

Paniculate Sedge (*C. paniculata* L.) belongs to a rare species of flora wetlands in Ukraine Ukrainian Carpathians this species has spread locally and often occurs in the mountains CHYVCHYNY (ridge Black Dil). Formation of communities as rare for Ukraine, to be protected and listed in the Green Book of Ukraine [5].

In Chyvchyny at the foot of the ridge Black Dil valley in Sarata located natural monument of local importance "White Stream". It is a pryshylove swamp, formed in place of bottling eponymous karst origin. Bog of its kind in the Ukrainian Carpathians inherent eutrophic sphagnum cover, as feed poor in minerals waters. In general, this calcareous bog with characteristic plant species and factions that other regions of Ukrainian Carpathians unknown.

Another monument of nature (geological) "Kizya Waterfall" is located between the villages of Ust-Putyla and Byskiv Putyla area. The slopes around the waterfall covered with beech and spruce-fir forests mixed with sycamore or maple nespravno-platanovoho (*Acer pseudoplatanus* L.).

The territory of the NPP "Cheremosky" rich in its landscape and recreational resources (landscape, humanistic, historical, cultural, landscape and aesthetic, spa, travel) that are poorly investigated and improperly assessed.

In the rocky cliffs of the ridge Black Dil strands (just south of Big Stone g) composed the Triassic-Jurassic limestones marmurovanymy known several karst caves and tectonic Molochnobratskoho dairy panel, announced by Presidential Decree Ukraine from 10.12.1994 number 750 karst and speleological reserve of national importance . Placed it at a distance of about 3.5 km from the confluence Perkalaba and Satara within Perkalabskoho forest on an area of 20.3 hectares. We know about 10 underground cavities - fractured vertical wells and horizontal caves. Most of cavities is investigated cave "Milk brothers", a depth of 40 m with a total length of 60 m. It is the second depth in the Ukrainian Carpathians and the deepest in the Chernivtsi region. This is promising for cavers and tourists object [2, 10].

Within the park are three mineral springs. In Ukraine and abroad chloride water of the type used in the treatment of cardiovascular diseases, damage to the gastrointestinal tract, urological diseases and skin. Analogues of water known in neighboring Romania (God knows resort), Lithuania (Druskininkai), Russia (Staraya Russa, Usolie) [2].

Given the lack of near major sources of air pollution should be considered a promising development of spa treatments general profile. The aesthetic framing of the environment creates a positive and emotsiyyy background that will contribute to the efficiency of treatment and procedural measures.

Is a large historical and cultural value of the national park. It limits and in the neighborhood many interesting tourist ethno-cultural objects.

The capital of Bukovina Carpathians assumed Putila village, located on the same river. Each year, every spring (usually in May) are made the traditional mass celebration "Out of the mountain", which accompanied yutsya folk festivals and attract visitors.

Putila mention of 1501 was long settlement was called Putila, Storonets-Putyla, Putyla-Storonets. It was born Ukrainian writer Yuri Fedkovich Democrat (1834-1888). Muzsy-estate Fedkovych reproduced on the site where was his family hut.

Putila is home to the famous peasant band, head of the anti-serfdom uprising of 1848-1849. Lukyan filly (1812-1851), also was elected a deputy of the Austrian peasants Reichstag (parliament).

Museum-house and monument Lukyan filly can visit the village of Sergius, which is located near Putila, at pp. Putila. This village is also known mineral waters. For water with healing and refreshing at any time of the year Vantsen source on the slopes of the mountain of the same name coming from almost all of Bukovina. In Putyla tributaries Porkulyyn Foshky

and visitors can admire noisy waterfalls.

Very picturesque village Roztoky. It is easily spread in a wide area in the valley of Cheremosh. Other village - emblazoned Seliatyn fault in the mountain valley along the river Suceava. Finding here in the 80s of XIX century. treasure of Roman coins give reason to assume that here, in the old way of military significance, there was a more ancient settlement.

Conclusions. National Park "Cheremosky" - created by cross-border component of Ukrainian-Romanian bilateral environmental reserve of "Maramoroskyi mountains."

For representation of protected species of vascular plants in the Ukrainian Carpathians existing national parks, in terms of their significance zoological NPP "Cheremosky" is second only Carpathian NNP.

Phytocenoses national park "Cheremosky" especially rocks limestone ridge Black Dil. zoological are of exceptional importance as due to the fact that part of their growing abundance of rare, endangered and endemic species, and given the fact that many of them are in other regions of Ukrainian Carpathians and Ukraine as a whole are not available, or known from isolated habitats.

Overall, the top White (and Black) CHEREMOSH in the Ukrainian Carpathians - the most mysterious and clandestine manner of very interesting (heuristic) region.

Список літератури

1. Андрієнко Т. Л. Флора та рослинність проектованого міждержавного українсько-румунського біосферного резервату "Мармароські та Чивчино-Гринявські гори" / Т. Л. Андрієнко, І. І. Чорней, В. А. Онищенко, В. В. Буджак // Укр. ботан. журн. – 2005, № 4. – С. 589-596.
2. Гетьман В. І. Українські Карпати: ландшафтно-рекреаційні ресурси [Навчальна книга] // В. І. Гетьман. – Тернопіль: Богдан, 2010. – 136 с.
3. Гетьман В. І. Печери природно-заповідного фонду України та їх використання / В. І. Гетьман // Заповідна справа в Україні, Т. 17, Випуск 1- 2. – Канів, 2011. – С. 1-6.
4. Заповідна справа в Україні [Навчальний посібник] / За загальною редакцією М. Д. Гродзинського, М. П. Стеценка. – К.: Географіка, 2003. – 306 с.
5. Зеленая книга УССР. Редкие, исчезающие и типичные, нуждающиеся в охране, растительные сообщества. – К.: Наук. думка, 1987. - 286 с.
6. Каталог раритетного біорізноманіття заповідників і національних природних парків України. Фітогенетичний фонд, мікогенетичний фонд, фітоценотичний фонд / Під ред. С. Ю. Поповича. – К.: Фітосоціоцентр, 2002. – 276 с.

7. Коржик В. П. Територіальні проблеми раціонального природокористування / В. П. Коржик // Географія Чернівецької області. – Чернівці, 1993. – С. 89-91.

8. Матеріали проекту створення національного природного парку “Черемоський”, 2009.

9. Шеляг-Сосонко Ю.Р . География растительного покрова Украины / Ю. Р. Шеляг-Сосонко, В. В. Осычнюк, Т. Л. Андриенко – К.: Наук. Думка, 1980. – 288 с.

10. Юзик А. Таємниці Чорного Долю. Національний природний парк “Черемоський” / А. Юзик // Зелені Карпати. – №1-4, 2014. – С. 44-46.

В статье подчеркивается, что в русле выполнения Паневропейской стратегии сохранения биологического и ландшафтного разнообразия национальный природный парк “Черемошский” войдет в состав создаваемого трансграничного украинско-румынского природоохранного резервата билатерального типа “Мараморосские горы”.

Характеризуется флористическое разнообразие территории национального природного парка “Черемошский” в причинно-следственной связи с природными (абиотическими) условиями региона юго-западной части Украинских Карпат. Представлен детальный перечень редких видов флоры в составе растительных сообществ парка, внесенных в Красную книгу Украины, Европейский Красный список, а также названы редкостные ценозы Зеленой книги Украины.

Территория НПП “Черемошский” богата ландшафтно-рекреационными ресурсами (пейзажными, гуманистическими, историко-культурными, ландшафтно-эстетическими, бальнеологическими), которые еще недостаточно исследованы и оценены, на что и указано в статье.

Национальный природный парк, резерват, разнообразие, флора, растительность

PHYTODIVERSITY OF TERRITORY OF NATIONAL PARK "CHEREMOSKY"

**V. I. GETMAN, Candidate of Geographical Sciences
Taras Shevchenko National University of Kyiv**

This article characterizes floral diversity of National Natural Park's area "Cheremosky" in cause-and-effect relationship with natural (abiotic) conditions of the south-west part of the Ukrainian Carpathians region. Detailed list of rare flora species consisting of park's vegetative grouping related to the Red Data Book of Ukraine, European Red List is presented and rare cenosises of the Green Data Book of Ukraine is also mentioned.

Accent is made on fact that in the tideway of Pan-European Biological and Landscape Diversity Strategy implementation, The National Natural Park's "Cheremosky" will be part of created transboundary Ukrainian-Romanian environment-oriented reserve of bilateral type "Maramorosky Mountains".

Flora, vegetation, national natural park, reserve, diversity

Ukrainian Carpathians anciently famous scenic mountain and valley landscapes, valuable mineral waters, numerous monuments of wooden sacred art, cheerful Ukrainian songs and dances, in which so much poetry and beauty. Azure dome majestic peaks, green Carpathian meadows, mountain sun, fresh air filled with the scent of dense forest - dense spruce stands Buchin and dark, narrow valley of the turbulent river of crystal memorable one who traveled the Ukrainian Carpathians, unique for life.

Pristine corners of the nature of these mountains is stored in the natural reserve fund (NRF) - reserves, national parks, preserves and more. Their expansion and improvement is one of the important optimization of protection of human life, the preservation of landscape and biotic diversity of ecological network.

In the Ukrainian Carpathians as most important for Ukraine and Central Europe ekologoznachymomu region has long carried out a consistent policy to establish an adequate system of protected areas, primarily due to territorial and landscape and monolithic representative areas. Currently established fairly clear structure protected areas and facilities, covering almost all the high altitude zone landscape complexes Ukrainian Carpathians - from lowland deciduous-mishanolisovyh to medium-high coniferous forests and subalpine.

Until recently, a kind of "white spot" in the Nature Reserve industry remained south-eastern part of the Ukrainian Carpathians in the upper

reaches of the Black and White Cheremosh, which focuses much of the biodiversity of the region and remained the least anthropogenically modified landscapes that define regional environmental situation. It is the most remote places in southwestern Ukrainian (Forested) Carpathian Mountains on the border between Ukraine and Romania, where the area is the north-eastern foothills Maramaroskoho crystalline array - geological core PrakarpatyThat. The main (central) part of it is located within Romania.

Millions of years ago, in the second half of the Paleozoic era, the Hercynian orogenesis (about 350 - 250 million. P. So) here began forming at the site of the Carpathian Mountains geosyncline - seabed giant ancient Tethys Ocean that separated the northern and southern continents of the globe. It rises from the oldest birth Carpathians. Then began and ended in the formation of the Alpine orogenesis (from 25 to 2-1,5 million. G. Ago), the Alps, and Kavkakyh Crimean mountains, the highest of the Himalayas like.

The richness of the natural environment, especially biotic diversity, Intergovernmentalism single natural complex Maramorosh crystalline array was a prerequisite for the creation of this powerful territorial cast transboundary Ukrainian-Romanian bilateral environmental reserve of "Maramoroskyi mountains" as provided in the framework of the European Strategy for the conservation of biological and landscape diversity. To this end, Romania established Biosphere Reserve (Park) "Maramaroschyny Mountain" area of 168,754 hectares, of which area (river basin Visheu) directly adjacent to the border with Ukraine should be part of the Romanian transboundary reserve. To reserve "Maramoroskyi mountain" will also include Romanian national park "Mount Rodney." The package of documents on the matter submitted to UNESCO, as reported on the Romanian side of the Romanian-Ukrainian seminar held last April in the city. Visheu de Sus funded by the EU under the cross-border project "Biorehio Carpathians".

Geographical proximity predetermined locations within the Romanian Maramaroschyny 14 Ukrainian settlements. They form within Maramures Ukrainian ethnic territory in a border zone. In the national structure of the population is over 88% are Ukrainian. It is important to the functioning of transboundary conservation reserve.

On the Ukrainian side to enter the territory of the reserve CBR (area - 58,035.8 ha) and in the Transcarpathian region and **National Park (NPP) "Cheremoskyi"** (area - 7117.5 ha), established by the Decree of the President of Ukraine of 11 December 2009 on the conservation of natural, historical and cultural complexes and objects within Putyla district of Chernivtsi region .

In general, the proposed cross-border reserve include CHYVCHYNY Hrynyavskyy and ridges in the Ivano-Frankivsk region, and ranges Putylli Yarovytsya and land west of the village. Sarata within the Chernivtsi region

[1, 2]. The first step to this organization here was to create a reserve in 1997 Cheremoskoho regional landscape park (RLP) in the area of 6555.8 hectares.

In the natural respect NPP "Cheremosky" located on the territory serednohirya Bukovina Carpathians (Fig. 1). He cluster type and consists of three main sets: Yarovytsko-Chornodilsky - in the extreme southwest of the Bukovina Carpathians; Maksymetsky array is located to the north and occupies the top of the chain ranges Maksymets - Losova- Ropachel; array carcinoembryonic Shurdyn located in the southern part Pokutsko-Bukovina Carpathians. Much of the park is concentrated in the origins of the White Cheremosh and includes the territory referred Cheremoshskiy RLP and the adjacent forests.

The aim - to show the relevance of effective search of new species of flora protection Bukovina Carpathians to ensure their preservation and restoration in a constantly growing anthropogenic influence, outline the main ways and forms of modern solution to the problem of absolute conservation in the National Park.

Results and discussion. In respect Geobotanical national park "Cheremosky" refers to Chyvchyny-Hrynyavskyh mountains. Dominant position is occupied by pure spruce forests formation of European spruce (*Picea abies*). Most of them are almost radical in nature, and there is absolutely fundamental. Basically this option klimatoheny smerechyn. In conditions of cold humid temperate climate, long snowy winters and short growing season replacing spruce beech (*Fagus sylvatica* L.) and ordinary fir (*Abies alba* Mill.), Forming monodominant group, only sometimes mixed with pine (*Pinus cembra* L.).

The most valuable in zoological regard are fragments completely indigenous communities cedar-fir forests (*Pineto (cembrae) - Piceetum (abietis) vaccinioso (myrtilli) - hylacomiosum*), which found a large stone on the mountain ridge Black Dil. This rare group of relict character, which spivdominantom acts listed in the Red Book of Ukraine pine. This is its only habitat in Bukovina Carpathians [4].

It is interesting to note that g Big Stone - one of the most unique phytodiversity cells in the Ukrainian Carpathians and Ukraine in general. There m² 1 accounts for more than 40 species of plants. Big Stone Mountain - habitat of rare plants such as crepis Zhakena (*Crepis jacquinii* Tausch) and sosyureya (bitter root) colored (*Saussurea discolor* (Willd.) DC.), Which are found in Ukraine only in the NPP "Cheremosky." Growing here leontopodium alpinum or edelweiss, silk kositsya (*Leontopodium alpinum* Cass.), Which is a symbol for the Hutsul selfless love. [7]

In the formation spruce forests most common group kvasenytsevyh smerechyn Association (*Piceetum (abietis) oxalidoso (acetosellae)*), which are confined to the rich soil of brown more or less gentle slopes. This is the most productive plant communities that form stands classes I-II growth

class. Especially valuable are monodominant spruce grouping of associations formed to rendzina-soils on limestone and dolomite [6].

Fragmented are in the park and grouping shrub type vegetation. The largest area is occupied chornychnyky (*Vaccinieta myrtilli*). They are mainly secondary in nature and formed in the forest belt of spruce forests in place a short-term derivatives group. In the bilberry plant communities there are curiosities: mountain arnica (*Arnica montana* L.), Heyfeliv saffron (*Crocus heuffelianus* Herb.), Rejected violet (*Viola declinata* Waldst.et Kit.) And others.

The second highest area - grouping meadow type vegetation. Basically it pislyalisovi bows that formed in place following summary of forests and the use of these areas for grazing or hay and confined to vypolozhenyh or slightly declivous slopes.

The most common group formation Kostrytsya red (*Festuceta rubrae* L. s. Str.). They are found everywhere and are formed in place of fresh and moist spruce forest types. Most of these groups stands spivdominantom bent or polovytsya thin (*Agrostis tenuis* Sibth.), Which in its environmental requirements Kostrytsya close to the red (*Festuca rubra* L. s. Str.).

On rare species of flora consisting of groups of meadow type of vegetation growing mountain arnica, chyna smooth (*Lathyrus laevigatus* (Waldst et Kit.) Gren.), Cyanosis blue (*Polemonium caeruleum* L.), and listed in the Red Book of Ukraine Orlik blackish (*Aquilegia nigricans* Baumg.), Astraintia major (*Astraintia major* L.), Botrychium lunaria (*Botrychium lunaria* (L.), zatinkova sedge (*Carex umbrosa* Host), Carpathian cornflower (*Centaurea carpatica* (Porc.) Porc.), green tongue (*Coeloglossum viride* (L.) C. Hartm.), autumn crocus (*Colchicum autumnale* L.), Heyfeliv saffron (*Crocus heuffelianus* Herb.), palchatokorinnyk sertsenosnyy (*Dactylorhiza cordigera* (Fries) Soo), chaff Portsiusa (*Festuca porcii* Hack.), Gentiana acaulis (*Gentiana acaulis* L.), bylynets dovhorohty (*Gymnadenia conopsea* (L.) R. Br.), levkorhis whitish (*Leucorchis albida* (L.) E. Mey.), lily or curly (b. name - royal curls) (*Lilium martagon* L.), Kukushkin tears ovate (*Listera ovata* (L.) R. Br.), decorated with orchids (*Orchis signifera* Vest) and burned (*O. ustulata* L.), traunshteynera spherical (*Traunsteinera globosa* (L.) Reichenb.) [5].

The European Red List includes tonkonih Reman (*Poa rehmanni* (Aschers. Et Graebn.) Woloszcz.) And poloninsky primrose (*Primula poloninensis* (Domin) An. Fed.). Zahalnokarpatski endemic - serrated bells (*Campanula serrata* (Kit.) Hendrych) and korolytsya rotundifolia (*Leucanthemum rotundifolium* (Waldst. Et Kit.) DC.).

In the meadows growing south-east-endemic - rejected violet (*Viola declinata* Waldst. Et Kit.), Jaundice Alpine (*Chrysosplenium alpinum* Schur), alpine geraniums (*Geranium alpestre* Schur). East-endemic Marmaroska is cornflower (*Centaurea marmarosiensis*). endangered relict species - common ophioglossum (*Ophioglossum* L.).

Rare species are montannymy platanolystyy buttercup (*Ranunculus platanifolius* L.) and Hornshuha (*R. hornschuchii* Hoppe), cloves clusters (*Dianthus compactus* Kit.), Soldanela Hungarian (*Soldanella hungarica* Simonk.); decorative disappearing - tyrlychnyk ciliary (*Gentianopsis ciliata* (L) Ma) and sholudyvnyk Hackett (*Pedicularis hacquetii* Graf) .Otzhe, in the meadow plant communities growing the largest number of rare species, compared with other types of groups [5, 6].

Much of the rarity fitohenofondu contained in the composition of public calcicolous rock groups. Compared with other types of plant communities of a small area, but within Bukovyna are known only in the national park.

Their presence in the region due to the geological structure, shale outcrops of metamorphic, igneous rocks and fragments of Triassic-Jurassic limestone marble. Last come to the surface in the form of carbonate klipeniv (Big Stone peak hours), or some powerful vidtorzhentsiv-blocks that often occur on the ridge Black Dil.

Quite unique in coenotic and floral respect to national park "Cheremosky" grouping marsh vegetation type. The most common are hanging swamps, which are communities of herb-moss formations (classification EM Bradis). Predominant characteristic southeast of Ukrainian Carpathians group formation sedge paniculate (*Cariceta paniculatae*) [6].

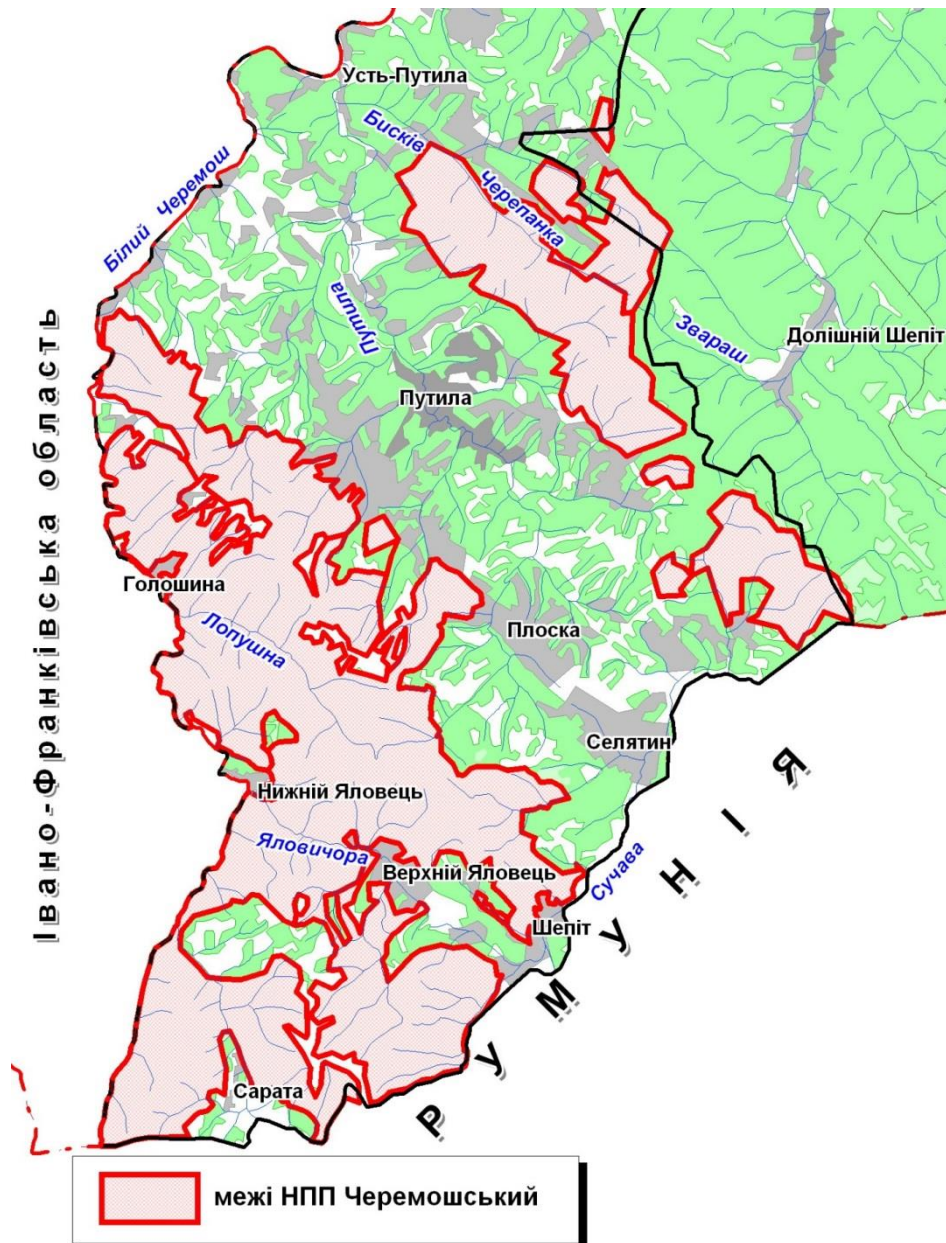


Fig. 1. Location of NNP "Cheremoskyi"

Paniculate Sedge (*C. paniculata* L.) belongs to a rare species of flora wetlands in Ukraine. In the Ukrainian Carpathians, this species has spread locally and often occurs in the mountains of the Chyvcshyny (ridge Black Dil). Formation of communities as rare for Ukraine, to be protected and listed in the Green Book of Ukraine [3].

In Chyvcshyny at the foot of the ridge Black Dil valley in Sarata located natural monument of local importance "White Stream". It is a pryshylove swamp, formed in place of bottling eponymous karst origin. Bog of its kind in the Ukrainian Carpathians inherent eutrophic sphagnum cover, as feed poor in minerals waters. In general, this calcareous bog with characteristic plant species and factions that other regions of Ukrainian Carpathians unknown.

Conclusions. National Park "Cheremoskyi" - created by cross-border component of Ukrainian-Romanian bilateral environmental reserve of "Maramoroskyi mountains."

For representation of protected species of vascular plants in the Ukrainian Carpathians existing national parks, in terms of their significance zoological NPP "Cheremosky" is second only Carpathian NNP.

Phytocenoses national park "Cheremosky" especially rocks limestone ridge Black Dil have exceptional value as zoological due to the fact that part of their growing abundance of rare, endangered and endemic species, and given the fact that much of including in other regions of the Ukrainian Carpathians and Ukraine as a whole are not available, or are known in isolated habitats.

Список літератури

1. Андрієнко Т. Л. Флора та рослинність проектованого міждержавного українсько-румунського біосферного резервату "Мармароські та Чивчино-Гринявські гори" / Т. Л. Андрієнко, І. І. Чорней, В. А. Онищенко, В. В. Буджак // Укр. ботан. журн. – 2005, № 4. – С. 589-596.

2. Заповідна справа в Україні [Навчальний посібник] / За загальною редакцією М. Д. Гродзинського, М. П. Стеценка. – К.: Географіка, 2003. – 306 с.

3. Зеленая книга УССР. Редкие, исчезающие и типичные, нуждающиеся в охране, растительные сообщества. – К.: Наук. думка, 1987. – 286 с.

4. Каталог раритетного біорізноманіття заповідників і національних природних парків України. Фітогенетичний фонд, мікогенетичний фонд, фітоценотичний фонд / Під ред. С. Ю. Поповича. – К. : Фітосоціоцентр, 2002. – 276 с.

5. Матеріали проекту створення національного природного парку "Черемоський", 2009.

6. Шеляг-Сосонко Ю. Р. География растительного покрова Украины / Ю. Р. Шеляг-Сосонко, В. В. Осычнюк, Т. Л. Андриенко – К.: Наук. думка, 1980. – 288 с.

7. Юзик А. Таємниці Чорного Долю. Національний природний парк "Черемоський" / А. Юзик // Зелені Карпати, №1-4, 2014. – С. 44-46.

В статье характеризуется флористическое разнообразие территории национального природного парка "Черемошский" у причинно-следственной связи с природными (абиотическими) условиями региона юго-западной части Украинских Карпат. Подан детальний перелік раритетних видів флори в складі рослинних спільнот парку, занесених в Червону книгу України, Європейський Червоний список, а також названо рідкісні ценози Зеленої книги України.

Подчеркнуто, что в плане выполнения Общеввропейской стратегии сохранения биологического и ландшафтного разнообразия национальный природный парк "Черемошский" войдет в состав создаваемого трансграничного украинско-румунского природо-охранного резервата билатерального типа "Мараморошские горы".

Флора, растительность, национальный природный парк, резерват, разнообразие

This article characterizes floral diversity of National Natural Park's area "Cheremosky" in cause-and-effect relationship with natural (abiotic) conditions of the south-west part of the Ukrainian Carpathians region. Detailed list of rare flora species consisting of park's vegetative grouping related to the Red Data Book of Ukraine, European Red List is presented and rare cenosises of the Green Data Book of Ukraine is also mentioned.

Accent is made on fact that in the tideway of Pan-European Biological and Landscape Diversity Strategy implementation, The National Natural Park's "Cheremosky" will be part of created transboundary Ukrainian-Romanian environment-oriented reserve of bilateral type "Maramorosky Mountains".

Flora, vegetation, national natural park, reserve, diversity

STUDY OF FORMATION ANTHROPOGENIC FACTORS ON THE QUALITY OF WATER RESOURCES DECENTRALIZED WATER SUPPLY RURAL WITHIN BEREZHANY TERNOPIL REGION

N. M. GLOVIN, Candidate of pedagogical Science

O. V. PAVLIV, Candidate of Veterinary Science

VP NUBiP Ukraine "Berezhany Agrotechnical Institute»

The main anthropogenic factors of chemical and toxicological pollution of decentralized water-supply sources in rural settlements are examined. Complex estimation of water pollution level is made and the dependence of subsoil waters quality from season changes is elicited on the example of countryside within Berezany district Ternopil region

Subsoil waters, well, chemical pollution index, toxicology pollution index, water hardness

The targeted application of sustainable rural development for the period until 2020 [1] provides for the continuous monitoring of environmental quality in rural areas, including water sources and improvement of the health and rehabilitation of social and environmental situation in Ukraine. Water resources of any state is one of the most significant strategic factors in ensuring the functioning of the economy and public health.

In rural areas, the widespread use of decentralized water supply sources (wells and individual wells). They all have a regulatory sanitary protection zone (this is one of the main sanitary requirements) which prevents toxicological and chemical pollution of water in them. Regarding the placement of wells at the private home ownership, then, given the small area of land, they can not create the necessary zone of sanitary protection. Therefore, along with the power supply and are often outbuildings for animals and toilets vyhrebamy and manure piles, which are sources of nitrates, which lead to soil contamination and accordingly soil water in it. [9] The most common is groundwater pollution sulfates, chlorides, nitrogen compounds (nitrates, ammonia, ammonite), oil products, phenols, iron compounds, heavy metals, making them unsuitable for use in drinking purposes [5]. More details in our research, we settled on studying the problem of global groundwater contamination in Ukraine inorganic nitrogen compounds, which are dominated by nitrates. The main sources of pollution are fertilizers, liquid runoff from livestock farms, natural sediments and organic waste [6, 7, 8]. Note that nitrate nitrogen is the most mobile

forms of nitrogen compounds in the soil, they are easily washed out the necessary water flow down to the ground water, which is their constant accumulation, and as a result - nitrate pollution. However, their content in the soil is insignificant [5].

Berezhany district mainly agricultural, but because agricultural production has become one of the biggest polluters of water resources, including groundwater. Dangerous source of pollution of natural waters, especially during periods of spring flooding and torrential floods are diffuse runoff from agricultural land. Among them is made on average 3-4 times more nutrients and suspended solids than the natural land. [10] So, given the condition of groundwater sources, the issue of meeting the needs of the rural population in the drinking water of high quality is an extremely serious problem.

Analysis of key studies and publications. The relevance of this study is due to the fact that the known data, more than 80% of diseases transmitted through water sources [4]. In particular, numerous observations and studies found that among the problems of drinking water agricultural areas are of high hardness and total mineralization [4]. Last provoke adjournment of salts in the body (arthritis, delaying kidney stones and gall bladder). A special place among the known chronic poisoning belongs poisoning heavy metal salts. We know of more than forty elements, including the most common: copper, mercury, manganese, cobalt, chromium, nickel, gold, iron, cadmium, lead, antimony, thallium, bismuth and others [11]. One of the main sources of heavy metals into the environment is a natural process of evaporation from the earth's crust and revenues as a result of human activity. Established that anthropogenic of heavy metals on the order exceeds the natural flow [10]. These elements can be found in agricultural insecticides and herbicides, industrial joints organic or inorganic nature medicines. In excess of maximum permissible concentration of a substance emerging threat to health. But bad and more - the concentration of an item less than it is necessary for the normal functioning of the body. In the words of a famous scholar of the Middle Ages Paracelsus, everything is poison, everything is medicine - it all depends on the dose. Often, even a slight excess concentration of a substance causing illness and death [8]. It is therefore important to know the most common physiological properties of the compounds. If contact with such harmful substances is constant, there is definitely risk of poisoning the body grows too. This weakened immunity, increases the risk of chronic disease [3].

So nitrates - a salt of nitric acid (nitrate), which existed long before man and without which life itself. The problem is not available, and in quantity. Plants absorb from the soil, fertilizers rich in compounds several times more nitrogen than necessary for their development. As a result, only a percentage of nitrate is synthesized in vegetable protein we need, and the rest falls on the table in the "kind" of fruit, in roots, stems and leaves in.

In living organisms, their fate depends on many factors, including the state of our health. Some nitrates freely displayed, others - are required to have chemical compounds, and others - are transformed into nitric acid salts - nitrates. They react with hemoglobin, eliminating the possibility of red blood cells provide oxygen to the cells of organisms. As a result, disturbed metabolism, significantly reduced immunity [2, 4, 9].

The results of human impact on natural resources should not be seen only in the light of technological progress and population growth, but also depending on the social context in which they appear. The relation to the environment is a measure of social and technological achievements of human society, characteristic of civilization. [9] Due to lack of funds in the rural councils, current repair work on rural water supply forced people to spend their money on their own, but the quality of sanitation may not always be carried out efficiently. [12]

The aim is to study the influence of anthropogenic factors on the formation of quality decentralized water supply for chemical indicators toxicological contamination and identify ways to improve the environmental situation in Ukraine. Such research is a promising area of decision-making at the state level.

Materials and methods of research. The material for the research were average patterns of decentralized water sources, such as the foundation of water (wells) in areas subject to man-made impact in rural areas. The study of these sources of water held by officially established methods of subsoil waters GOST 26483-85, GOST 26490-85, GOST 24281-80, GOST 24849-81.

Results and discussion. Today, consumers of water faced with certain difficulties. Thus, the laboratory analysis of water treated with the following questions: why water has an unpleasant taste and smell, why water is muddy and yellow, why water-heating devices are covered with a thick scum, and other similar issues. Analysis of water samples for a number of chemical and toxicological indicators provides answers to some questions. Laboratory analysis of water from the centralized and decentralized water supply today clearly identify growth trends cases detection in water wells nitrates, phosphates, indicating that emissions aquifers mineral and organic fertilizers. The analysis evaluated the chemical composition of water and toxicological indicators and issued recommendations for the correction of the water, taking into account the concentration of components and cleaning technology.

For qualitative composition (content of cations and anions, mineralization) of groundwater Ternopil region used to supply substantially dominated by hydro-sulphate calcium-sodium water with mineralization 0,2-0,8 g / dm³. In particular, Berezhany district underground fresh water are bicarbonate-sulphate calcium-sodium composition by total mineralization of 0.5-0.7 g / dm³. In the 3432 there are artesian wells, including in rural areas - 2679 and 753 - in cities and towns and 74,296 mine pit.

Information about the content of the studied parameters shown in Table 1. It is established that the area marked by low concentrations of nitrite during

the entire study period, except for rare cases of growth: the fall in with. Zhukov (up to 0.02 mg / dm³) and spring in the village. Drought (up to 0.04 mg / dm³), due to increased precipitation and, consequently, increasing runoff from agricultural land. Minor concentrations of nitrates in groundwater in the area (less than 0.01 mg / dm³) due to their extreme instability. They are oxidized, turning into the most stable inorganic nitrogen - nitrates. Stability nitrate forms leads to the accumulation of them in the groundwater by infiltration of the soil solution, the richest of these compounds, and further as a result of economic activity (making the surface soil nitrogen mineral and organic fertilizers) and pollution gaseous, solid and liquid nitrogen compounds [4]. As for nitrate, then set them high rates of gradual growth from spring to autumn. In the village. Zhukov this figure does not exceed the norm than the fall, when it is 52,35 mg / dm³. Significant increase in the concentration of nitrates in the territory of the studied areas autumn because when the rains fall in the ground water contaminants flowing from the fields, which made nitrogen fertilizers. Summer can be explained by increasing fertilizer.

Research z`yasovano the content of sulfate and chloride during the entire period of study of the problem is not higher than normal, but generally tends to improve these indicators in spring and autumn, which is associated with an increase in rainfall (as occurs in spring snow melt) and increasing runoff. Also, the main sources of sulphate and chloride to the ground water is wastewater.

Comprehensive evaluation of water contamination by sanitary-toxicological criteria indicated (Table. 2), for the study water contamination exceeds acceptable level. High levels of contamination found on the 3rd object - spring (4.3 units.) And autumn (3.4 units)., And the 4th object - spring (3.1 units.). High levels of pollution makes it impossible to use this water for drinking water supply, which indicates the need for special measures Water.

Overall analysis of the chemical composition of water in the territory of studies suggests the poor state drinking water quality decentralized water supply. According to our data, it is necessary to strengthen control of the toxicological and chemical indicators of water from decentralized sources of water in the spring and fall, when through the use of contaminated water increases the risk of infection.

1. State water quality decentralized water with some chemical parameters in different seasons

Name of settlement	Seasons			
	winter	spring	summer	autumn

Нітриди, норма 0,00 мг/дм³				
Надрічне	0,003	0,003	0,003	0,002
Жуків	0,004	0,004	0,004	0,004
Куропатники	0,004	0,004	0,004	0,003
Посухів	0,003	0,004	0,002	0,003
Нітрати, норма 50 мг/дм³				
Надрічне	50,78	60,4 1	77,2	104,7
Посухів	96,65	58,59	137,9	181,6
Жуків	39,46	25,5	39,87	52,35
Куропатники	62,02	47,34	56,38	109,4
Хлориди, норма 250 мг/дм³				
Надрічне	54	76,5	79,3	88
Жуків	32	56,3	57,2	78,1
Куропатники	48,3	68	42,9	84,7
Посухів	58	33	65,9	90,2
Сульфати, норма 250 мг/дм³				
Надрічне	78,5	95,3	96,2	85,7
Жуків	38,09	63,5	75	113,3
Куропатники	70	84,32	60	102,3
Посухів	65,08	44,44	79,49	98,45

2. The degree of water pollution on health and toxicological indicator

object number	Sanitary and toxicological indicator			
	winter	spring	summer	autumn
1 (Надрічне)	1,8	2,47	1,3	2,03
2 (Жуків)	1,4	2,5	1,67	2,8
3 (Куропатники)	2,96	4,3	2,68	3,4
4 (Посухів)	2,3	3,1	1,3	1,5

Conclusions. The results say about the poor state of groundwater due to increased nitrate content in these sites. Z`yasovano that sewage and fertilizers that are made in the ground, the greatest impact on the quality of water from underground sources. Also set to increase the content of nitrites, nitrates, chlorides, sulfates during the spring snow melt and fall during the rainy season. Due to the excess of the norm of nitrates in groundwater, it is imperative to control of nitrogen fertilizers in the soil, conduct additional purification of drinking water before use. It is also necessary to place well at a distance of at least 20-25, and sometimes 100 meters from pollution sources subject areas of movement of groundwater.

Therefore, decentralized water supply security, especially in rural areas should be a priority for public policy for sustainable rural development regarding drinking water. It is clear that in areas with a high percentage of "non-standard" water increased risk of cancer. The effect of water with high content of nitrates increases against the backdrop of malnutrition that now is a particularly relevant.

As preventive measures to improve the quality of drinking water supply is recommended decentralized control of the sanitary and epidemiological services on the sources of decentralized water supply twice a year, especially in spring and autumn. In DerzhSanPiN recommended to conduct such studies 1 per year in the most unfavorable period. Life and tube wells should pledge given direction of movement and location of groundwater pollution sources (livestock facilities, latrines, garbage dumps). Local authorities recommend to inform the public about farm products and how to disinfect wells. To clean and disinfect wells upgrade should be done in the most unfavorable time of year - spring.

Список літератури

1. Бадюк Н. С. Використання методу суб'єктивної оцінки в розробці шляхів оптимізації водозабезпечення населення. [Електронний документ]: Н. С. Бадюк, А. М. Войтенко / Режимдоступу: <http://www.health.gov.ua/Publ/conf.nsf/165dc8dd0ddb56dc2256d8f00264254/95610ec8ab872de6c2256d950045218d?OpenDocument>
2. Бєличенко Ю. П. Захист водних ресурсів / Ю. П. Бєличенко, В. М. Дращнер, В. М. Чередниченко // – К.: Будівельник, 1990. – 96с.
3. Герасимчук З. В. Еколого-економічні основи водокористування в Україні. / З. В. Герасимчук, Я. О. Мольчак, М. А. Хвесик // – Луцьк: Надстир'я, 2000. – 364 с.
4. Катернога М. Т. Українська криниця / М. Т. Катернога // – К.: Техніка, 1996. – 112 с.
5. Прокопов В. О. Контроль за якістю питної води: нормативи, системи, методики, обладнання / В. О. Прокопов //Матеріали науково-практичних конференцій II Міжнародного водного форуму „Аква Україна-2004”, 21-23 вересня 2004 р. – С. 248–249.
6. Руденко Г. Б., Питна вода на межі політики, екології та економіки / Г. Б Руденко., Омельянець С.М. //Матеріали науково-практичних конференцій II Міжнародного водного форуму „Аква Україна-2004” 21-23 вересня 2004р. – С. 156–159.
7. Тугай А. М. Водопостачання. Джерела і водозабірніспоруди / А. М. Тугай, Я. А. Тугай // – К.: УФІ М і Б, 1998. – 192 с.
8. Хоружий П. Д.Розширення використання підземних вод / П. Д. Хоружий, Т. П. Хомутецька // Водне господарство України. – 1997. – №1. – С. 21–22.
9. Якість води. Відбір проб. Частина 3. Настанови щодо зберігання та поводження з пробами: ДСТУ ISO 5667-3-2001 ISO 5667-3:1994.
10. Токсикологія води. Терміни та визначення: ДСТУ 3928–99.
11. Якість води. Визначання нітрату: ДСТУ 4078–2001 і ISO 7890–3:1998.

12. «Державний комітет України по водному господарству»
[Електронний ресурс] – Режим доступу: <http://www.scwm.gov.ua>.

Рассмотрены основные антропогенные факторы химического и токсикологического загрязнения источников децентрализованного водоснабжения в сельских населенных пунктах. Проведена комплексная оценка уровня загрязненности воды и выявлена зависимость качества подземных вод от сезонных изменений на примере сельских местностей в пределах Бережанского района Тернопольской области.

Грунтовая вода, колодець, химический показатель загрязнения, токсикологический показатель загрязнения, твердость воды

BACTERIAL MICROBIOTA OF SUGAR BEET ROOTS, STRUCK THE TAIL ROT

K. P. DVORAK, postgraduate *
Institute of bioenergy crops and sugar beet NAAS

*On the basis of morphological, culture-based and biochemical properties in the composition of the microbiota of sugar beet roots with typical symptoms of infestation by tail rot it was determined the presence of bacteria *Pantoea agglomerans*, *Pectobacterium carotovorum* and representatives of the genus *Pseudomonas* and *Bacillus*.*

Tail rot, sugar beets, bacteria, defeat, properties, identification

Root rot which currently identified more than 20 species, is one of the main reasons for the decline of yield and technological quality of sugar beet. Pathogenesis of rot of sugar beet roots is a complex process because it involves complex organisms, which are constantly competing with each other provided that [3].

Tail rot or homoz is one of the most harmful diseases of bacterial origin for sugar beet. Every year it is affected from 2 to 4.2% of plants in almost all areas of Ukraine [4]. The place of penetration of bacteria in root and spread it has fibrovascular bundles; on sections across lesion above the root of tissue bundles are the drops of liquid, which show numerous bacteria [1].

Tail rot affects the roots during the growing season and often leads to its total loss [11]. The decay begins with the root of the tail, whence came the name of the disease; another of its names - homoz characterized as soft mucous tissues decay still at an early stage lesions. Affected first part of root darkens and becomes black or lead-gray, brown and dies [3, 11].

Leaves of affected plants become chlorotic appearance, necrotizing and die - bottom first, then the rest [9]. Part of the affected roots and beet factory during storage continues to provide a source of rot and rot kahatnoyi [4].

To carry pathogens *Xanthomonas axonopodis* pv. *vasculorum* (Cobb 1894) Vauterin et al. 1995. Outdated name *Xanthomonas campestris* pv. *vasculorum* (Cobb 1894) Dye 1978 [5]. In addition to the type of surface and the internal tissues of the affected tail rot of sugar beet roots may be different types of bacteria that can initiate the infectious process or exacerbate infestation of plants caused by other microorganisms.

* Supervisor – doctor of agricultural sciences, professor Sabluk V. © K. P. DVORAK

The purpose of research - to identify bacteria in the microbiota composition affected tail rot of sugar beet roots.

Materials and methods of research. The material for the research were roots of sugar beets with typical symptoms of tail rot, selected in the second half of vegetation culture at research sites in settled conditions-Lyulynetskoyi experimental breeding station.

To isolate bacteria from root crops washed with symptoms of bacterial lesions excised pieces of covering the affected and healthy tissue, rubbed them in a mortar with 0.5 ml of sterile tap water and used for bacteriological sowing potato agar surface. The bacteria were cultured at a temperature of 28 ° C for 5 days.

Morphological, cultural and physiological and biochemical properties of the isolated bacteria were determined using classical methods [2, 8]. To establish the presence of pectinase enzymes studied the ability of bacteria isolates matseruvaty pieces of potato. The ability to induce hypersensitivity reactions determined by introducing a suspension of bacterial cells 1h107 CFU / ml in the epidermis of tobacco leaves by the method of Z. Klement et al. [8]. The identification of isolated bacteria was performed according to key Berg [6].

Results and discussion. Root of the sample were characterized by the presence of decay tail. Affected tissues have dark color, were softened. The size of the affected roots were lower compared with healthy.

As a result of bacteriological analysis of selected isolates different morphological types of bacteria. In selected bacterial isolates identified morphological, physiological and biochemical properties and on the basis of the data identified 17 isolates (Table 1).

Bacteria isolates B-55, B-56-1, 59-2-B, B-62-1 that form round colonies with yellow center compacted, smooth or slightly wavy edges and are Gram-negative, oksydazonehatyvny, mobile, non spore-forming rods representatives of the species identified as *Pantoea agglomerans*.

Four isolates of bacteria (53-8-B, B-54-2, 60-3-B, B-58-1) that form a smooth, shiny, semi-colony of gray and are Gram-negative, oksydazonehatyvny, mobile, non spore-forming rods, able to consume glucose under aerobic and anaerobic conditions and cause maceration of plant tissues, attributed to the type *Pectobacterium sarotovorum*.

Based on that isolates 53-3-B, B-54, B-55, B-53-1, 53-6-B, B-62-2 form a translucent shiny gray colonies are Gram-negative aerobic moving fluorescent sticks, able to initiate a hypersensitivity reaction in tobacco leaves, they are identified as members of the genus *Pseudomonas*.

Of the affected sugar beet roots also highlighted bacterial isolates B-55-2, 60-1-B, B-53-5, which are characterized by the formation of colonies of beige color with a gripping edges, rod-shaped cells positive Gram staining, and the ability to sporogonic type of movement and enzyme glucose uptake, so they referred to the genus *Bacillus*.

The results are consistent with the data of Russian plant pathologist, indicating that bacteria genera *Pseudomonas* and *Bacillus mesentericus* and species *Pantoea agglomerans* able to clog the conducting system, disrupt the metabolism of plants develops in cells with low turgor and can cause symptoms like necrosis vascular bundles and pidselena them saprophytic microflora is able to initiate or accelerate decay [5].

The literature is also a message that the kind of bacteria isolated from *Pectobacterium* repeatedly affected by soft rot of sugar beet roots [7, 10]. It is known that due to the presence of bacteria in this kind of pectinase enzymes, they cause rotting of plant tissues, causing a violation of their integrity, resulting in the possibility of penetration of the plant affected other microorganisms.

1. Morphological and physiological and biochemical properties of bacteria isolated from infected tail rot of sugar beet roots

Test	Type bacteria			
	<i>Pantoea agglomerans</i> (4 ізоляти)	<i>Pectobacterium carotovorum</i> (4 ізоляти)	<i>Pseudomonas</i> sp. (6 ізолятів)	<i>Bacillus</i> sp. (3 ізоляти)
Забарвлення за Граммом	–	–	–	+
Рухливість	+	+	+	+
Форма клітин	П	П	П	П
Спороутворення	–	–	–	+
Флуоресціюючий пігмент	–	–	+	–
Оксидаза	–	–	–	–
Пектолітична активність	–	+	–	–
Реакція надчутливості	–	–	+	–
Використання джерел вуглецю:				
глюкоза(анаеробно)	К	К	–	К
глюкоза (аеробно)	К	К	К	К
сахароза, рамноза, рафіноза	К	К	Х	–
мальтоза, манітол, галактоза	К	К	К	–
арабіноза	К	–	К	–
сорбітол	–	К	К	–
лактоза	Х	К	–	–
Фруктоза	н/д	Х	Х	–
дульцитол	–	Х	–	–
Утворення індолу	–	–	–	–
Утворення H ₂ S	–	–	–	–

Примітка: «+» – наявність ознаки; «-» – відсутність ознаки; «К» – утворення кислоти (зі зміною кольору середовища); Х – штамova варіабельність; «П» – палички; н/д – не досліджували.

Conclusions. So, with the tail rot affected sugar beet roots isolated bacteria species *Pantoea agglomerans* and *Pectobacterium carotovorum* and the genera *Bacillus* and *Pseudomonas*. Determining the species of pathogenic bacteria and saprophytes for crops that are on the surface or in the internal tissues of affected plants and may affect the pathological processes makes it possible to choose effective means limiting their development and their impact on the level of hazard.

Thus, isolated and identified bacteria species *Pectobacterium carotovorum* able to cause rotting tissues of roots and bacteria species *Pantoea agglomerans* and genera *Bacillus* and *Pseudomonas* cause symptoms like necrosis vascular bundles and reinforce pathological processes initiated by other bacteria or numerous *Micromycetes* that are in the soil or on plant debris and cause infestation pathogens sugar beet roots.

Список літератури

1. Гвоздяк Р. І. Фітопатогенні бактерії. Бактеріальні хвороби рослин: [Монографія] / Р. І. Гвоздяк, Л. А. Пасічник, Л. М. Яковлева [та ін.]; за ред. В. П. Патики. – К.: ТОВ «НВП «Інтерсервіс», 2011. – 444 с.
2. Методы исследований бактериальных болезней растений / [К. И. Бельтюкова, М. С. Матышевская, М. Д. Куликовская, С. С. Сидоренко] – К.: Наук. думка, 1968. – 316 с.
3. Роїк М. В. Хвороби коренеплодів цукрових буряків / М. В. Роїк, А. К. Нурмухаммедов, А. С. Корнієнко – К.: ПоліграфКонсалтинг, 2004. – 224 с.
4. Саблук В. Т. Шкідники та хвороби цукрових буряків / В. Т. Саблук, Р. Я. Шендрик, Н. М. Запольська – К.: Колообіг, 2005. – 448 с.
5. Селиванова Г. А. Причини широкого распространения корневых гнилей в ЦЧР / Г. А. Селиванова // Сахарная свекла. – 2013. – № 5. – С. 27 – 31.
6. Brenneis D. J. *Bergey's Manual of Systematic bacteriology*. Second Edition, Vol. 2, part B. / D. J. Brenneis, N. R. Krieg, J. T. Staley. – Springer – 2005. – 1106 p.
7. Fassihiani A. Characterization of Iranian *Pectobacterium carotovorum* Strains from Sugar Beet by Phenotypic Tests and Whole-cell Proteins Profile / A. Fassihiani, R. Nedaeinia // *Phytopathol.* – 2008. – Т. 156, № 5. – P. 281 – 286.
8. Klement Z. *Methods in phytobacteriology* // Z. Klement, K. Rudolf, D. C. Sands – Budapest: Akademiai Kiado, 1990. – 568 p.
9. Koike S. T. *Vegetable diseases: a color handbook* / S. T. Koike P. Gladders, A. O. Paulus // Gulf Professional Publishing. – London, 2007. – 448 P.

10. Nedaienia R. Host range and distribution of *Pectobacterium betavasculorum* the causal agent of bacterial vascular necrosis and root rot of sugar beet in Fars province / R. Nedaienia, A. Fassihiani // Iran. J. Plant Path. – 2011. – Т. 47, №. 2. – P. 47 – 48.

11. Pfähler B. Rübenfäulen Symptomatik und Verwechslungsmöglichkeiten / B. Pfähler, G. Büttner. – Zuckerrübe, 2001. – № 5.– S. 296 – 298.

*В составе микробиоты корнеплодов сахарной свеклы с типичными симптомами поражения хвостовой гнилью на основании определения морфологических и культурально-биохимических свойств установлено наличие бактерий *Pantoea agglomerans*, *Pectobacterium carotovorum* и представителей родов *Pseudomonas* и *Bacillus*.*

Хвостовая гниль корнеплодов, сахарная свекла, бактерии, поражение, свойства, идентификация

ETHYLENE SYNTHESIZING ABILITY PATHOGENIC BACTERIA BACTERIAL RAPE DISEASES

O. M. ZAHAROVA, assistant *
National Agriculture University of Ukraine

The ethylene synthesize ability and pathogenic properties of strains of pathogens of bacterial diseases of rape seed have been investigated. It has been shown that ethylene synthesized these strains do not always coincide with their aggressive.

Bacteriosis of roots, slimy bacteriosis, ethylene, Xanthomonas campestris pv. campestris, Pseudomonas fluorescens

Rape belongs to Ukraine for strategic crops. Over the last decade it has strengthened its competitive position in the global market, substantially increased its gross harvest of seeds and expanded markets, and prices for seed and its products have reached quite a high level. The areas under oil crops this year are increased and at present there are rape occupies 3rd place among oilseeds. But despite the relatively high profitability and use in many industries, analysis of rape plantations evidence of its destruction bacterial etiology, leading to a significant shortfall and lower quality green mass and seeds. The main bacterial diseases of rape include: roots bacteriosis (*Xanthomonas campestris pv. Campestris* and *Pseudomonas fluorescens*) and slimy bacteriosis (*Pectobacterium carotovorum* subsp. *Sarotovorum* and *Pseudomonas fluorescens*) [1].

We know that phytopathogenic bacteria can cause different symptoms in plants that are manifested in chlorosis, necrosis, tumors and rot [1, 4]. Typically, these symptoms are caused by a change in metabolism in plant cells under the influence of enzymes, hormones or toxins isolated pathogen. Among these factors in pathogenic microorganisms may make plant hormones [4]. It is known that these compounds hipersynteza pathogens leads to imbalance in the hormonal system of plants and the emergence of a number of diseases. From the literature it is known that pathogenic microorganisms to plants have the ability to synthesize ethylene, it is because they are one of the factors of pathogenicity. Research scientists show that most pathogens ethylene cyntezyut not only in vivo, but in vitro. From the literature it is known that microorganisms having the ability to synthesize ethylene include pathogens such as *Botrytis cinerea*, *Fusarium oxysporum*,

**Науковий керівник - доктор біологічних наук, професор, академік НААН
України Мельничук М.Д.*

©О. М. ЗАХАРОВА,

Acremonium falciforme [4]. Thus, in 1985 M. Goto and colleagues had studied the ability of pathogenic bacteria *Pseudomonas syringae* PV. *phaseolicola* synthesize large quantities of ethylene [6]. The same is the ability two years later watched M. Sato et al in *P. syringae* pv. *glycinea* [5].

It should also be noted that some strains of ethylene synthesis level often correlates with their level of aggressiveness. In addition, the ability to synthesize ethylene pathogens in vitro diagnostic use for their identification and that is a necessary part of plant protection. Dan sign used in the taxonomy of some pathogens at the genus *Pseudomonas patovarovomu* and species levels [2, 3]. Instead, etylensyntezyuchy ability of the genus *Xanthomonas*, especially *Xanthomonas campestris* species almost never investigated.

Therefore, **the aim** of our study was to evaluate the ability of our dedicated and collection strains of pathogenic bacteria - pathogens of bacterial diseases of rape to the synthesis of ethylene and establish a comparative analysis of the number of synthesized relevant strains of pathogenic bacteria ethylene with the level of aggressiveness on rape as a possible factor of pathogenicity.

Materials and methods of research. The objects of research were 18 strains of pathogenic bacteria isolated us from affected tissues rape, 21 collection strain of *Xanthomonas campestris* pv. *sampestrista* and 1 strain of *Pseudomonas fluorescens*, derived from the collection of cultures of pathogenic bacteria Institute Department of Microbiology and Virology. Zabolotny of NAS of Ukraine. To investigate the ability etylensyntezyuchoyi phytopathogenic bacteria cultured in bottles of 25 ml mowed potato agar. Bottle tightly closed with rubber stoppers and parafilmom to prevent leakage synthesized by bacteria ethylene. The cultivation of pathogenic bacteria studied by us performed for 24-48 hours. at a temperature of 280 degrees respectively. Synthesis of ethylene phytopathogenic bacteria was determined by gas chromatography. The composition of the gas mixture over a column agar medium were analyzed by gas chromatograph "Chromium-5" (Czech Republic) with a flame ionization detector.

Results and discussion. Our studies have confirmed the ability of collection strains pathogenic bacteria synthesize ethylene. It was established that the investigated strains synthesize ethylene in various quantities (Table 1).

1. Synthesis of ethylene collector pathogenic bacteria strains and their aggressiveness

	Strain	Number ethylene, нмоль·год ⁻¹ ·г ⁻¹	Aggressiveness, points
	<i>Xanthomonas campestris</i> pv. <i>campestris</i>		
1	80036	0,48	7,29 ± 0,69
2	8185	0,87	6,38 ± 0,48

3	8050	0,11	6,69 ±0,57
4	820	0,3	7,88 ±0,71
5	8188	1,5	4,5 ±0,35
6	8172	0	3,94 ±0,44
7	8182	5,58	6,94 ±0,44
8	8836	9,5	7,19 ± 0,57
9	8147	1,8	4,81± 0,57
10	8195	0,32	4,71± 0,60
11	8166	0,2	2,31± 0,27
12	8159	0,12	7 ± 0,71
13	8154	0,1	4 ± 0,71
14	8170	12,6	5 ± 0,53
15	8149	4,4	5,15 ± 0,63
16	8161	0,19	5,81 ± 0,62
17	8156	0	2,06 ± 0,39
18	8179	0,4	6,25 ± 0,83
19	8189	0,038	5,13 ± 0,53
20	8176	0	5,25 ± 0,66
21	8180	0	4,44± 0,57
<i>Pseudomonas fluorescens</i>			
	8573	27,5	6,36 ± 0,98

Thus, as shown in Table 1, collection strains of *X. campestris* pv. *campestris* synthesize small quantities of ethylene ranging from 12.6 to 0.1 nmol · h⁻¹ · g⁻¹, and in some collection strains such as *X. campestris* pv. *campestris* 8172, 8156, 8176, 8183 and 8180 this phytohormone was never found, but these were strains with pathogenicity. For example, *X. campestris* pv. 8176 *campestris* does not synthesize ethylene, but showed pathogenicity 5.25 points. Among the collection of strains of *X. campestris* pv. *campestris* the highest number of ethylene synthesized strains of *X. campestris* pv. *campestris* 8170, 8836 and 8182 the number of ethylene synthesized according to 12.6; 9.5; and 5.58 nmol · h⁻¹ · g⁻¹. But the level of ethylene synthesized by these strains does not always coincide with their aggressiveness. In particular, the strain of *X. campestris* pv. 8170 *campestris* which synthesizes 12.6 nmol · h⁻¹ · g⁻¹ ethylene compared with other collection strains was the least aggressive of all the studied strains. The amount of ethylene synthesized by *Pseudomonas fluorescens* 8573 (27.5 nmol · h⁻¹ · g⁻¹) while also being aggressive.

Emphasis on rape pathogens bacteriosis obtained results also found the ability to synthesize ethylene in vitro (Table. 2). Furthermore, strains that synthesize a significant amount of ethylene selected among our isolates were found. Analyzing the degree of aggressiveness of selected bacterial diseases of rape, found that all isolates are high and aggressive on different varieties of canola. In particular, proved to be the most aggressive strains 8, 9, 4a, 6a, aggression in which

averaged 7 points on a 9-point scale, and the least aggressive - 1 strains, 3A, 2A and 14 * with aggressive 5 points. Instead, for strains 6 *, 8 and 2O ethylene synthesis correlated with their aggressiveness on recognized varieties of rapeseed (tab. 2).

2. Synthesis of ethylene selected strains of pathogenic bacteria and their aggressiveness

Strain	Number ethylene, нмоль·год ⁻¹ ·г ⁻¹	Aggressiveness, points
Виділені штами <i>X. campestris</i> pv. <i>campestris</i>		
1	2	3
1	1	30
2	2	6,7
3	5	0,6
4	7	0
5	8	6
6	9	16,3
7	5*	17,5
8	6*	7,7
Виділені штами роду <i>Pseudomonas</i>		
9	2O	6,3
10	3A	16
11	6a	26
12	7a	9
13	7*	0
14	2a	18
15	4a	14
16	8*	19
17	9*	0
18	14*	35

Conclusions. Thus, it was found that synthesis of ethylene in selected strains we do not always correlate with the level of aggressiveness. That is, for bacterial diseases rape synthesis of ethylene is shtamovoyu feature a high level of aggressiveness of strains that produce small quantities of ethylene may be due to the synthesis of other pathogenicity factors, including toxins, enzymes or other phytohormones or hormone-like compounds (abscisic, salicylic or jasmine acids).

Список літератури

1. Гвоздяк Р. І. Фітопатогенні бактерії. Бактеріальні хвороби рослин / За ред. В. П. Патики /– К.: ТОВ "НВП "Інтерсервіс", 2011. – 444 с.
2. Данкевич Л. А. Продукування етилену патогенними для бобових патоварами роду *Pseudomonas in vitro* / Л. А. Данкевич // Міжнародна конференція daRostim. Мікробні технології: актуальність і майбутнє, 19-22 листопада 2012. – К.: Нічлава. – С. 105–106.
3. Данкевич Л. А. Фенотипні та генотипні властивості збудника бурої бактеріальної плямистості люпину / Л. А. Данкевич // Мікробіол. журн. – 2006. – 68, № 6. – С. 20–27.

4. Цавкелова Е. А. Гормоны и гормоноподобные соединения микроорганизмов / [Е. А. Цавкелова, С.Ю. Климова, Т. А. Чердынцева, А. И. Нетрусов] // Прикл. биохимия и микробиология. – 2006. – 42, № 3. – С. 261–268.

5. Nagahama K. Ethylen production by strains of plant-pathogenic bacterium *Pseudomonas syringae* depends upon the presence of indigenous plasmids carrying homologouse gene for the ethylene-forming enzyme / [K. Nagahama, K. Yoshino, M. Matsuoka] // Microbiology– 1994. – N 140. – P. 2309–2313.

6. Weingart H., Volksch B. Ethylene production by *Pseudomonas syringae* pathovars *in vitro* and on planta / [H. Weingart, B. Volksch] // Appl. and Envir. Microbiol. – 1997. – Vol. 63, №1. – P. 156–161.

Исследована этиленсинтезирующая способность и патогенные свойства штаммов фитопатогенных бактерий – возбудителей бактериальных болезней рапса. Установлено, что уровень синтезированного данными штаммами этилена не всегда совпадает с их агрессивностью.

Бактериоз корней, слизистый бактериоз, этилен, Xanthomonas campestris pv. campestris, Pseudomonas fluorescens

FEATURES EXTRACTION OF NUCLEIC ACIDS VIRAL WITH MUSHROOMS

**T. V. IVANOVA, Candidate of Agricultural Sciences
National Agriculture University of Ukraine**

Double-stranded RNA isolated from the mushroom. Viral infection is present in mushrooms.

Fragments of viral double-stranded RNA present identical with the data] of lesion-specific fungi mikovirusamy. efficiency is double-stranded RNA zaproponovanoyitmetodyky identification with fruiting bodies of mushrooms.

Mushroom, viral disease, identification, double-stranded RNA diagnostics.

The primary condition for obtaining high yields of mushrooms is the introduction of high-quality seed production, which have high resistance and is free from viruses (Grogan, Gaze, Maffettone, Boyko Ivanov).

Most cultivated species of mushrooms are edible and only a few have medicinal properties. Among them, dvosporova mushroom (*Agaricus bisporus*) (J. Lge) Imbach) which accounts for over 40% of the total production of mushrooms.

Recently, viral diseases were among the most dangerous for fungal cultures. The culture *A. bisporus* described over ten pathogenic viruses, to identify which virtually no highly sensitive methods. Government programs to promote the mushrooming of gradual recovery and expansion of production areas. Today in Ukraine there is virtually no molecular diagnostics to identify mikovirusiv that affects mushrooms.

In recent years, viral diseases have become very common for the industrial production of mushrooms. British scientists in the late 90s

Twentieth century reported a decrease crop of mushrooms, the causes of which have not been able to establish. Some symptoms of the disease answered on La France, but diagnostic tests for spherical virus showed negative results. Also, the disease associated with the presence of double-stranded RNA new insulation (dIRNK) elements. However dIRNK different from previously described in *A. bisporus* dIRNK and the elements characteristic of the disease La France. This

disease induced previously undescribed virus with characteristic dIRNK genome, called MushroomVirus X (MVX) [4-8, 9].

It is proved that for viral diseases of fruiting bodies of fungi morphologically changed, losing its taste and are often unsafe for consumption. Also, they not only reduce the harvest of mushrooms, but also lead to complete loss of mycelium.

The aim - improving the diagnosis of viruses fungi, adaptation techniques isolation, purification of viral double-stranded RNA (dIRNK) with the culture of mushrooms.

Materials and methods of research:

According to the anticipated goal of solving problems:

1. Make a screening samples mushrooms in greenhouses conditions in terms of infection by viruses using the methods of visual diagnostics fruiting bodies and mycelia.

2. To study the prevalence of viral diseases in mushroom farms under greenhouses Kiev region.

3. Adapt and improve the method of isolation, purification and identification of viral double-stranded RNA (dIRNK) with the culture of mushrooms.

Object of research - molecular diagnosis of viral diseases hrybnych cultures.

Methods - biotechnology, molecular biological, virological, biochemical, electrophoresis in agarose gel, electron microscopy, computer-statistics.

Results. For the analysis of selected fruit bodies of symptomatic disease and without. For infected mushrooms waves observed during all fruiting. As controls were mushrooms fruiting bodies dvosporovoyi that undergirding according to a visual assessment on destruction and electron microscopic analysis in the laboratory [1-3, 5].

For extraction of viral pathogens of mushrooms used cellulose chromatography method. For this purpose, samples were taken mushrooms with specific symptoms that are expressed in the dimness, lysis of mycelium, strain fruiting bodies, vodyanystosti legs and shapynok, elongation of the legs and the withering away shapynok, formation of necrosis and tumor (enatsiy) in fruit bodies, browning mycelium and fruiting bodies, sudden change in morphology, tissue staining fruiting bodies etc. [1-7, 8]. Bold dIRNK of fruiting bodies of fungi carried by conventional methods [5].

One of the objectives of our work was optimization and modification of the method of separation, purification and diagnosis of double-stranded RNA viruses. The essence of the uniqueness and practicality of the method is to allocate the total number of nucleic acids is unique to the virus - dIRNK. The method was first proposed and published in 1979 and more than thirty years acquired its distribution and use. Its specificity is to identify double-stranded form of the viral nucleic acid, which is virtually absent from

representatives of flora and fauna, and if they emit, it is a nucleic acid of viral origin.

Method for diagnosis and identification of RNA-containing fitovirusiv (Fig. 2) it involves the following steps of 3.5 grams of plant sample (the affected areas of leaves, stems, roots, seeds, etc.) homogenized in STE buffer (0.1 M NaCl, 0.05M tris-HCl, 1.0 mM EDTA, pH 7.0) under liquid nitrogen.

After homogenization is carried phenolic isolation and purification of nucleic acids and total two cycles tselyu-loznoho fractionation involving several stages using 16% ethanol solution.

DIRNK cellulosic fraction after the filtrate is transferred to STE buffer without ethanol and concentrated in two volumes of chilled 95% ethanol and 0.1 volume of 0.2 M sodium acetate, pH 5.5.

After analyzing the method of diagnosis and identification of RNA-containing fitovirusiv, we found that the proposed allocation method for microscopic and edible mushrooms does not provide fully sufficient purity and concentration dIRNK viruses.

We proposed allocation method is that by using a sample weight of 10 g, which after homogenization in terms liquid nitrogen is transferred to a centrifuge tube, add 12 ml STE buffer 2x (H₂O - 500 ml, NaCl - 29h, tris - 30,5h , EDTA - 1,85h), 1 ml of 1% SDS (H₂O - 100 ml of sodium dodytsylosulfat - 10 g) and 1 mL of bentonite, mix in a shaker for 15 minutes until smooth. Add 17 ml STE-phenol (H₂O - 500 ml, 2 x STE - 500 ml, pH 4.5) and 17 ml of chloroform-izoamilu (24: 1) (centrifuged for 20 minutes at 2500 rev / min). After centrifugation selected aqueous phase and then centrifuged for 10 minutes at 8000 rev / min, selected nadosad with the addition of 1.5 g cellulose and 3 ml of absolute ethanol, stirred for 15-20 minutes, further samples transferred to ice for 30 minutes at a temperature of - 15° C. The contents of the tubes is poured into a column, add buffer STE-OH (STE - 100 ml ethanol - 174 ml H₂O - 726 ml) and 20 ml of STE buffer - 20 ml. Filtrates poured into centrifuge tubes and add 30 ml of ethanol, centrifuged for 30 minutes at 8000 rev / min, poured nadosad and dried on filter paper at a temperature of + 18-20° C - 2 hours, add 200 ml 10X RNA-buffer (0.35 % (w / v) Orange G, 30% (w / v) Ficoll 400, 1 mM EDTA). In the resulting solution add 1 ml MgCl₂ and transferred to a thermostat for 1 hour at a temperature of 37 ° C.

By optimizing the method described above, which would increase the mass of sample source material up to 10 g, STE buffer volume (30 ml) for initial washing, adding 50% by volume of phenol chloroform 17 ml, 2 ml of isoamyl alcohol under the conditions of allocation of double-stranded viral RNA becomes possible to confirm the effectiveness of the proposed method of diagnosis and identification of RNA-containing viruses and microscopic edible mushrooms. Applying the method of diagnosis and identification of RNA-containing viruses and microscopic edible

mushrooms, we provide obtaining sufficient concentration dIRNK viruses, resulting in possible claim to improve the efficiency of research.

Conclusions. Identification of RNA fragments to fitovirusiv is constant for specific representatives and phyto mikovirusnyh pathogen, which is a method of diagnosis and identification of RNA-containing fitovirusiv, stages of transport carriers (fungi, insects, nematodes, etc.) as well as study the differences isolates RNA containing phyto and mikovirusiv.

Weighty use the technique can be modified for pecherychnyh phytosanitary control systems, quarantine, Ukrainian customs. The results of isolation and identification dIRNK mikovirusiv in combination with classical methods of virus diagnostics allow to study the issue of localization and transport of the virus in mushrooms.

Thus, the analysis dIRNK that are isolated from fruiting bodies of mushrooms, imposed the presence of viral infection. Based on experiments recommended sample source material 10 grams, the amount STE buffer for primary washing

30 ml, adding 50% by volume of phenol chloroform and 17 ml

2 ml of isoamyl alcohol. This method ensures the quality of diagnosis and identification of RNA-containing viruses in microscopic and edible mushrooms.

Prospects for further research. To intensify the industrial production of mushrooms in virus-free basis and prevent the spread mikovirusiv - recommended in the early stages to conduct a comprehensive diagnosis of virus mycelium on using studies of diagnostic test kits based on PCR that these will be the subject of our research.

Список літератури

1. Іванова Т. В. Особливості виділення сумарної РНК з плодових тіл печериці двоспорової / Т. В. Іванова, І. О. Антіпов, В. В. Оверченко: Матеріали V Міжнародної конференції молодих вчених "Біологія: від молекули до біосфери", м. Харків, 22–25 листопада 2010 р. / М-во освіти і науки України [та ін.]. – Харків: Оперативна поліграфія, 2010. – С. 60–61.
2. Іванова Т. В. Виявлення вірусних хвороб у плодових тілах печериці двоспорової (*Agaricus bisporus* (J.Lge) Imbach) [Електронний ресурс] / Т. В. Іванова // Наукові доповіді НУБіП України – 2011. – № 1(23). – 12 с. – Режим доступу http://www.nbu.gov.ua/e-journals/Nd/2011_7/11tvibsm.pdf
3. Goodin M. M. Characterization of an RNA dependent RNA polymerase activity associated with La France isometric virus. J. / M.M. Goodin, B. Schlaghauser, T. Weir, C.P. Romaine // Virology. – 1997. – №71. – P. 2264–2269.
4. Grogan H. M. Double-stranded RNA elements associated with

the MVX disease of *Agaricus bisporus* / H. M. Grogan, B. A. Adie, R. H. Gaze [et all.] // Mycol. Res. – 2003.– №107 (2). – P. 147–154.

5. Elibuyuk I. Detection of a virus disease on *Agaricus bisporus* (white button mushroom) in Ankara, Turkey / I. Elibuyuk, H. Bostan // International journal of agriculture & biology. – 2010. – №12.– P. 597–600.

6. Mills P. R. Final Project Report on Defra project HH2304SMU: Characterisation of длРНК associated with mushroom Virus X / P. R. Mills, B. Adie, H.M. Grogan // 2002. – 23 p.

7. Gaze R.H. A new virus disease of *Agaricus bisporus*? / R. H. Gaze, L. Calvo-Bado, M. P. // Challen In Science and cultivation of Edible fungi // Balkema Publishers. – Rotterdam. – 2000.– P. 701–705.

8. Hollings M. Viruses associated with a die-back disease of cultivated mushroom / M. Hollings // Nature – 1962. – №196. – P. 962–968.

9. Maffettone E. Characterization of a novel virus associated with the MVX disease of *Agaricus bisporus*: Phd thesis for the degree of Doctor of Philosophy / E. Maffettone // – Cranfield University, 2007. – 273 p.

В результате анализа дцРНК, выделенной из плодовых тел шампиньона установлено наличие вирусной инфекции.

Присутствие фрагментов дцРНК вирусного происхождения совпадает с литературными данными о возможности поражения грибов специфическими миковирусами. Можно утверждать эффективность предложенной нами методики идентификации дцРНК, выделенных из плодовых тел шампиньона двуспорового.

Шампиньон двуспоровый, вирусная болезнь, идентификация, дцРНК, диагностика.

ENVIRONMENTAL RISKS REDUCING CARBON SEQUESTRATION IN SOIL ZONE NORTHERN STEPPES UKRAINE

**A. S. KOBEC, Doctor of Public Administration,
M. M. HARITONOV, Doctor of Agricultural Sciences,
U. I. GRICAN, Doctor of Biological Sciences,
L. I. KATAN, Doctor of Economic Sciences
Dnipropetrovsk State Agrarian University of Economics**

Smaller content of humus in arable slopes caused with the conditions of formation of soils, the influence of erosion and anthropogenic factors. A significant influence on the eroded soil genesis of the virgin ravine has vegetation that is "pumping" the main biological and absorbed other elements. Its rate depends on the intensity and capacity of the biological cycle, the nature of the localization of active accumulative roots in the soil and the localization of the litter dying plants. Comparison of humus reserves in virgin lands from stockpiles plowing indicates intensive humus formation in terms of plowing. In connection with the disposal of the biomass harvest, and also in consequence of a small proportion of perennial grasses in crop rotation is the nature of the biological cycle of substances on plowing leads to uncompensated state humus regime.

Landscape, slopes, erosion, soil, tillage, humus destroying

Dehumifikatsiya land and, consequently, increased emissions of carbon dioxide - the greenhouse effect agent - is a significant cause of regime change weather conditions. This includes other destructive land degradation mechanism - desertification. In the spatial context of desertification may be regarded as the frontal phenomenon, which is to increase the area of depleted ecosystems. Desertification - a manifestation of the effects of reducing biodiversity, biomass and evaluation edaphic factors influence the nature of the primary productivity of ecosystems existing in the conditions of agricultural landscapes [1].

Dimensions accumulation of humus in black soil not determined by any one factor (vegetation, activity of microorganisms, hydrothermal regime, physical and physicochemical properties), and a combination of factors and conditions, soil environment [1, 2].

Erosion of land leads to a significant loss of fertile soil and crops. The size of losses due to non-receipt of a crop of eroded land is annually about one third of agricultural GDP. This means that for every dollar created added

value, one third is lost due to erosion. Should take into account several key facts [3]:

a) almost half (19 mln. ha) of arable land is located in the steppe zone of Ukraine;

b) 60% of agricultural land in the country is owned agricultural enterprises, more than half of which are located in the steppe zone;

c) nearly 45% wheat, 15% corn and 47% of sunflower grown in the plains;

d) in the steppe zone soils are most prone to erosion and loss of fertility that are most susceptible to the negative effects of climate change.

Erosion leads not only to a decrease in soil fertility and crop yields, but i to siltation of rivers and reservoirs.

As estimated in the Ukraine under the influence of erosion and subsequent years will be about 15 mln. Ha [3]. Increased erosion associated with a significant decrease in the use of mineral and organic fertilizers, which caused a sharp decline in soil humus content.

Comparing the present climate of the past (100 years ago) shows that Ukraine has become arid area due to human activities. Wind erosion has become widespread even in areas that previously were not inclined to exercise this factor. Over the past 40 years, according to data of meteorological statistics, found that the frequency of dust storms per year is 3-5 in the steppe zone, with an average duration of 8-17 hours. [4] The origin of dust storms in the conditions of Ukraine usually starts at wind speed of 20 m / sec. It should be borne in mind that black soils are most prone to wind erosion. During dust storms, they can lose up to 70 tons of soil per hectare per hour. Based on these statistics can be recognized that dust storm March 23, 2007 was not unusual for the steppe zone of Ukraine. It was recorded from space through remote sensing techniques over the territory Kakhovka reservoir. Space dust cloud was 20000km². Three factors (dry conditions for 2 weeks, the wind speed of 20 m / sec and a lack of vegetation) led to the formation of clouds of black soil particles.

The process of water erosion, destroying soil, primarily affecting the availability of soil organic matter. Thus, the content of humus in black soil slaboerodovanyh reduced by 5-10% serednoerodovanyh - by 25-30% and 35-40% sylnoerodovanyh compared to povnoprofilnymy. In such soil composed of humus topsoil contains a relatively larger proportion of fulvic acid and less - humic, reduced its biohennist, worsening terms of growth and development of crops and eroded soil productivity is reduced by 10-40% depending on the degree of erosion.

Due to the considerable development of erosion in the area of distribution of ordinary black soil humus accumulation regime violated. As a result, even a weak flush usual black soil lost from 0.5 to 2% humus [5].

The purpose of research - to distinguish content and reserves of humus in arable and virgin soils in scale: the area - rural settlement - agrolandscape the example of Dnepropetrovsk region.

Material and methods of research. In the first stage of our study was associated with determining the content and estimated reserves of humus in soils of different regions of Dnipropetrovsk region.

The study of genetic horizons slope fertility of soils in the area of distribution of ordinary black soil was carried out on environmental ground DDAEU (arable land) and slopes of virgin beams in the Dnipropetrovsk region, Oleksandrivka village.

Environmental landfill has an area of 14 hectares and is crossed by three beams. One of them is the depth of 30 meters and slope > 7 °, two other slope of 3 °. The study was conducted on plakori (povnoprofilnyy ordinary black earth), the slope of northern exposure (slabozmytyy soil), the slope of southern exposure (serednozmytyy ground).

Virgin beams located near the landfill has slopes of northern and southern exposures 25-30 °, well developed vegetation and soils, which differ in morphology from arable. Slope soils are alluvial horizon beams, on the slope of northern exposure - 50 cm, on the slope of southern exposure - 40 cm, and then goes to the profile in the first case slabozmytyh soil, the second - serednozmytyh. Soil samples were taken every 10 cm to 100 cm depth.

Results and discussion. The humus content is directly dependent on the capacity of the humus horizon. Along with the change of power humus horizon and humus content in the flushing influenced dramatically changing its reserves. The ability of organic matter cause deep and comprehensive changes in the composition and properties of soil and store them relatively stable over time allows us to consider its gross reserves as the most important evaluation criterion for determining the potential fertility of the soil. Thus, the average reserves of humus in the region in the plow layer of black soil povnoprofilnyh normal up 120 t / ha with a range from 101 to 130 t / ha. Influenced by flushing these stocks are significantly reduced, reaching an average slabozmytyh soils and 89 t / ha (73-100 t / ha) (Table. 1).

1. Stocks of humus in the plow layer povnoprofilnyy and eroded soils Dnepropetrovsk region (t / ha)

Soil	Васильківський р-н	Новомосковський р-н	Магдалинівський р-н	Софіївський р-н	П'ятихатський р-н	Синельниківський р-н	Середнє по області
Чорнозем звичайний	130	106	130	115	120	120	120
малогумусний повнопрофільний	113-134	96-110	103-134	98-134	101-139	98-132	101-130
Слабоеродований ґрунт	106	86	110	94	101	101	99
Середньоі	91-118	86-89	98-112	77-103	79-120	79-120	85-111
	101	70	89	86	94	94	89

Thus, there is a clear relationship: the more washed away the soil, the less they humus content and reserves. According to our research in povnoprofilnomu usual black soil humus serednopotuzhnomu (Dnipropetrovsk region) in the layer 0-10 cm humus content was 4.25%, 10-20 cm - 4,05%, 20-30 cm - 3.9%, decreasing at a depth of 70-80 cm by 1.4% and 90-100 cm - 0.6%. While both slabozmytomu ground these figures were respectively 3.26; 2.9; 2.8; 0.7 and 0.5%; Wash off in the medium - 2.0; 1.9; 1.8; 0.2 and 0.1% (Table. 2).

Stocks humus layer 0-100 cm influenced flushing decreased from 292.1 tons / ha (povnoprofilnyy ordinary black earth), 211.1 tons / ha (slabozmytyy soil) and 124.6 t / ha (serednozmytyy). A clear reduction in inventories observed humus in the plow layer (0-30 cm) from 146.6 tons / ha to 107.4 and 68.4 t / ha, which is 36% and 2.1 times.

2. Content and reserves of humus in arable soils and slopes plakoru

Soil, cm	NH humus. povnoprofilnyy			Slabozmytyy soil			Serednozmytyy soil		
	%	т/га	C, %	%	Т/га	C, %	%	т/га	C, %
0-10	4,25	51,0	2,50	3,26	39,0	1,90	2,00	24,0	1,18
10-20	4,05	48,6	2,38	2,90	34,8	1,71	1,90	22,8	1,11
20-30	3,90	46,8	2,29	2,80	33,6	1,65	1,80	21,6	1,06
30-40	2,90	34,8	1,79	2,70	32,4	1,59	1,90	22,8	1,11
40-50	2,20	26,4	1,29	1,50	18,0	0,88	1,10	13,2	0,65
50-60	2,00	26,0	1,18	1,20	15,6	0,71	0,60	7,2	0,35
60-70	1,90	24,7	1,12	0,90	11,7	0,53	0,50	6,5	0,29
70-80	1,40	18,2	0,82	0,70	9,1	0,41	0,20	2,6	0,12
80-90	0,60	7,8	0,35	0,80	10,4	0,47	0,20	2,6	0,12
90-100	0,60	7,8	0,35	0,50	6,5	0,29	0,10	1,3	0,06
0-100		292,1			211,1			124,6	

The data from the reduction of inventories and humus reflect its connection with the terrain, and the difference in solar and thermal radiation.

The difference in heat and water regimes on the slopes of varying exposure affects both the production of biomass, and the microbial processes, resulting in a different rate of accumulation, mineralization and humification of organic matter.

In our studies as a result of a significant display of water erosion on the slope of southern exposure are formed soils with less humus content and humus shortened profile. On the slopes of northern exposure where erosion is less pronounced power humusovanoho profile and humus content greater than the slopes of southern exposure is 40%, but compared

with upland soil humus content is reduced by 20% (slope of northern exposure) and 2 times (slope southern exposure).

Analysis of arable soil humus state ecological landfill showed that the slope of northern exposition contains humus 0.4 (90-100 cm layer) - 1.2% (0-10 cm layer) over southern exposure and slope 0.1 - 1 % less than povnoprofilnyy black soil (plakor). Research arable soil ecological landfill using profiles showed that the slope of southern exposure observed a significant reduction of humus content (2.0%) relative to soil plakora (4.25%). This is not only influenced by water erosion, but its hydrothermal conditions. During the study, virgin soil research fields DDAE located on the territory of the beam "Bublikova", it was found that the slope of northern exposure formed namytye soils with humus horizon is 50 cm. The biggest difference is observed between the slope of northern exposure and plakorom (tab. 3).

3. 3. The content of humus and soil carbon virgin beams

Terrain	Layer, sm									
	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Плакор	<u>.15</u> 3,00	<u>.05</u> 2,35	<u>.27</u> 1,90	<u>.72</u> 1,58	<u>.26</u> 1,31	<u>.52</u> 1,47	<u>.86</u> 1,08	<u>.87</u> 1,09	<u>.37</u> 0,80	<u>.97</u> 0,55
Схил північної експозиції	<u>.85</u> 4,56	<u>.68</u> 3,88	<u>.30</u> 3,08	<u>.30</u> 3,08	<u>.15</u> 1,83	<u>.05</u> 1,77	<u>.93</u> 1,70	<u>.52</u> 1,46	<u>.26</u> 1,31	<u>.05</u> 1,19
Схил південної експозиції	<u>.20</u> 4,19	<u>.35</u> 3,69	<u>.98</u> 2,90	<u>.55</u> 2,65	<u>.10</u> 1,80	<u>.98</u> 1,73	<u>.52</u> 1,47	<u>.35</u> 1,37	<u>.07</u> 1,20	<u>.83</u> 1,06

Примітка: в чисельнику – гумус, %, в знаменнику – вуглець, %

Thus, the slope of northern exposure humus content was 7.85% (0-10 cm layer) on the slopes of southern exposure - 7.2%, and plakori - 5.15%. In the deeper layers (10-20,20-30,30-40 etc.) humus content decreases, but even at a depth of 100 cm it is quite high and amounted to respectively 2.05 - 1.83 - 0.97%. Virgin soils have significant reserves of humus (tab. 4).

4. Reserves of humus in virgin soils beams

Terrain	Layer, sm
---------	-----------

	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	0-100
Плакор	61,8	48,6	39,2	32,6	27,1	32,2	24,2	24,3	17,8	12,4	320,2
Схил північної експозиції	94,2	80,2	63,6	63,6	37,8	39,6	38,1	32,8	29,4	26,7	506,2
Схил південної експозиції	86,4	76,2	59,8	54,6	40,3	38,7	32,8	30,6	26,9	23,8	470,1

As shown in Table 4, the maximum margin of humus seen on the slope of northern exposure 506.2 t / ha. Its value is 8% higher than the slope of southern exposure and 37% than plakori. Comparing data on the distribution of humus in the meter soil layer we can see that the process dehumifikatsiyi not only covers arable layer. Dehumifikatsiya soil is influenced by two processes: the mineralization of humus and erosion. However, the processes that lead to dehumifikatsiyi soils at different terrain variety. If the watersheds where virtually no erosion, reduction of humus content is exclusively due to salinity, on the slopes of dehumifikatsiya defined as mineralization of humus and erosion. In plowing comparable to virgin dramatically decreases the amount of organic residues.

The application of biological technology in land conservation leads to increased carbon content in the soil. In this case, CO₂ emissions are reduced by a very low degree of topsoil through the use of zero or minimum tillage and traffic mulchuyuchoho layer. Increased humus content in the soil by using technologies No-till and minimum tillage promotes carbon sequestration. Field experiments in the field of natural farming, agricultural firms conducted in "Agrosoyuz", "Steppe" and some farms Dnepropetrovsk region showed positive results when used technologies No-till and minimum tillage. To reflect the economic effect of natural agriculture scientists DDAEU was designed business plan of growing "organic" cereal and legume crops on 30 hectares of land area ahrokoroporatsiyi "Steppe". Natural agricultural production is the only one among a wide range of management techniques that do not harm the environment. Natural agricultural production systems based on specific and precise requirements of the production process, aimed at supporting optimal ecosystem for social, environmental and economic levels.

Conclusions

1. Zonal farming systems are based on a multi-year average and the average potential growth class soils. Instability change steppe agriculture provides a wide range of environmental conditions, topography and diversity of soil.

2. The smaller humus content in arable slopes due to the formation of soil conditions, exposure to erosion processes and anthropogenic factors. Significant impact on the genesis of virgin soil on sloping beams has vegetation that is "pumping" the main biofilnyh and absorbed other

elements. Its magnitude depends on the intensity and capacity of the biological cycle, the nature of the localization of active absorbing roots in the soil and localization rain of dead plants.

3. Comparison of humus reserves in virgin soils with reserves in plowing indicates dehumification intensive in terms of plowing. Due to the exclusion of biomass yield, and as a result the fate of small grasses in crop rotation, the nature of the biological cycle of matter on plowing leads to uncompensated state humus regime.

Список літератури

1. Демидов А. А. Пространственная агроэкология и рекультивация земель: монография/ [А. А. Демидов, А. С. Кобец, Ю. И. Грицан, А. В. Жуков] // – Днепропетровск: Изд-во «Свидлер А.Л.», 2013. – 560 с.
2. Гедройц К. К. Сравнительное плодородие различных почвенных горизонтов. / К. К. Гедройц // Изб. Соч. – т.3, – Изд. АН СССР, 1955. – С. 50-65.
3. Feleccia T. Ukraine: Soil fertility to strengthen climate resilience preliminary assessment of the potential benefits of conservation agriculture. / Turi Fileccia et al. // Food and Agriculture Organization of the United Nations. – Rome, 2014. – 96 p.
4. Birmille W. A case of extreme particulate matter concentrations over Central Europe caused by dust emitted over the southern Ukraine. / W. Birmili et al. // Atmos. Chem. Phys. – 2008. – V.8. – P. 997–1016.
5. Багорка М. О. Особливості ґрунтоутворюючого процесу на порушених і малопродуктивних схилових землях Степу України / [М. О. Багорка, О. О. Мицик, В. Т. Пашова, М. М. Харитонов] // Наукові праці Полтавської державної аграрної академії. – 2005. – Том 4 (23). – С. 159–167.

Меньшее содержание гумуса на пахотных склонах обусловлено условиями формирования почв, влиянием процессов эрозии и антропогенных факторов. Значительное влияние на генезис склоновых почв целинной балки оказывает растительность, которая ведет “перекачку” главных биофильных и других поглощенных элементов. Ее масштабы зависят от интенсивности и емкости биологического круговорота, характер локализации активных поглощающих корней в почве и локализации детрита отмирающих растений. Сравнение запасов гумуса в целинных почвах с запасами на пахоте свидетельствует об интенсивной дегумификации в условиях пахоты. В связи с отчуждением биомассы с урожаем, а также вследствие малой доли многолетних трав в севооборотах, характер биологического круговорота веществ на вспашке приводит к некомпенсированному состоянию гумусного режима.

**Ландшафт, склоны, эрозия, почвы, возделывание,
дегумификация**

PYROLYSIS sludge wastewater into water vapor HIGH PRESSURE

U. A. KOZHEVNIKOV, A. G. CHIZHIKOV,
candidates of technical sciences

S. V. PASHKIN, Doctor of Physical and Mathematical Sciences
Federal State Scientific Institution All-Russian Research Institute for
Electrification of Agriculture

The results of the experimental studies have been described aimed at the pyrolytic utilization of sewage sludge derived from municipal wastewater treatment plants using the high-pressure steam technology. The steam temperature varied in the range of 400° C to 550° C while the pressure was ©25-40 MPa. The initial moisture content in probes of sewage sludge was not less than 75%. Pyrolysis led to a not less than two times decrease in mass of the dry sludge which corresponds to about 10 times reduction of the original weight of the wet sludge. Experiments have shown that combustible gases are present in the resulting gas composition, and no carbon dioxide or nitrogen oxides have been detected. The relative composition of combustible gases is strongly dependent on the experimental conditions, and their amount corresponds to the dry weight loss of initial sludge obtained by a long-term drying procedure at 110° C. The solid dry fraction of the pyrolysis products is a dark fine powder without any specific odor that can be easily mixed with water, without consequent powder subsidence during 10 days after its preparation and without making considerable marks on a conventional paper filter of normal density.

Silt sediments, pyrolysis, installation, experiments, water vapor, pressure, temperature, flammable gases

Sewage sludge produced in large quantities at the municipal wastewater treatment plants. Sediment from the sludge can occupy an area of several hundred square meters, being the source of noxious fumes with a very bad smell and the worsening ecological situation in the surrounding areas.

High (more than 70%) moisture even dewatered sludge does not allow to burn it using standard techniques, so you have to take away to landfills or substrate comprising 2/3 of the water for a natural drying, or to evaporate the residual water, which requires special equipment and large energy costs. As

a rule, precipitation are taken for burial in landfills or dried for subsequent combustion in boilers. In both cases, the products are produced rotting in landfills precipitation or rainfall products of combustion in the form of polluting gases and dust, which is unacceptable from an environmental point of view.

One of the most effective solutions to the above problems is the use of a known method of organic waste pyrolysis precluding contact of the feedstock with the environment [1]. The significant disadvantages of the most common pyrolysis technologies using heat generated by partial combustion of organic matter inside the reactor being supplied with oxygen or air, can carry a large amount of tar and low calorific value gaseous process products.

An experimental study of the pyrolysis products of the sludge of wastewater in the environment of high-pressure water vapor without contact with the environment. Thus, the vapor source is water, part of the feedstock, which allows the thermochemical decomposition reaction of its organic components to form a low molecular weight gaseous compounds, coal and water which after condensation and cooling in the heat exchanger can be recycled into the environment or fed to final purification for use, for example, for technical purposes.

The purpose of research - to determine the effectiveness of the studied method and its parameters.

Materials and methods of research. The experimental setup for the processing of sludge by pyrolysis in an environment of high pressure steam is shown in Figure [2, 3].

1 pressure vessel (reactor, autoclave) has two removable end cap for placing it in the sample cup of the feedstock. This device was placed in a muffle furnace 2, which is allowed to heat the feed to a vessel with a glass temperature of 600 ° C.

Processing of the sample was subjected to many years of sludge from wastewater treatment facilities Lyubertsy Moscow Region. Initial samples had a sharp odor and semi-liquid consistency of dark green (almost black) color.

Samples were placed in a thin-walled stainless steel cup 3, which is in turn inserted with a slight clearance in a cylindrical pressure vessel 1. In one of the flanges of the steel tube was incised at the other end of which 4 were manometer and a pressure reducing valve 5. The valve was preset to reset the pressure in the range of 20,0-40,0 MPa, which corresponds to the operating regimes in the developed technology of industrial applications thermochemical reactor. To the outer side wall of the cylinder by a thin dielectric spacer 6 attached thermocouple insulated from external heat source junction so that its temperature corresponds to the temperature of the reactor wall 1. reducing valve 5 communicates pipe 7 for collecting the gases exiting from the reactor in a pre-filled with water bottle 8 placed in the water tank 10.

Experiments were conducted for samples with different initial moisture content of the mass, which organic feed was mixed with the

appropriate amount of added water and mixed thoroughly until a uniform pulp 9 being placed in a glass 3 before the pyrolysis process.

To achieve the conditions necessary for each particular experiment the autoclave was heated in a muffle furnace 2. In this case, the required pressure value is maintained in the reactor 1 via a reducing valve preset by pressure relief. The maximum temperature in these experiments varied in the range of 350-550 ° C.

The experiment was performed as follows. Once placed in a muffle furnace autoclave containing a glass sample prepared by the raw materials, and include insulation gap, heating muffle furnace. When heated to a temperature of 380-400 ° C in the reactor pressure reached the threshold pressure reducing valve 5 through which gas began to flow out with water vapor. At a given temperature, heating was stopped and the reactor was removed from the muffle furnace and cooled. Full heating-cooling cycle took time from one to three hours. The reactor was then depressurized and removed a glass with solid components of raw materials processed products. The residue represented the ultrafine mass of dark brown color and a neutral odor. The properties of this mass looks like a normal ash. Upon contact with water, it is wetted and partially sink, forming a slurry, which almost completely passes through the single-ply paper filter. The composition of the product gas after processing in the autoclave at different temperatures and pressures were measured instrument Testo t350 S (Germany).

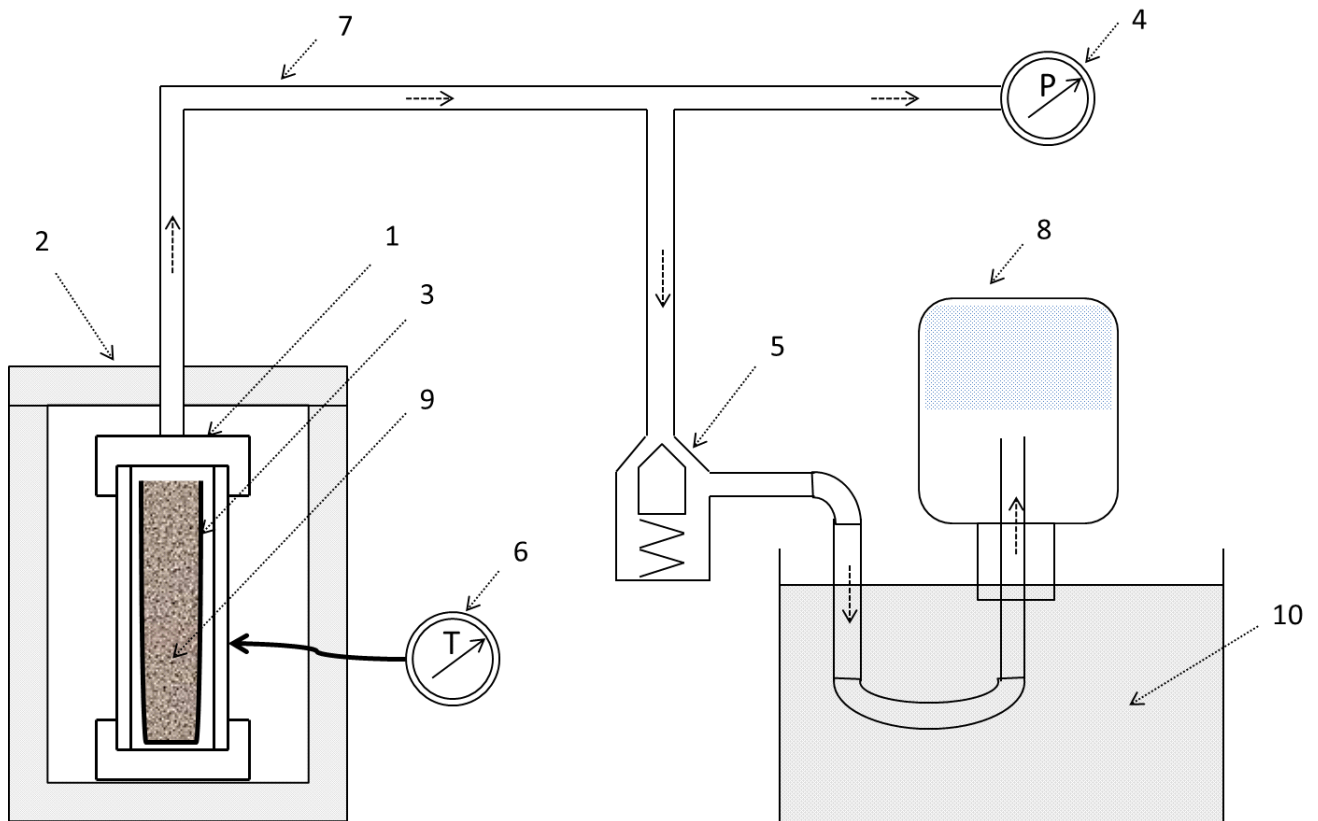


Fig. 1. Experimental setup: 1 - reactor (autoclave); 2 - muffle furnace; 3 - glass; 4 - pressure gauge;

- 5 - the pressure control valve; 6- thermometer with thermocouple;**
7 - connecting tube; 8 - a tank for gas collection;
9 - raw water; 10 - tank containing water.

The results of research. Table 1 shows the results of determination of the dry weight of the solid pyrolysis products, which were compared with the results of the weighing of samples of the original organic material. The moisture content of the initial sample was determined by evaporating the water in a fume hood for 6-10 hours at a temperature of 110-120 ° C. The sample weight loss in such measurements is 75-84%, which corresponds to an average moisture content of about 80% of samples. solid mass of thermochemical processing of samples is approximately 10 times smaller than the mass of the original organic matter. Table. 1 efficiency of utilization of the sludge is presented "a weight loss factor" - a parameter representing the ratio of the weight of the final dried product to the weight of raw material [4].

1. Loss of dry weight of solids in the long drying and thermochemical processing of sludge.

Sample number	Sample Weight		Max. temperature ° C	Dry weight of the solid, g	weight loss ratio
	source Raw g	added water, g			
When thermochemical treatment					
16	60,0	60,0	460	6,8	0,11
31	20,0	100,0	465	1,6	0,08
32	20,0	100,0	430	2,3	0,15
34	40,0	80,0	510	3,9	0,1
39	10,0	110,0	450	1,0	0,1
During prolonged drying (10 hours at T-D 110 ° C)					
–	133,4	–	120	27,9	0,21

The analysis of the composition and quantity of gases emerging from the autoclave as a result of the thermochemical treatment. Table 2 shows the values of gas concentration obtained for samples processed under different experimental conditions. It should be noted a very wide range of variation of the ratio of the gaseous components in the reaction products. This indicates that the maximum temperature variation can lead to significant changes in the relative composition of the gases. However, it found that the water vapor pressure gases and does not affect the composition of the gaseous products of thermochemical processing. For this reason, the data on the dependence of the composition of gas pressure in the reactor is given.

The amount of gas collected in the various experiments are also varied within wide limits. To accurately determine the amount of product gas necessary to consider its volume in the supply tubes, remaining at a high pressure.

Used for the rapid analysis of a digital device can simultaneously detect the presence of other gases. Definitely it can be argued that the concentration of carbon dioxide and nitrogen oxides in the pyrolysis products does not exceed 0.1%. A small number of tests (about 10%) showed the presence of a small amount (less than 0,2%) SO₂.

The volume of data resulting from the experiments is insufficient to explain the large variation in the relative concentrations of components of the fuel gas. Specifically, this issue has not been studied, since it goes beyond the basic task of the present work, which is rather an applied nature and is to investigate the possibility of recycling of sludge residues environmentally efficient manner, while ensuring maximum reduction of weight of the solid product.

2. The composition of the gaseous products of processing sludge.

Sample number	The composition of the sample		Max. temperature °C	The composition of the gas, %		
	Raw g	water, g		CO	H ₂	C _x H _y
32	20	100	440	6	38	56
39	10	110	450	2	4	94
31	20	100	465	15	15	70
16	60	60	480	26	11	63
34	40	80	510	7	13	80
21	40	80	520	13	45	42

It can be assumed that the reasons for the observed substantial variation of the relative share of gas produced in the processed products in specific experiments are differences in the actual values of the partial pressures of gas mixture components, which determine the kinetics of homogeneous chemical reactions. At the same time the control of these parameters was not provided for the construction of the laboratory setup. The real situation is even more complicated, given the heterogeneity of the partial pressures of the temperature distribution in the direction of flow from the reactor to the gas discharge point to the receiver via a pressure reducing valve [5].

The composition of the solids after processing in the autoclave was not determined. It can be described as a fine powder of neutral odor containing no resins or fluids.

Conclusions. The experiments on the pyrolysis of sewage sludge in an environment of high pressure steam showed the following:

- Thermochemical processing reduces the dry mass of about twice the feedstock with transition substantial portion of the substance in the gas;
- Consisting of collected gas at atmospheric pressure contains only combustible components, substantially no carbon dioxide, and nitrogen oxides, and sulfur;

- Combustible gases include carbon monoxide and hydrogen, with the ratio of the actual concentrations can vary over a wide range depending on the processing mode process.

The experimental results confirm the presence of sludge in sewage sludge significant amount of decomposed organic matter, even after long-term storage in open areas. It is shown that the composition of the resulting combustible gas can vary within wide limits depending on the temperature and other conditions of the pyrolysis process, which indicates the possibility of controlling the composition of the gaseous products useful technological methods.

Further studies will aim to clarify the technological parameters of the pyrolysis of various organic materials under supercritical conditions, the creation and testing of the experimental setup with a continuous production cycle.

Список литературы

1. Кожевников Ю. А. Использование технологии WRHTP для переработки отходов биомассы. // Ю. А. Кожевников, С. В. Пашкин, В. В. Сербин, Ю. М. Щекочихин // Тезисы докладов Международной научно-практической конференции "Будущее энергетики: возможности российско-германского сотрудничества" (в рамках года Германии в России), 26-27 февраля 2013 г.– Москва. – С. 28-31.

2. Пашкин С. В. Патент 2408649, МПК В01F 7/10 «Способ переработки органических отходов и устройство для его осуществления». Заявл. 29.12.2008; Бюл. № 29, 2011.

3. Кондратюк В. А., Воскобойников И. В., Щелоков В.А., Пашкин С. В., Иванова М. А. Патент 2464295, МПК В01F 7/10 «Способ термохимической переработки биомассы для получения синтез-газа». Заявл. 16.11.2010. Бюл. № 29, 2011.

4. Чижиков А.Г. Приготовление экологичных котельных биотоплив / А. Г. Чижиков, Ю. А. Кожевников, О. Е. Аладинская // Альтернативная энергетика и экология. – ISJAEE 3.– 2012. – Ч. 1,– с. 96-101.

5. Систер В.Г. Приготовление композитных котельных и моторных биотоплив из альгамассы / В. Г. Систер, Е. М. Иванникова, В. Г. Чирков, Ю. А. Кожевников // Альтернативная энергетика и экология.– ISJAEE, 2013 –Том 2,4,1.

Наведено результати експериментальних досліджень піролізу мулових осадів стічних вод міських очисних споруд у водяному парі високого тиску (у діапазоні 400-550° С за тиску 25-40 МПа та вологості 75%). Встановлено, що у складі утворених газів присутні тільки горючі компоненти за відсутності двоокису вуглецю та окислів азоту. Відносний склад горючих газів у значній мірі залежить від умов проведення експериментів, а їх загальна кількість відповідає втраті сухої маси, одержаної у результаті тривалого сушіння за температури 110° С вихідного мулового осаду. Отримана після піролізу

суха маса являє собою ультрадисперсний гігроскопічний порошок темного кольору без запаху, який утворює стійку суспензію у воді. Після пропускання через фільтрувальний папір стандартної щільності суспензія практично не залишає слідів на фільтрі і не зазнає помітного розшарування (осідання твердої фракції) протягом, принаймні, 10 діб.

Мулові опади, піроліз, установка, експерименти, водяна пара, тиск, температура, горючі гази

**THEORETICAL BASICS OF USING RESEARCH METHODS
ANTHROPOGENIC TERRITORIAL SYSTEM ANALYSIS
AND MONITORING AGRICULTURAL LANDSCAPES
WITHIN PROTECTED AREAS**

***R. V. KOLODNICKA, Candidate of Geographical Sciences
VP NUBiP Ukraine "Berezhany Agrotechnical Institute»***

The article analyzes the main methods for the investigation of the current state of anthropogenic territorial systems, which are used in case of analyzing and monitoring agricultural landscapes within nature reserves, which gives the possibility to analyze both the changeability, caused by anthropogenic factors, of such territorial system components as phytocenosis and soil, and the reaction of landscape formations on these impacts.

Anthropogenic territorial systems, methods of the investigation of territorial systems, current state of agricultural systems

Among a large number of methods used to study the constructive geography anthropogenic and anthropogenic modified territorial systems, it is difficult to choose one or even a small amount that adequately enabled to explore and assess such complex territorial entities. However, such a combination of methods is always elected for each study.

Analysis of recent research and publications. An important contribution on forming research methodology anthropogenic modified natural systems made such domestic and foreign scholars as G. Denysyk (2001) [4], KN Diakonov (2002) [7] AG Isachenko (1980) [8] Myhalevska T. (2006). [12]

The aim - to analyze the main methods of anthropogenic territorial systems to analyze and monitor agricultural landscapes within protected areas.

Overall assessment methods territorial systems - is one of the components of an appropriate examination, that a set of special methods of money or scoring impact of modern or future economic use of a resource, the consequences of this act on the state of objects, business functions (agricultural crops, etc.) and human health. This assessment is a multi-operation at every stage which used individual methods, but they are aimed at determining two states: present and future (projected).

The current state of agricultural systems (territorial systems with appropriate ahronavantazhennyamy) should indykuvaty using methods: landscape of general, structural-functional, structural January, environmental, GIS.

Landscape and scientific methods as analysis of phenomena and problems related to landscape structure of the territory based on the combined effect of the environment [10], is the first analytical method by which analyzed the phenomenon clearly "lay down" the real landscape structure that allows analysis within particular territorial systems. It is based on this method other, revealing the current state of these entities.

Once Landscape structural organization of the study area is found, it becomes feasible to use other analytical methods, for example - structural and functional [1, 3]. It is based on the establishment of a system linked to the formation of the landscape-forming components identified environmental consequences of human impact, the factors that determine the need to protect land from erosion, groundwater, air pollution, depletion of natural resources and degradation. At this stage, methodical study determined the most striking mizhkomponentni relationship (between lithogenic basis and soils, atmospheric quality component systems and phytocoenoses etc.).

Almost complementary method used structural January [14]. On the basis of receiving a detailed structural picture of the object, multidimensional structural image, it is the isolation of certain structural components of the overall structure of the structural system. This operation requires estimates for specific steps.

And most wide that allows not to use the analysis component and system structure of the area is an ecological method. This universal knowledge of the scientific method, which involves the study of any object through interactions with its environment. Since it is in the surrounding landscape environment characterized by not only corrective but also guiding functions to it, is the object of study, taking into account the specifics of this environment is considered essential.

Since the main purpose of evaluation is aimed at identifying trends in the development of certain classes of regional, consider it appropriate to use set of methods aimed at identifying appropriate opportunities to obtain trend phenomena. First of all, he belongs to those trending method as a means of determining the general tendency of graphic fluctuations (changes) of the environmental effects (object) using trend lines that show the long-term average of the phenomenon on annual fluctuations. Is calculated by the formula:

$$y = \epsilon - ax ; \quad (1)$$

where y - the annual value of the observed phenomenon (eg, number); ϵ - the mean value of the first year; and a - the value of which is changed every year trend line; x - the number of years each subsequent year from the original date. A similar trend shows averaged trend and therefore is quite reliable. So, for example, the method of grids (multistage matrix) developed by John. Sorensen. It contains an inventory of different land use options and specific to their type of impact. More determined effects associated with these initial changes in the state of individual

components of the environment and these changes are caused by disturbances in the natural environment (eg, reducing fish populations) [7]. These methods operate on the principle: if the current trend remains some variability, then a suitable time in the territorial system could take place next event (the next state). That is, it does not account for possible fluctuations and human intervention.

Geographic information systems (GIS) to study agricultural landscapes become the last period of particular importance, since the creation of environmentally sustainable natural systems is a major socio-economic problems of society. GIS able to propose ways and means of solving the problems of territorial modifications and facilitates the rapid development and management decisions, and monitoring of operational agricultural landscapes, including some fertility of land.

Close to the above, but which also deserve ahrovykorystannya use in local systems is comparable methods. Sam comparative method is based on a comparison of regional systems for certain other characteristics, it is important to present all the performance analysis in a form that would be suitable and convenient for comparison. The challenge is not only to set a rate for each single dimension, but also need to find a means of comparison of a variety of indicators in their regional variations. [8] This method allows you to: 1) identify not only the fact of the similarities and differences between objects of study, but their cause; 2) establish the possibility for interpolation of the hidden properties of objects to be compared; 3) extend the known laws in unexplored areas [16, 13]. Comparing the situation with already known analogues there is quite likely to foresee the emergence of certain processes and states of landscape design. Therefore, the most applicable method is comparable among natural counterparts. This installation method identifying similarities and differences between man-made landscapes with their sometimes better studied natural analogues [5].

A more difficult in this series is the method of comparative analysis of the geographical space and time. Based on the comparison he interaction of natural ingredients and most regional systems as coherent entities that can detect significant relationships emergent and complex nature of the relationship between them. This is where the system begins to show the essence of territorial units, which is extremely important for the preservation of the highest possible mechanisms of variation and adaptation.

Amplified and supplemented by a comparative research approach eco-geographical method [11]. It belongs to the direct observation of the territorial system or individual components in vivo, which provides non-intervention (or the smallest possible interference) researcher in natural processes, relationships or conditions. This method should be used for direct field research when the accumulation of relevant empirical material. The collected materials so most fully meet (adequate) study of reality.

At this stage we used the method of comparative natural analogs [4]. In fact, it enhanced (anthropogenic and man-modified systems) interpretation of prior research method, the feature of which is to establish the similarities and differences between man-made and anthropogenically modified landscapes studied natural (natural) analogues. As for integrated territorial systems, not just their individual components, this method becomes a method of landscape and environmental counterparts [2]. Is to search for the projected system landscape of its counterparts - geosystems same species, but those who some time were under the influence factor changes as a result of which you want to predict. Since absolutely identical Geosystems look almost impossible tentative forecast results, although they may introduce a quantitative form.

So well known methods analogues are effective in the study ahronavantazhen landscaped systems. Overall unique method is based on the long-term forecast of the territorial system, which are based on the findings of future processes in them similar to those that occurred earlier. It is assumed that if the assumptions are similar, it would be similar and subsequent development processes. However, be aware that a complete analogy between the processes set in landscaped formations unlikely and minor deviations in the initial state can cause significant differences in the further development processes. Because most of the unique method used with caution and only as part of more complex techniques.

Since the object of research in protected areas are real geographical system, and the aggregate of such methods, we have attempted to use the same method of geographic counterparts. We give it two definitions:

- is predicting natural processes similar to those recorded before (for example, the impact of reservoirs on the nature coast [6];
- is comparing dissimilar objects, one of which, quite understood, seen as the counterpart of another, unexplored; with the first properties to some extent are transferred to the second. A well-known example, the analogy between the system volohoobihu the landscape and the circulatory system in the body [9].

That is, first, poprotsesnyy method to examine their spatial and temporal trend. As to territorial systems as integral units, it can be called by extrapolation process by which it is possible to trace in a natural complex of various processes (including undesirable person), to determine the likelihood and nature of their display in the future, and extrapolate some data about them identified or predicted in individual territorial systems on morphological units of the same species that are not subject to direct examination. That is the method of extrapolation is:

- transferring data from a particular area of activity (in a certain range), more or less similar wide area (range). Varieties of this method is statistical methods for evaluating the next series of values of some properties based on preliminary curve (continuation of the famous series, current trends for the coming period of time or on a yet unknown, but

estimated a similar space). Sometimes extrapolations are also searching some intermediate values between the known properties of values - straight interpolation, exponential or other previously known curves changes [15];

– based on the assumption of the immutability of previously established trends and conservation in the future. For quite reasonable forecast by extrapolating the data needed to assess the retrospective period was 2-3 times greater than the forecast period. [12]

Conclusions. Thus, we have described a set of methods for the study of anthropogenic territorial systems to analyze and monitor agricultural landscapes within protected areas allow consider as anthropogenically-induced variability of the components of territorial systems, plant communities and soils as well as the reaction of most landscape design for these effects. The combination created a kind of methodical methods overlap, thus ensuring reliability obtained the appropriate conclusions.

Список літератури

1. Голубец М. А. Актуальные вопросы экологии / М. А. Голубец. – К.: Наукова думка, 1982. – 158 с.
2. Гришанков Г. Е. Введение в физическую географию: предмет и метод: [Учеб. пособие] / Г. Е. Гришанков. – К.: О-во «Знання», КОО, 2001. – 249 с.
3. Гуцуляк В. М. Еколого-геохімічний аналіз природно-антропогенних ландшафтів (на прикладі Чернівецької області та півночі Молдови): автореф. на здобуття наукового ступеня доктора географічних наук: спеціальність 11.00.01 «географія» / В. М. Гуцуляк. – К., 1994. – 36 с.
4. Денисик Г. І. Нариси з антропогенного ландшафтознавства. [Навчальний посібник] / Г. І. Денисик, В. М. Воловик. – Вінниця: ГІПАНІС, 2001. – 170 с.
5. Денисик Г. І. Лісостепові полісся / Г. І. Денисик, О. П. Чиж. – Вінниця: Видавництво «Теза», 2007. – 210 с.
6. Дьяконов К. Н. Ландшафтные исследования в районах влияния волохранилищ / К. Н. Дьяконов // Изв. АН СССР. Сер. геогр. – 1965. – № 5. – С. 50-54.
7. Дьяконов К. Н. Экологическое проектирование и экспертиза: [Учебник для вузов] / К. Н. Дьяконов, А. В. Дончева. – М.: Аспект Пресс, 2002. – 384 с.
8. Исаченко А. Г. Методы прикладных ландшафтных исследований / А. Г. Исаченко. – Л., 1980.- 222 с.
9. Исаченко А. Г. Теория и методология географической науки: [Учеб. для студ. вузов] / А. Г. Исаченко. – М.: Академия, 2004. – 400 с.
10. Исаченко А. Г. Ландшафтоведение на переходе ко второму столетию своей истории / А. Г. Исаченко //

Ландшафтоведение: теория, методы, региональные исследования, практика: Материалы XI Международной ландшафтной конференции. – М.: Географический факультет МГУ, 2006. – С. 3–8.

11. Ковальчук І. П. Екологія: [Підручник] / І. П. Ковальчук, В. Є. Робак. – Львів: Видавничий центр ЛНУ імені Івана Франка, 2006. – 328 с.

12. Михалевська Т. В. Моделювання і прогнозування стану довкілля: [у 2 ч.] – / Т. В. Михалевська, В. М. Ісаєнко, В. А. Гроза, В. М. Криворотько. – К.: Книжкове вид-во НАУ, 2006. Ч.1 – 212 с.

13. Нееф Э. Теоретические основы ландшафтоведения / Э. Нееф. – М.: Прогресс, 1974. – 219 с.

14. Созінов О. О. Агроєкосистема / О. О. Созінов., С. П. Сонько // Екологічна енциклопедія: у 3 т. – К.: ТОВ «Центр екологічної освіти та інформації», 2006. – Т. 1. – С. 14.

15. Сочава В. Б. Введение в учение о геосистемах / В. Б. Сочава. – Новосибирск: Наука, 1978. – 319 с.

16. Уатт К. Экология и управление природными ресурсами / К. Уатт. – М.: Мир, 1971. – 464 с.

В статтє проаналізовані основні методи дослідження сучасного стану антропогенних територіальних систем, які застосовують при аналізі та моніторингу агроландшафтів в межах заповідних територій, що дозволяє розглядати, як антропогенно-викликану змінчивість таких компонентів територіальних систем, як фітоценоз і ґрунти, так і реакцію самих ландшафтних образунків на ці впливи.

Антропогенні територіальні системи, методи дослідження територіальних систем, сучасний стан агросистем

**FEATURES OF FORMATION ABOVEGROUND BIOMASS
PRIMULA VERIS L. S. L.**

**V. V. KONISHUK, Doctor of Biological Sciences Senior Fellow,
O. R. KIRICHISHIN, applicant,
O. B. HODIN'**

Institute of Agroecology and Environmental NAAS

Sandwiched plate and flowering stems of a plant characteristic parameters play an essential role in life as a species, and the general population. By collectively plant organs can assess growth, vitality and state populations phytomass accumulation of the studied species and others. In the present work processed morphometric parameters of the plant, the dependence of the mass of Primula veris L. s. l. the parameters of leaf blade and flowering stems and proposed a formula for its determination.

Cowslip, leaf blade, flowering stems, parameters, morphometric parameters, weight

In the process of structural and functional organization of grass substantial role assigned to plant organisms that make up the groups. Determination of biomass and leaf plates parameters enabling to assess these vital processes in phytocenoses intensity streams of energy production and decomposition of organic matter, binding and release of organic compounds, photosynthesis, respiration and transpiration [3, 5, 7].

Leaf blade - this assimilationist body that performs various functions vital for plants: formation and laying plastic materials, gas exchange with the atmosphere, clean the air of dust and harmful gases. Growth and development of leaf plates accompanied by intensive course of photosynthesis. Floral stem - a phytocoenotic unit, morphological and morphometric analysis which characterizes the process of reproduction and propagation determines favorable conditions for the growth and development of species and populations as a whole [1, 4, 9].

Morphometric criteria for individuals (parameters of leaf blade and flowering shoots) are important for forecasting the population, and their comparative evaluation, the different between a forest typology circumstances, decides environmental needs type (in relation to light, humidity and soil) [1, 2, 6 8].

The purpose of research - to identify the dimensional characteristics of leaf blade (length and width) and a height of flowering stems in different habitats. Set dependence on biomass aboveground morphometric parameters of *Primula veris* L.

Materials and methods of research. To achieve this goal draws permanent sample plots other than each other ecological factors: soil moisture and trofnisty, zimknutisty upper tiers of the forest.

Field studies were carried out using forestry-taksatsiynyh, botanical methods. The data worked out using standard techniques (Zaitsev, 1990) and software packages Microsoft Excel-2010, StatSoft, Statistica-6. For factual material obtained using correlation analysis.

Results. Research conducted mass primrose on the results of measurements of leaf plates (1545 pcs.) And flowering shoots (212 pcs.).

Based on the correlation matrix between where the stem height, leaf size and their weight, there is a close relationship respectively $r = 0,86$ and $0,82$, weight primrose can be described by the following formula:

$$M_{3ae} = M_{cm} + M_{лucm}, \quad (1)$$

where: M_{3ae} – total mass of plants, g; M_{cm} – mass flowering stems, g; $M_{лucm}$ – leaf weight, g.

The mass of the stem is well described by the following formula:

$$M_{cm} = a_1 \cdot \left(1 - e^{-(b_1 \cdot L_{cm})}\right)^{c_1} + \varepsilon, \quad (2)$$

where: L_{cm} – length of inflorescence stems, mm; a_1 , b_1 , c_1 – coefficients of equation.

Weight letter described by the following formula:

$$M_{лucm} = n \cdot \left\{ a_2 \cdot \left(1 - e^{-(b_2 \cdot L_{лucm})}\right) \cdot \left(1 - e^{-(c_2 \cdot B_{лucm})}\right) \right\} + \varepsilon, \quad (3)$$

where: n – number of leaves, pieces.; $L_{лucm}$ – leaf length, mm; $B_{лucm}$ – leaf length, mm; a_2 , b_2 , c_2 , – coefficients of (Table. 1)

1. The coefficients equation to calculate the mass of plants

Coefficients	The length of the stem, mm	Settings sheet, mm
<i>a</i>	4,9966	4,0936
<i>b</i>	0,0032	-0,001206
<i>c</i>	2,0733	-0,002581

For a more complete analysis models is additional statistical criteria between measured and model values, namely:

- the amount of deviation between the actual values and model who has to go 0;
- coefficient of determination (R^2) linear relation between the actual values and model, where the values of free factor should go to 0 ($\square = 0$) and slope factor under 1 ($\square = 1$);

- the adequacy of the model - convergence properties (features, parameters, characteristics) model and the properties of the object, which is calculated by the following formula [author]

$$\theta = 1 - \frac{\sum (y - \tilde{Y})^2}{\sum (y - \bar{Y})^2}, \quad (4)$$

where: θ – adequacy model; y – the actual value of; \tilde{Y} – the value model; \bar{Y} - The average value.

The adequacy of the model can take values from -1 value to 1. 1 model describes a given pattern between the actual and the modal values; the value 0 - model is slightly worse than the average of the value; and the negative value model is much worse than average and is a systematic error.

The adequacy of the proposed equations for estimation of stem and leaf weight shown in Fig. 1-4.

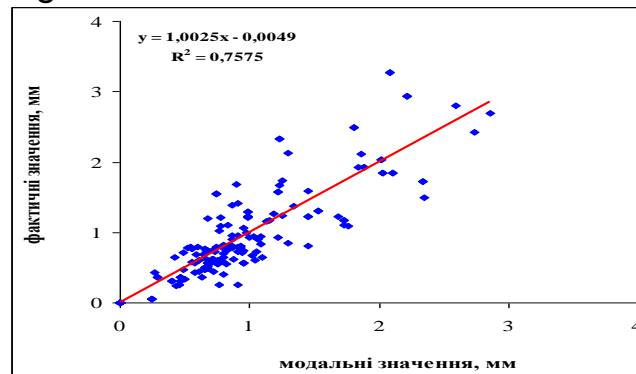


Fig. 1. Dependence of the mass of the stem between theoretical and actual values

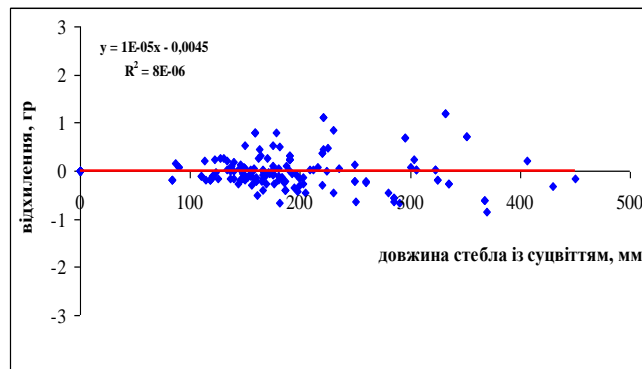


Fig. 2. Dependence of the difference between the actual mass of stems and theoretical values

How accurate equations describing the mass of stems show Fig. 1 and 2. The adequacy of the model (θ) is 0.758; free rate and tends to 0 (0.0049), and the coefficient b - 1 (1.0025). The maximum difference between theoretical and actual values of maximum 0.85 grams, corresponding to 4.7%, the amount of deviation between the actual and theoretical values equal to - 0.48, and the value = -0.0026. Consequently,

the proposed equation adequately describes the actual signs masses stems.

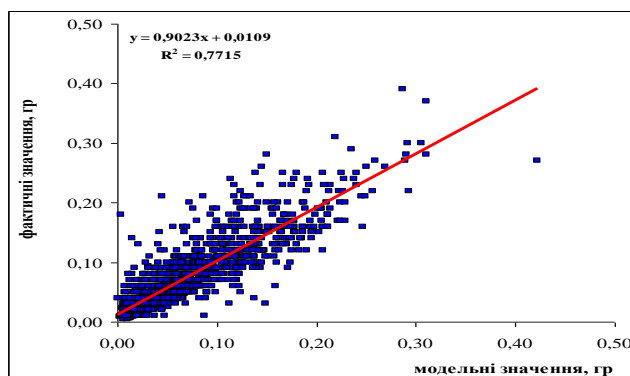


Fig. 3. Dependence leaf mass between the theoretical and actual values

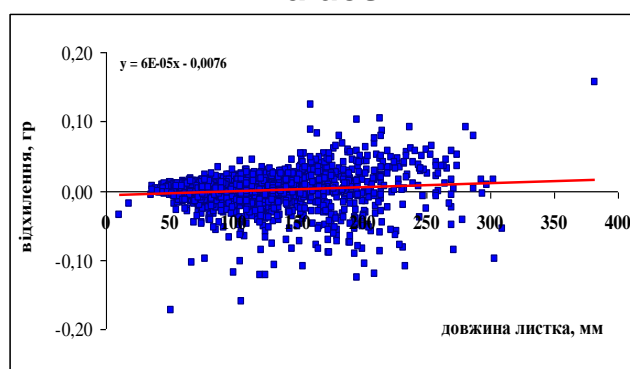


Fig. 4. Dependence leaf mass difference between the actual and theoretical values

Established that the adequacy of the model (R^2) is equal to 0.772 free rate and tends to 0 (0.0109), and the coefficient b - 1 (0.9023) (Fig. 3, 4). The maximum difference between theoretical and actual values of 0.18 grams, corresponding to 2.4%, the amount of deviation between the actual and theoretical values equal to - 7.10, and the value = -0.0046. Consequently, the proposed equation adequately describes the actual signs of leaf mass.

Conclusions. Based on our empirical equations adequately describe the proposed stem and leaf mass the size of the plant in fresh-cut state. Mass plants in air-dry plant mass equal to freshly state multiplied by the percentage of moisture

Список літератури

1. Булатов В. И. Пути и методы агроландшафтных исследований / В. И. Булатов // Общие и региональные проблемы ландшафтной географии СССР. – Воронеж: Изд-во ВГУ, 1987. – С. 54-63.
2. Веретенников А. В. Физиология растений с основами биохимии [Текст] / А. В. Веретенников. – Воронеж: ВГУ, 1987. – 256 с.
3. Волошина Н. Ю. Морфологічні ознаки та стан фотосинтетичного апарату листків *Acer platanoides* і *Acer tataricum* із

різних рівнів крони / Н. Ю. Волошина, Н. М. Топчій, Н. О. Білявська, Я. П. Дідух // Доповіді НАН України. – 2008. – № 8. – С. 153-159.

4. Гаврилів О. Р. Вплив кліматичних факторів на параметри листової пластинки первоцвіту весняного (*Primula veris* L.) / О. Р. Гаврилів // Наукові основи підвищення продуктивності та біологічної стійкості лісових та урбанізованих екосистем. (61-ша наук.-техн. конф. 4–6 травня 2011 р). – Львів: РРР НЛТУ України, 2011. – С. 13-15.

5. Краснов В. П. Атлас рослин-індикаторів типів лісорослинних умов Українського Полісся [Текст]: [моногр.] / В. П. Краснов, О. О. Орлов, М. М. Ведмідь // Під ред. д. с.-г. н., проф. В. П. Краснова. – Новоград-Волинський: НОВОград, 2009. – 488 с.

6. Маховська Л. Й. Біологічні особливості *Arnika montana* L. на території Горган [Текст]: автореф. дис. на здобуття наук. ступеня канд. біол. наук / Л. Й. Маховська // – Львів, 2008. – 20 с.

7. Меньшикова З. А. Энциклопедия лекарственных растений [Текст] / З. А. Меньшикова, И. Б. Меньшикова, В. Б. Попова. – М.: Адонис, 2006. – 464 с.

8. Мінарченко В. М. Життєва стратегія сировинно-значущих видів лікарських рослин України та її реалізація в умовах трансформованого навколишнього середовища / УБЖ. – 2007. – Т. 64, № 5. – С 25-31.

9. Нухимовский Е. Л. Основы биоморфологии семенных растений [Текст] / Е. Л. Нухимовский // Габитус и формы роста в организации биоморф. – М.: Оверлей, 2002. – Т. 2. – 859 с.

10. Loague K., Green R. E. Statistical and graphical methods for evaluating solute transport models: Overview and Application. J. Contam. Hydrol, 1994 – P 51-73.

*Листовая пластинка и цветоносный стебель с характерными для растительного организма параметрами играют существенную роль в жизнедеятельности как вида, так и популяции в целом. По совокупным признакам растительных органов можно оценивать рост, жизнеспособность и состояние популяций, накопления фитомассы изучаемого вида и др. В представленной работе обработано морфометрические показатели растительных органов, установлена зависимость массы *Primula veris* L. s. l. от параметров листовой пластинки и цветоносного стебля и предложено формулу для ее определения.*

Первоцвет весенний, листовая пластинка, цветоносный стебель, параметры, морфометрические показатели, масса

**IMPROVEMENTS LANDSCAPING
ST. CYRIL'S CHURCH NATIONAL PRESERVE
"SOPHIA" IN KIEV**

***A. I. KUSHNIR, Candidate of Biological Sciences
O. A. SUHANOVA, Candidate of Agricultural Sciences
A. U. UDOVENKO, Master's student ****

The article highlights the complex variants, present in studies carried out on the territory of St. Sophia's church in St. Cyril's national reserve during 2012-2015: the main steps of the reserve, factors who influenced the formation of particular areas and particular plantations, definition of the current state of the area who is studied and the developed measures for his improvement.

St. Cyril's Church, landscaping, greenery, planning structure

Cyril Church - a unique monument of architecture of Ukraine (XI-XVIII c.), Has historical and spiritual value, is a monument monumental painting XII-XIX. It was built on the territory of contemporary Dorozhychi tract, which was located in the northwest part of the city. Kyiv, which later became known Dorohozhychi. The name is derived from the passage of this important trade routes in Vyshhorod, Smolensk, Chernigov, Polotsk, Novgorod [1, 5, 6, 7].

At the time of Kievan Rus were the most powerful princes of Chernigov O. hereditary who seized the solution of important trade routes - Dorozhychi. In 1146 built a large stone church on a hill, from which opens a good view of the river Pochayna. Church of St. Cyril named in honor of St. Cyril of Alexandria, one of the Slavic educators.

Cyril Church was ancestral burial O. family. In 1194 became the burial place for Kiev prince Svyatoslav - the protagonist of the story "The Tale Ihorovim" [1, 7].

In the first half XVII. Kirillov monastery was restored under the reign of Constantine Ostrog.

In 1748-1760 gg. In the territory adjacent to the interior of the church was built of stone monastery buildings erected wall and tower. Until now, only a small portion of these extensions. After XVII. general appearance of the church has changed and it has become a modern image in the Ukrainian Baroque style.

The aim - to determine the current state of the landscaping at St. Cyril's Church National Reserve "Sophia" in the city. Kyiv, its planning

* Supervisor - Doctor of Biological Sciences, docent Kushinir A.I.

structure stezhkovoyi state road network, small architectural forms, decorative plants and propose measures for their improvement.

Materials and methods of research. The study was conducted by an object we pre-analysis area is determined mistobudivelnu, historical, functional, architectural and landscape planning and evaluation; state was established landscaping and space resolution of an object made poderevna inventory space. The main methods of establishing a general assessment area were full-scale inspection route, iconographic analysis, journalistic and academic sources, a significant achievement in the study served as stages of church archives.

Research results. Since 1883 in the interior of the church was carried out works on cleaning and restoration of wall murals, under the direction of Professor A. Prahova, who worked in a team of Mikhail Vrubel. It is thanks to the coordinated work was able to significantly improve the appearance of the interior of the church. [7]

In 1929 St. Cyril's Church proclaimed the State Historical and Cultural Museum-Reserve of national importance. Started archaeological research projects continue until the end of the Great Patriotic War (1941-1945.). Subsequently conduct extensive restoration work, strengthen the walls and foundation of the church.

In 1965, St. Cyril's Church declared a museum, which is part of the National Reserve "Sophia." During the museum spend big in terms of rehabilitation and restoration work.

Recently, the major work conducted on the interior of the church building had character restoration, initiated and financed enterprise "base-Solsif." When these works were found the remains of the foundations of past extensions churches and other securities in the archaeological and historical significance of things. [7]

Currently, St. Cyril's Church National Reserve "Sophia" a museum open to visitors. The main part of the complex stretches along the slope, and the interior of the church building is located directly on the hill (Fig. 1).

The complex stairs leading bahatomarshevi (Fig. 2), requiring repair. On both sides of the stairs surrounded by an array of trees and shrubs. Until recently, the slope was terraced, where growing fruit trees. Today he reinforced retaining walls, terraces not visible, an array of trees and shrubs THICKENED, species composition of vegetation is represented with lime, alder., Maples and ash. Under the canopy of tall woody plant fruit are not sufficient conditions for normal growth and fruiting, so eventually fall out.

The dominant building complex stands interior of the church, except for her with built-existing administrative structures and small architectural forms. The complex is shopping kiosk that performs a service function and read the whiteboard, working hours and conditions visit possible by information stands.



Fig. 1. The facade of St. Cyril's Church with lime cordata foreground

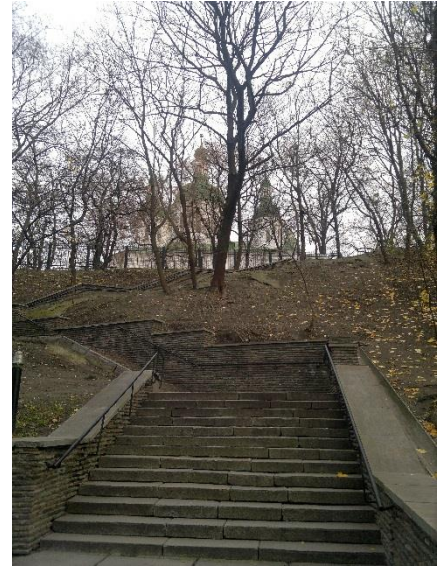


Fig. 2. Stairs leading to the interior of the church from the side of the street. Telihiy

The complex has an extensive road network *stezhkovu* that is inserted lighting area and surrounded by a wall that needs renovation. In many places electric cables unearthed, are unaesthetic appearance and pose a threat to workers and visitors to the facility.

Sanitary zone is not clear the examined areas for rest and appropriate landscape equipment.

Flower design of the compound represented mixborders, the range of plants is not relevant to the object and its functions.

For the convenience of the work on the inventory of structural elements of the object of research area was divided into seven sections. In terms of inventory, presented in Fig. 3, these areas are marked with different colors.

During the 2013-2015 biennium. Custom Directorate of the National Reserve "Sophia of Kyiv" we were made to work with pre study area and research facility planned major steps to improve its existing condition.

As a result of inventory work established species composition of vegetation, defined by their age structure, distribution of plants held in diameter trunks and origin; The types of plantations and established their quality status (see. Table.) [8].

During the study, the research area of the object we found that plantations are 39 taxa of woody plants in an amount of 106 specimens of trees and bushes of 108 copies. The predominant species are of the genus maple (*Acer L.*).

In the first three parts of the inventory plan that surround St. Cyril's Church and considered its estates, plantations are 19 species of plants, 11 species of which are local, and 8 - introduced, of which 11 species - trees, 8 - bushes. The basis of the plantings in these areas constitute cordata

plant linden (*Tilia cordata* L.). Diameter shafts are plants include seven groups of eight diameters defined in the Regulations inventory of green spaces in cities and towns of Ukraine [9]. Thus, a group of diameters up to 6 cm referred 13 instances are usually shrubs; most specimens of plants classified in the group of more than 50 cm in diameter - 12, the smallest number of plants classified in the group 38,1-46,0 cm - 9 copies.

Age structure stands presented 3 age groups. Assigned to the prevailing woody plants that are aged over 50 years, the least represented - to 15 years. By type of plantations in which plants are concentrated, dominated by single (Tapeworm) landing.

Quality state of the plants installed during the inventory work is satisfactory. Some specimens of woody plants with good fortune. Typically, these young people landing on the open field.

The idea for writing slope terraces fruit plants today are not monitored, self-seeding crops and pushed yasenelystoho Branch maple, linden cordata, alder sticky and Robinia psevdokatsiyi. Among shrubs dominated lilac ordinary [2, 3, 4].

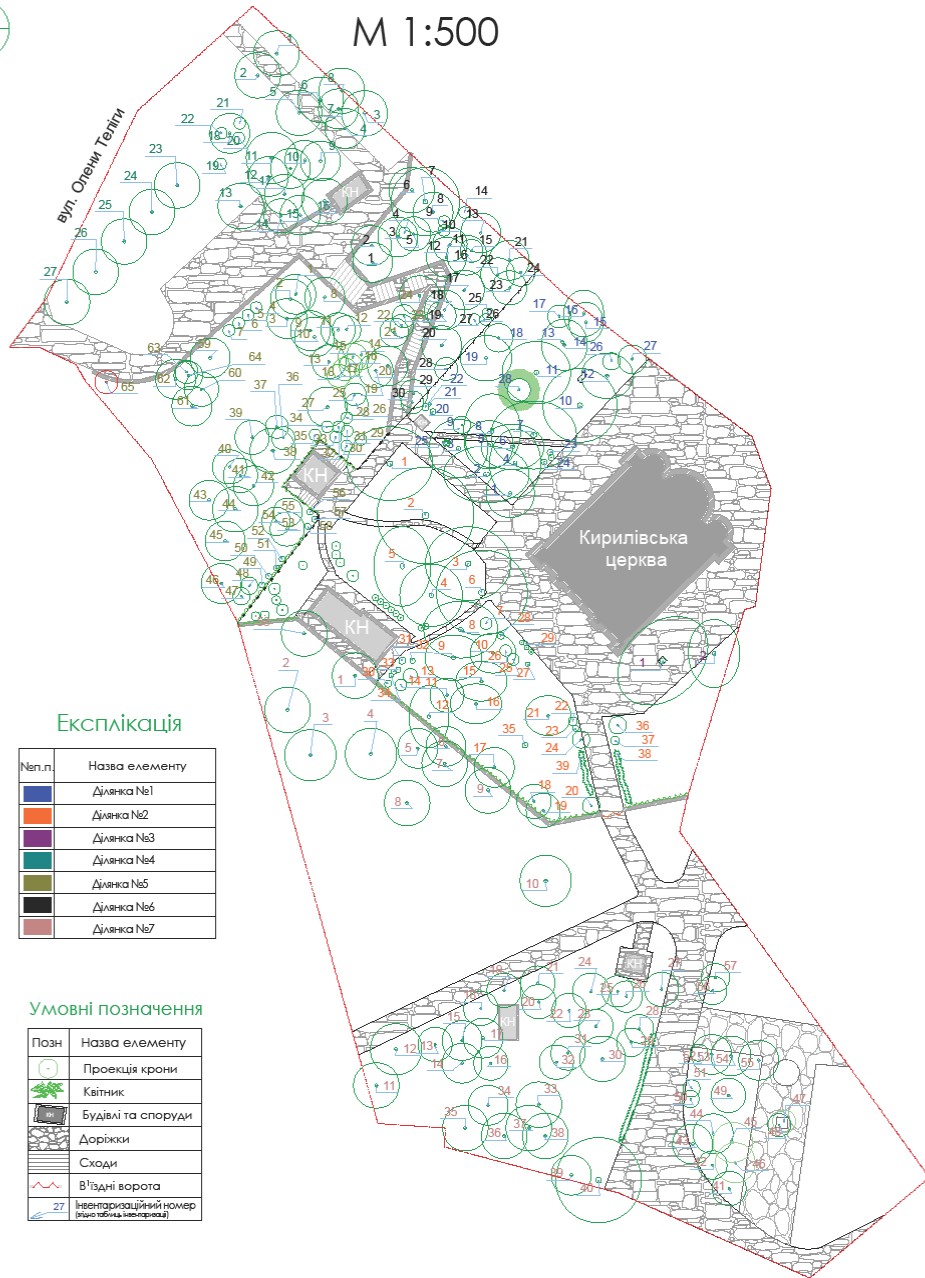
Today, the area is complex represented a small area, which leads to lack of allocation of certain elements common to the monastery gardens - orchard or vegetable garden herbs. Available copies lime characteristic species for monastic cadiv and have a good condition, so the overall concept, dedicated to the reconstruction of the facility, they offered to keep.

Схема інвентаризації зелених насаджень
 території Національного заповідника
 "СОФІЯ КИЇВСЬКА"
 (Кирилівська церква)
 вулиця Олени Теліги, 12

Північ



М 1:500



ЕКСПЛІКАЦІЯ

№п.п.	Назва елементу
1	Ділянка №1
2	Ділянка №2
3	Ділянка №3
4	Ділянка №4
5	Ділянка №5
6	Ділянка №6
7	Ділянка №7

УМОВНІ ПОЗНАЧЕННЯ

Позн.	Назва елементу
○	Проекція крони
☘	Квітник
▭	Будівлі та споруди
▨	Доріжки
▧	Сходи
⤴	В'їзні ворота
27	Інвентаризаційний номер (вписано таблиць інвентаризації)

Сотопов'язано	
Висл. н.к. №	
Підп. і дата	
Ім'я, На пр. і підп.	

					---0001-12				
					Заказчик				
Ім'я	Катег.	Лист	№зак.	Позп.	Дата	Назва проекту	Стадія	Лист	Листов
						а2 к церква	-	12	1
							Назва організації		

Копіюван

Fig. 3 inventory plan of St. Cyril's Church

Overall inventory sheet woody plants

№ п/п	Name of plant	Count, pc.	Якісний стан		
			good	satisfactory	unsatisfactory
1	Абрикоса звичайна – <i>Armeniaca vulgaris</i> Lam.	2		+	
2	Барбарис звичайний - <i>Berberis vulgaris</i> L.	4		+	
3	Береза повисла – <i>Betula pendula</i> Roth.	7		+	
4	Бузина чорна – <i>Sambucus nigra</i> L.	9		+	
5	Бузок звичайний – <i>Syringe vulgaris</i> L.	15		+	
6	Верба ламка – <i>Salix fragilis</i> L.	3		+	
7	Вишня повстяна – <i>Cerasus tomentosa</i> Wall.	3		+	
8	В'яз граболистий – <i>Ulmus carpinifolia</i> Rupp. ex Suchkov	2		+	
9	В'яз шорсткий – <i>Ulmus glabra</i> Huds.	4		+	
10	Гіркокаштан звичайний – <i>Aesculus hippocastanum</i> L.	5		+	
11	Горіх грецький – <i>Juglans regia</i> L.	2		+	
12	Горіх сірий – <i>Juglans cinerea</i> L.	2		+	
13	Горобина звичайна – <i>Sorbus aucuparia</i> L.	2		+	
14	Гортензія деревоподібна – <i>Hydrangea arborescens</i> L.	3		+	
15	Гортензія волотиста – <i>Hydrangea paniculata</i> SIBE.	2		+	
16	Груша домашня – <i>Pyrus domestica</i> Medic.	3		+	
17	Дуб звичайний – <i>Quercus robur</i> L.	2		+	
18	Калина звичайна – <i>Viburnum opulus</i> L.	3		+	
19	Кизил звичайний – <i>Cornus mas</i> L.	3		+	
20	Клен гостролистий – <i>Acer platanoides</i> L.	19		+	
21	Клен польовий – <i>Acer campestre</i> L.	4		+	
22	Клен цукристий – <i>Acer saccharinum</i> L.	2		+	
23	Клен ясенелистий – <i>Acer negundo</i> L.	7		+	
24	Липа серцелиста – <i>Tilia cordata</i> Mill.	5		+	
25	Малина звичайна – <i>Rubus idaeus</i> L.	16		+	
26	Самшит вічнозелений – <i>Buxus sempervirens</i> L.	5		+	
27	Слива домашня – <i>Prunus domestica</i> L.	2		+	
28	Сумах оленерогий 'Ланцетний' – <i>Rhus typhina</i> 'Lanciniata'	3		+	
29	Таволга верболиста – <i>Spiraea salicifolia</i> L.	10		+	
30	Тополя канадська – <i>Populus x canadensis</i> Moench.	2		+	
31	Робінія звичайна – <i>Robinia pseudoacacia</i> L.	13		+	
32	Чубушник вінцевий – <i>Philadelphus coronarius</i> L.	12		+	
33	Шипшина зморшкувата – <i>Rosa rugosa</i> Thunb	5		+	
34	Шовковиця біла – <i>Morus alba</i> L.	8		+	
35	Яблуня домашня – <i>Malus domestica</i> Borkh.	4		+	
36	Ялина звичайна – <i>Picea abies</i> (L.) H. Karst.	3		+	
37	Ялина сиза 'Коніка' – <i>Picea glauca</i> 'Conica'	2		+	
38	Ялівець козацький – <i>Juniperus sabina</i> L.	7		+	
39	Ясен звичайний – <i>Fraxinus excelsior</i> L.	3		+	

The results of our studies during 2012-2015. Reasoned recommendations on improvement of landscaping St. Cyril's Church National Reserve "Sophia of Kyiv", which includes a number of provisions:

1) continue the search and analysis of historical, archival, reference, scientific, normative literature on the stages of formation and development of the object of research to identify the best measures that would contribute to the aim pursued;

2) determine the optimal methods of studying and establishing comprehensive assessment of historical object, based on domestic and foreign experience in reconstruction and restoration of these facilities;

3) conducting phenological observations in plantations complex to analyze changes in the overall appearance and condition of vegetation in different seasons.

Conclusions. According conducted our search and field research complex structures and areas that belong to the interior of the church of the National Reserve "Sophia", identified a number of provisions included in the general recommendations for improving its improvement. The main works to be carried out on the subject of research in the first place are the following:

1. cleaning the slope of self-seeding and porosti maple, linden and several other species that cover the interior of the church historic building from the side of the street. Telihiy limit viewing facility and damaging the main building, placed on the approaches and the territory of the complex;

2. advisable to develop project proposals for the reconstruction of decorative plantation complex using a wide range of plants and propose options for their layout, inherent to the objects of national heritage and historical cultural heritage, including plants and symbols;

3. for the reconstruction of a number of measures to improve the campus must apply modern technologies in the formation and maintenance of historic objects, materials (for fastening of slopes, atmospheric water drainage, installation of lighting) and equipment to farming operations.

Список літератури

1. Успенская Н. Д. Формирование зелёных насаждений при памятниках Древней Руси / Н. Д. Успенская, Ю. А. Клименко, С. И. Кузнецов, И. А. Давиденко– Киев: Наукова думка, 1991. – 112 с.

2. Кучерявий В. П. Озеленення населених місць: [підручник] / В. П. Кучерявий. – 2-ге вид. – Львів : Світ, 2008. – 456 с.

3. Ван дер Неер Ян. Всё о самых популярных хвойных растениях / Ян Ван дер Неер. – Москва: ОНИКС, 2008. – 208 с.

4. Теодоронский В. С. Садово-парковое строительство и хозяйство / В. С. Теодоронский. – Москва: Академия, 2012. – 288 с.

5. Odebur M.-T. Lesjardinsde Moyen-Ages / M.-T. Odebur. – Paris : Livre, 2001. – 205 с.

6. Mosse M. Histoire des jardins, de la Renaissance a nosjours / M. Mosse, J. Teyso // – Paris : Livre, 2002. – 218 с.

7. Візит у Київ [Електронний ресурс]. – 2013. – 1 с. Режим доступу <http://visitkyiv.com.ua/>.

8. Інструкція з інвентаризації зелених насаджень у містах і селищах міського типу України: ГКН 03. 08. 007 – 2002: Затверджено наказом Держбуду України 24. 12. 2001 № 226. – К., 2002. – 20 с.

В статье освещены материалы комплексных исследований, проводимых на территории Кирилловской церкви Национального заповедника «София Киевская» на протяжении 2012-2015 гг. Определены основные этапы становления заповедника, факторы, влияющие на формирование территории и насаждений в частности, установлено современное состояние территории объекта и разработаны мероприятия по его улучшению.

Кирилловская церковь, благоустройство, насаждения, планировочная структура

ANALYSIS VARIETAL DIVERSITY OF PLANTS *LOLIUM PERENNE* L. IN THE STATE REGISTER OF VARIETIES UKRAINE AND POLAND

O. U. LESHENKO, postgraduate*
O. V. KOLESNICHENKO, Doctor of Biological Sciences
National Agriculture University of Ukraine

*The positions of the State Register of plant varieties suitable for dissemination in Ukraine and Poland National Register of representativeness plant varieties of *Lolium perenne* L. were analyzed.*

Ecological plasticity, perennial ryegrass, register

Pasture coverage - not only an integral part of landscape management, but also the deterrent element of modern urboecosystem buffer. Decorative Lawn coverage depends on a number of environmental and biological characteristics of plants that are part of the lawn grass mixtures. The results of the analysis of kulturfitotsenziv lawn in the city. Kyiv show (AV Choha, 2005), ornamental lawns covering virtually no purpose and is short-lived (1-2 years), due to its use of placement of plant varieties, typically not zoned for this region and Ukraine as a whole [6]. Therefore, for the placement of high-quality grass kulturfitotsenziv should primarily take into account ecological and biological characteristics of plants and their ecological plasticity to the conditions of a region. Long-breeding practice with different kinds of grasses suggests that simulate the climate of a region is very difficult, and often impossible. [4] State Register of plant varieties suitable for dissemination in Ukraine contains a list of varieties of plants that have passed testing and have high performance adaptive to their growth in our state.

L. perenne L. (perennial pazhytnytsya) - a perennial plant that is a major cultural plant in hazonoznavstvi and fodder production in the temperate region of the world. Studies indicate [2-4, 6] that plant varieties *L. perenne* L. domestic breeding differ broader ecological plasticity compared with varieties of foreign selection. According to LG Revunova and DB Rakhmetova [2014], using plants *L. perenne* L. lawn grass mixture as a component of appropriate growing conditions for the varieties domestic breeding and regular watering. As a result of years of research established [3, 4] that the Ukrainian selection of lawn grasses, including and *L. perenne* L. autekolohichni have higher rates compared to foreign

* Supervisor - Doctor of Biology, Professor KOLESNICHENKO O. V.

plant varieties selection - varieties more drought, winter and frost. Published data indicate that in these conditions, which is winter 2002-2003, the varieties of *L. perenne* L. Western vyerzly full selection, which was caused by the use of plants not adapted to our climatic conditions [4].

The purpose of the study - analyzing the position of the State Register of plant varieties suitable for dissemination in Ukraine and Poland plan on the National Register of varieties of *L. perenne* L. and their distribution by area of use.

Materials and methods of research. Statistical analysis of the list of items the State Register of plant varieties suitable for dissemination in Ukraine and Poland National Register, analysis of published data on the subject of the research.

Research results. National Register plant in Poland - the official catalog of plants that have passed testing and could be implemented in Poland and other EU countries. Unlike the State Register of plant varieties suitable for dissemination in Ukraine, where all plants have a clear division in the direction of purpose, the National Registry includes five plants in Poland register of plant varieties that are entered into the National Register of Poland (Krajowy rejestr), but the effect at 30.06 . 2014 is a three - agricultural, vegetable and fruit plants (Fig. 1). Varieties of plants that are decorative, not regulated by the National Registry of Poland. There is a significant difference registers Recording plants as the National Registry of Poland is a long-term (10-20 years), unlike the Register of Ukraine, where each year must pass sortoispytaniya plants.



Fig. 1. General view of the Registers of plants included in the National Register of Plant Poland [7]

In 1974 Ukraine was registered in first grade plants *L. perenne* L. lukopasovyschnoho directly Drohobych-2. The first plant variety *L. perenne* L. Kyiv-101 for landscaping appearing in 1978 in 2001 marked a sharp increase in the number of registered varieties - 2.5 times and the emergence of a wide range of lawn grass breeding in Germany and the Netherlands on the market

gardening Ukraine (Fig. 2), which is due, in our opinion, the development of green building in our country

Today in the State Register of plant varieties suitable for dissemination in Ukraine presented 29 varieties of plants *L. perenne* L., of which only 13 - the national selection, which is only 44% of the present range available (Fig. 3). Among registered foreign companies - Euro Grass Breeding GmbH & Co. KG (Germany) - 6, Feldsaaten Freudenberger GmbH & Co. KG (Germany) - 4, Małopolska Hodowla Roślin Sp z o.o. (Poland) - 2, Innoseeds B.V. (Holland) - 2, DLF Trifolium (Denmark) - 1 and Pickseed (Canada) - 1 grade.

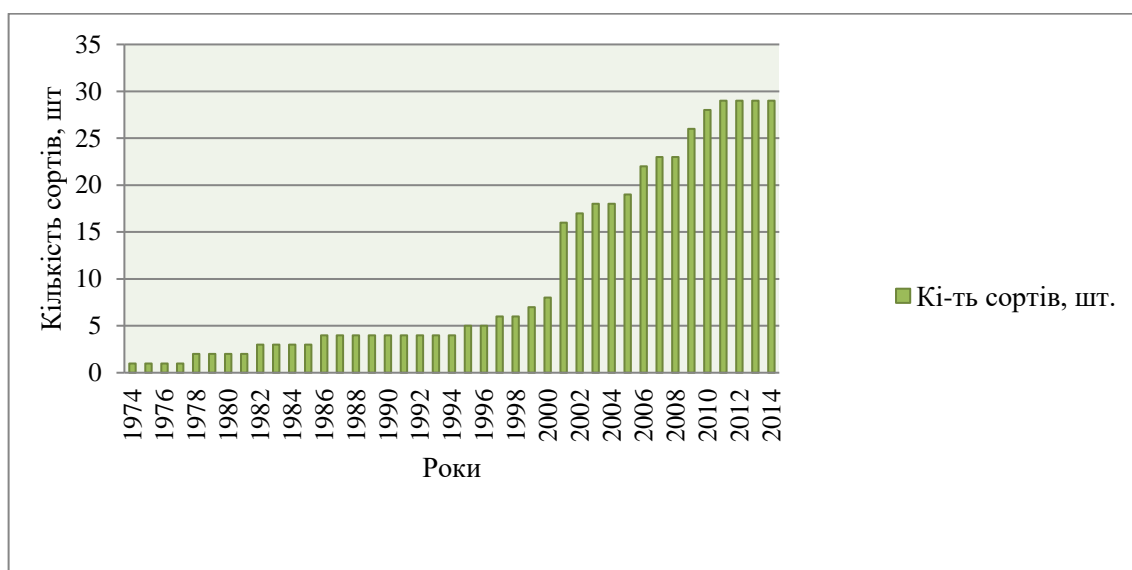


Fig. 2. Registered Plant Varieties of *Lolium perenne* L. in the State Register of plant varieties suitable for dissemination in Ukraine (1974-2014 years.)

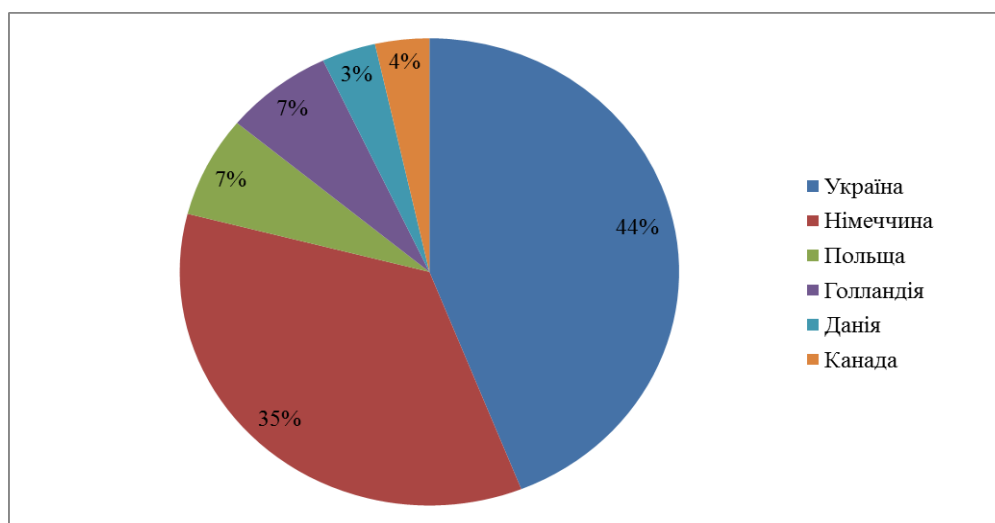


Fig. 3. Distribution of Plant Varieties of *Lolium perenne* L. in the State Register of plant varieties suitable for dissemination in Ukraine 2011-2014. For the countries claimants

In the Register of varieties of agricultural plant Poland registered 97 varieties of plants *L. perenne* L., which is part of the National Registry of Poland, of which only 39.2% own selection - 38 pcs. On the Polish market are lawn grasses such producer countries: Germany (29 pcs.), Denmark (21 pcs.) USA (4 pcs.), Netherlands (3 pcs.) And France (2 pcs.). However, unlike the State Register of plant varieties suitable for dissemination in Ukraine, where registered 2 varieties of Polish breeding, from 2001 - Inca, 2007 - Niha, selection Małopolska Hodowla Roślin Sp z oo, in the National Register of Polish plant varieties *L. perenne* L. Ukrainian breeding absent (Fig. 4).

In Poland, local plant varieties *L. perenne* L. occupy the largest share of the stated (39%), indicating a strong Polish breeders breeding work is comparable to Ukraine, where varieties own selection much less. One of the reasons, in our opinion, is the destruction of breeding and seed base in Ukraine in recent years. Also, decreased production of perennial grasses due to the decrease in acreage and yield under specialized enterprises [5].

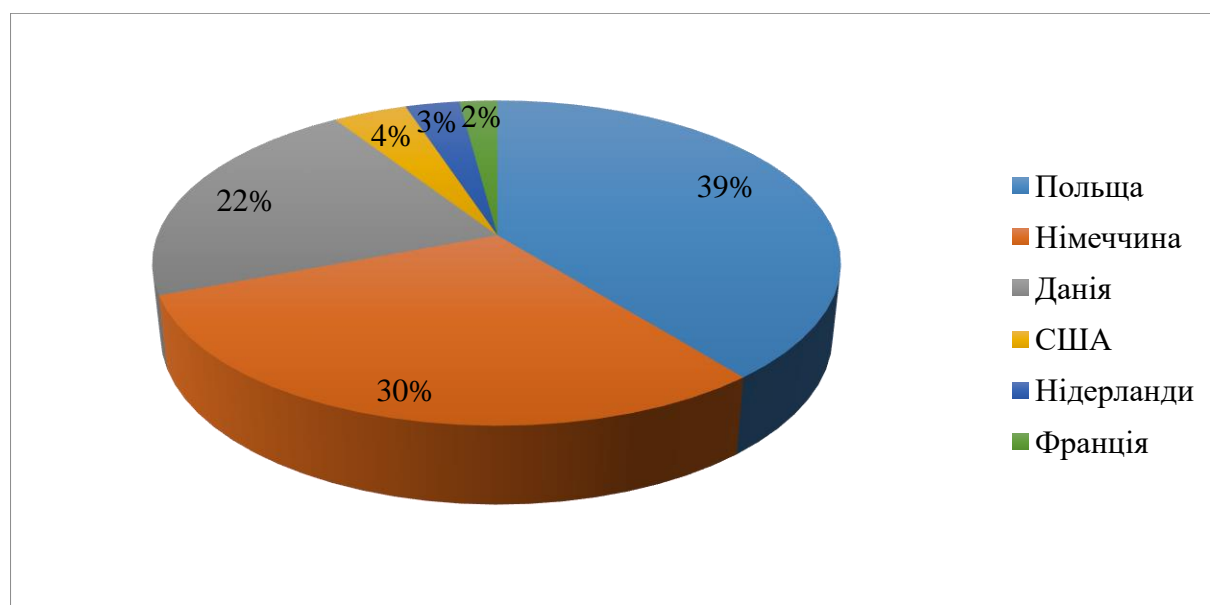


Fig. 4. Distribution of *Lolium perenne* L. plants in the National Registry of Poland in 2014 by country applicants

In 2014 Ukrainian applicants organizations omnibus *L. perenne* L. in the State Register of plant varieties suitable for dissemination in Ukraine registered four. This research station Kyiv National Scientific Center "Institute of Agriculture UAAS") 4 varieties) and the National Botanical Garden. MM Grisha NAAS of Ukraine, Carpathian Research Station of the Institute of Agriculture and Livestock western region of Agrarian Sciences - 3 and National Science Centre "Institute of Agriculture UAAS" - 2 varieties. Major Polish institutions zamayyutsya plant breeding and testing of *L. perenne* L., varieties of which are registered in the National Registry of Poland - Poznańska Hodowla Roślin sp. z o.o. (8 pcs.), DANKO Hodowla Roślin sp. z o.o. (6 pcs.), Małopolska Hodowla Roślin-HBP sp. z o.o. (7

pcs.), Hodowla Roślin Bartązek sp. z o.o. Grupa IHAR (9 pcs.), Alicja Ramenda (6 pcs.) INVEST Grzegorz Dąbrowski (3 pcs.) And Rolimpex Nasiona S.A. (2 pcs.).

Today, 60% of registered plant varieties *L. perenne* L. Ukrainian State Register appointment for landscaping populated areas (Figure 4), which shows the relevance and prospects lawn case in our country. In Poland, by contrast, *L. perenne* L. - hay and lukopasovyschnoho purpose, occupy most of the positions in the National Register of Poland - 62%.

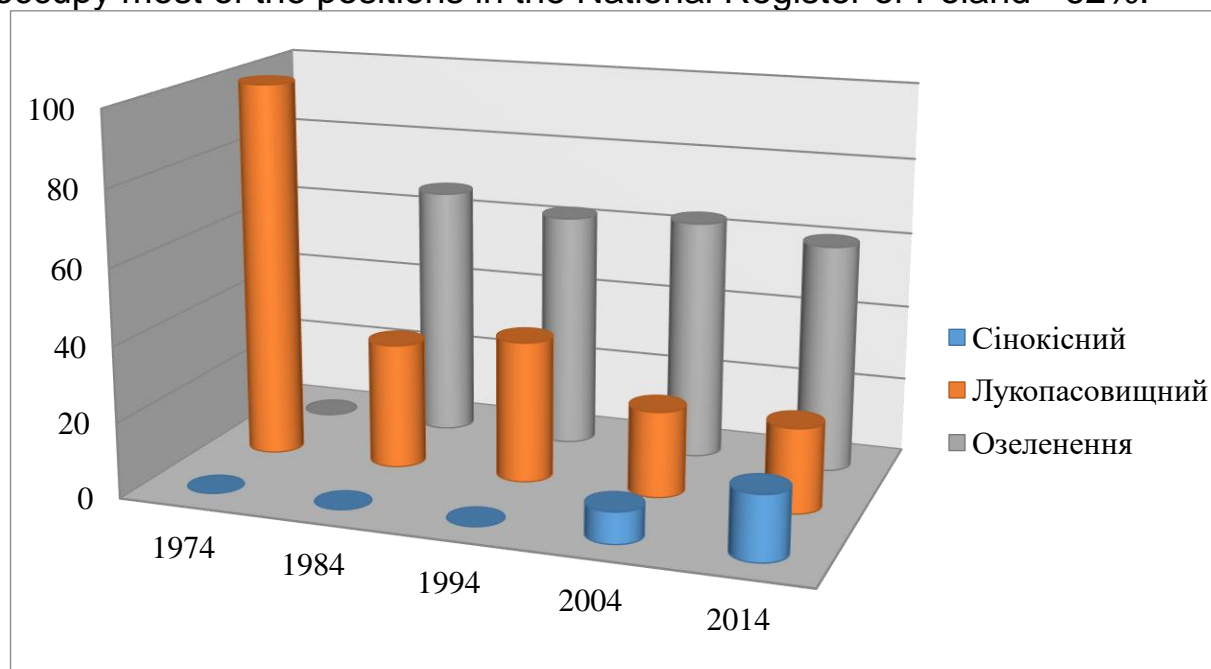


Fig. 5. Distribution plants *Lolium perenne* L. in the direction of use in the State Register of plant varieties suitable for dissemination in Ukraine (1974-2014 years.)

Conclusions. The analysis suggests that the relevance lawn business in Ukraine is growing every year. Experimental data show that domestic plant varieties *L. perenne* L. is competitive in the global market of seeds of perennial grasses ..

Список літератури

1. Державний реєстр сортів рослин, придатних для поширення в Україні у 2014 році – К. : Державна ветеринарна та фітосанітарна служба України, 2014.
2. Клименко А. В. Газонні та декоративні трави / А.В. Клименко, Г. Д. Дяченко // Бібліотека «Дім, сад, город». – К., 2008. – № 4. – 40 с.
3. Рахметов Д. Б. Біолого-морфологічні особливості інтродукованих газонних трав в умовах Національного ботанічного саду ім. М. М. Гришка НАН України / Д. Б. Рахметов, Л. Г. Ревунова // Вісник Харківського національного університету імені В. Н. Каразіна. Серія: Біологія. – 2014. – Вип. 20. – С. 61–68.

4. Сердюк М. А. Нові сорти низових злакових трав для озеленення / М. А Сердюк, О. М. Сердюк, О. В. Шкура // Збірник наукових праць Національного наукового центру «Інститут землеробства УААН». – 2008. – Вип. 2. – С. 110–120.
5. Стрілець Р. А. Організаційно-економічний механізм виробництва і реалізації насіння багаторічних трав. Х.: ХДАУ ім. В. В. Докучаєва, 2002
6. Чоха О. В. Газонні покриття м. Києва / О. В. Чоха. – К.: Фітосоціоцентр, 2005. – 288 с.
7. Lista odmian roślin rolniczych 2014. [Electronic Resource]. – Mode of access: http://www.coboru.pl/polska/Rejestr/odm_w_rej.aspx?kodgatunku=ZTThttp://www.coboru.pl/polska/Rejestr/ListyOdmian/lista_rolnicze_2014.pdf.

*Проанализировано позиции Государственного реестра сортов растений пригодных для распространения в Украине и Национального реестра Польши по степени репрезентативности сортов растений *Lolium perenne* L.*

Экологическая пластичность, райграс многолетний, реестр

INFLUENCE OF REDUCING HARM CROPS IN CERTAIN TYPES SHOVEL AND LEVEL OF EFFICIENCY ENTOMOPHAGES

***I. O. LIKAR, Candidate of Agricultural Sciences
National Agriculture University of Ukraine***

Determining the optimal economic thresholds major hazard butterflies in industrial cultivation of vegetables especially for food purposes is a priority. Knowledge of the age composition of larvae damage their nature and timing of the appearance of plant phenological phases respect of plants help to establish critical periods in the system of a plant pest. These periods of our culture, like most cultures, is the phase of flowering and fruit formation until maturation of seeds.

Entomophags, ratio predator:victim, phase of plant development

In vegetable crops that are grown in the Ukraine in all natural areas, there are more than 200 species of pests, of which cause significant harm to nearly 50 species. Among them, in systematic terms, they are as follows: among insects - Coleoptera - 49%, Lepidoptera - 19%, bugs - 12% Diptera - 7%, other types of insects series - 8% and 5% of species of slugs.

Tracks cabbage shovels in the leaves of cabbage and other cruciferous crops vyhryzayut large irregular holes, after tying heads they get them, and gnaw it moves "pollute" their excrement. Cabbage scoop prevalent in all areas of Ukraine, but the greatest harm to cabbage and other cruciferous crops causing a forest-steppe zone.

Economic thresholds hazard play a stabilizing role in agrobiocenosis in terms of pesticides and create preconditions for the transition to integrated plant protection from pests.

Materials and methods of research. In order to identify eggs scoops cabbage survey carried out in phase sockets and early sealing head. To determine levels of populations of plants eggs and caterpillars on an area of 50 hectares on two diagonals field examine 5 plants in 20 locations and set the number of eggs to inspect the plant and plant population of a percentage. In the phase of sealing heads for identifying caterpillars determine the degree of damage to the plants. In this phase of the early varieties economic harm threshold is 1 - 2 caterpillars on plants at 10% occupancy, or 5 - 8 tracks 1 m², and for late varieties - 5 larvae per plant by 10% settling plants. Planning chemical treatments for identifying these pests - the beginning of the formation of the head.

Release Trichogramma recommended in early phase outlet number 1 egg per plant by 10% populated plants.

The number of overwintering pupae was determined after harvesting the overall method of soil excavation (50 x 50 cm) and depth of 20 cm. The number of detected pupae transfer for 1 m².

In studying the harmfulness of certain types we used the method of isolating marlovymy garden plants, followed by replanting them in the first age of caterpillars in the phase of regrowth plants.

Results. The nature of damage to tracks depending on their age. Caterpillars eat the first age parenchyma leaf skeletuyuchy his third and fourth centuries - eat leaves from the edges, and feed generative organs (buds, buds, flowers). Caterpillars of older generations go up in the top tiers of plants and damage exclusively generative organs. On the fifth and sixth generations they gnaw buds, seeds and can eat away a few days destroy the entire crop.

Due to the fact that from the age of caterpillars does not only damage nature, but also its size, we studied the age composition of leaf-eating caterpillars of the scoop according to the phase of plant development (Table. 1).

Particularly noticeable poshkodzhuvaly rape plants caterpillars, cabbage (drop-off), when the square meter narahovuvalas to 4 copies. These plants poshkodzhuvalys almost completely and harm ranged from 16 to 71.3% (Table. 2).

With increasing density settlement tracks the percent loss of seeds. Harmful tracks scoops karadryny extremely high, if one tracks 10 crop plants seeds of carrots decreased by more than 20%.

1. The age structure of leaf-eating caterpillars scoop on seed crops of carrots, cabbage and canola

Culture / Culture Development Phase	Years of research	The number of caterpillars age ind./m ²					
		л	л2	л3	л4	л5	л6
Морква							
Стеблуння	1998-2012	0/1	0/2	0/0	0/2	0/2	0/2
Бутонізація		1/2	0/1	0/0	0/0	0/1	0/1
Цвітіння		40/28	5/3	5/1	18/10	13/6	12/8
Плодоутворення		10	12	19	25	30	32
Формування насіння		0/0	0/0	2/4	6/4	24/21	35/42
Капуста(висадки)							
Розвиток розетки (рано на весні)	1999-2012	2/1	1/2	12/14	20/13	27/2	5/1
Бутонізація		8/4	42/16	44/13	40/2	10/4	6/8
Ріпак							
Сходи	1999-2012	0/0	0	0	0	0	0
Стеблуння		2/2	4/8	12/6	14/10	28/10	15/4
Бутонізація		7/4	12/15	20/23	43/17	25/14	12/10

2. Harmful cabbage moth caterpillars and karadryny Depending settlement density of plants (Boryspil district)

The density of population of plants caterpillars, ind.	2012		2013	
	The weight of the seed of the 1st plant, g	Harmful, %	The weight of the seed of the 1st plant, g	Harmful, %
Рослини не пошкоджені та без гусениць	1,39/1,08±0,06	0	1,56±0,06	0
Одна гусениця на 1-ну рослину	0,45/0,42±0,02	67,1	0,45±0,03	71,3
Одна гусениця на 5-ти рослинах	0,94/0,83±0,04	32,4	0,96±0,05	38,5
Одна гусениця на 10-ти рослинах	1,07/1,0±0,05	22,7	1,16±0,06	29,6
Одна гусениця на 15-ти рослинах	1,18/1,01±0,04	16,1	1,3±0,06	16,8

Note: The numerator for damage cabbage scoops; denominator - karadryna scoop

Given that one square meter is more than 30 plants, we can assume that the number of caterpillars older ages in critical periods (Phase flowering, seed formation) in seed crops shall not exceed one specimen per square meter. Our studies have found varying degrees depending on the inflorescence ushkodzhenosti predecessor (Table. 3).

3. The damage of inflorescences carrot cabbage caterpillars shovels and karadryny depending on predecessor

Predecessor	Damage of inflorescences, %						
	2007 p.	2008 p.	2009 p.	2010 p.	2011 p.	2012 p.	2013 p.
Carrot food purposes	9,1	8,4	12,3	10,9	8,3	9,4	11,5
Cabbage	1,7	1,5	2,1	2,4	2,3	1,7	1,4
Rape	5,7	4,8	6,2	6,7	5,4	6,4	9,1

Damage of buds depends on the age of caterpillars. Significantly damaged carrot seed that grew in the fields of food crops celery crops, where the number of tracks in the phase of flowering and fruit formation several times higher than in other fields of precursors and damage of buds ranged from 4 to 11% in different years.

With biotic factors only useful species can play an important role in reducing the harmful activities of herbivores, as a priority in the development of new systems to protect plants from pests is to use along with EPSH entomophages and efficiency levels. Stabilizing role EPSH is that they help to reduce the use of chemicals and thus create favorable conditions for the survival of beneficial insects.

Determining the optimal economic thresholds of harmfulness main butterflies in industrial cultivation of vegetable crops, especially for food purposes is a priority. Knowing the age of the larvae, damage to nature and timing of their plants relative occurrence of phenological phases of the plant help establish critical periods in the system plant - pest. These periods of our culture, as for most of them, is the phase of flowering and fruit formation to full ripening seeds. In studying the levels of efficiency in the field entomophages held in a different ratio caterpillars of different ages and adepaga the family Carabidae. For experiments were dominant and most numerous species of beetles. As for the number of predators, they are on different fields during the spring-summer period of change. In May - early July is 1.5 - 3 times higher in the marginal zone of the field (band width 15 - 20 m) than the rest of the field. The maximum number of beetles coincides with the period of flowering, fruit formation.

Given butterflies multiplication factor depending on the physiological state of the plant can determine the efficiency entomophages in these fields. Tables 4 and 5, the effectiveness of some types of beetles that under steppes of Ukraine are common predators.

4. 4. The effectiveness in reducing the number of beetles caterpillars 2 - 3rd century scoops karadryny

Phase of plant development	Value larvae shovels, predator	Value offering predator by hour		
		через 24 год.	через 48 год.	через 72 год.
Flowering	30:5	1:5	0:5	0:5
	30:2	4:2	0:2	0:2
	30:1	15:1	6:1	0:1
Start building seeds	30:5	2:5	0:5	0:5
	30:2	6:5	1:5	1:5
	30:1	18:1	2:5	2:5

5. The effectiveness in reducing the number of beetles caterpillars older ages scoops karadryny

Phase of plant development	Value offering predator	Value offering predator by hour		
		через 24 год.	через 48 год.	через 72 год.
Flowering	30:5	2:5	0:5	0:5
	30:2	8:2	1:2	0:2
	30:1	18:1	4:1	0:1
Start building seeds	30:5	1:5	0:5	0:5
	30:2	3:2	0:2	0:2
	30:1	15:1	2:1	0:1

Conclusions. Given the specificity of the seasonal dynamics of caterpillars in different cultures and their relationship with plant phenology and harmfulness effective action entomophages family of beetles larvae

observed by the appearance of a second - the third age, and the use of Trichogramma can clear the field to scoop the emergence of larvae. The criterion of efficiency at this time should be considered a value offering predator - 5: 1. Active period falls on beetles night. Use traps in fields where research was conducted, shows that the highest ulovlyuvanist beetles observed from 16 to 21 hours (40% of all beetles), you need to keep in mind when planning treatment fields with insecticides.

Определение оптимальных экономических порогов вредоносности главных чешуекрылых в условиях промышленного выращивания овощных культур, особенно на продовольственные цели, является первоочередной задачей. Знание возрастного состава личинок, характера повреждений ими растений и сроков появления относительно фенологических фаз развития растения помогают установить критические периоды в системе «растение-вредитель». Такими периодами для наших культур, как и для их большинства являются фазы от цветения и плодообразования до полного созревания семян.

Энтомофаги, соотношение хищник:жертва, фазы развития растений

**PROSPECTS OF COMBINING IN COMPLEX USAGE OF DIFFERENT
TYPES OF RENEWABLE ENERGY AND CREATION OF RENEWABLE
ENERGY SOURCES**

***M. MALOVANYI, Doctor of Technical Sciences, Professor,
National University "Lviv Polytechnics"***

***Y. MAHERA, Doctor of Sciences, Professor,
Krakow Polytechnics***

***O. ZAKHARIV, Doctor of Agricultural Sciences, Professor, Separated
Subdivision of National University of Life and Environmental Sciences
of Ukraine "Berezhany Agrotechnical Institute"***

R. ROMANIV, Leading engineer,

National University "Lviv Polytechnics"

O. KHARLAMOVA, Ph.D., Associate Professor

Kremenchug National University of the name of Michael Ostrogradskogo

O. SYNELNIKOV, Teacher,

***Higher Professional College of the Lvov State University of Safety of
Vital Functions***

Current technical solutions for combining in complex usage of different types of renewable energy and creation of renewable energy sources have been thoroughly analyzed. A pilot plant for the investigation of the effectiveness of combining the work of a heat pump and solar collectors has been described. The advanced schemes of combining technologies for the creation of renewable energy sources have been considered. Prospects of prior cavitation treatment of cyanobacteria in order to increase the effectiveness of the process of methanogenesis have been shown.

***Combining, renewable energy sources, cyanobacteria,
methanogenesis.***

When building the scheme of power supply with the use of renewable energy sources (RES), one should take into consideration, that energy from these sources is not concentrated in some places, but scattered, changeable in time and place, thus, it is not stable. These sources can be used rationally only in case of ultimate closeness to a consumer without far distance energy transfer, and the stability of energy supplied by RES can be provided by means of combining the mutual work of two or more RES (wind energy + solar collectors; solar collectors + biomass; solar collectors + heat pump; heat

pump + biomass etc.), or by combining renewable and traditional energy sources (wind energy + power supply; solar battery panels + power supply; solar collectors + heat pump + power supply; solar collectors + heat pump + natural gas).

As for the problems of the creation of such renewable energy sources as biomass and biogas, the technologies of their production (synthesis) and prior preparation usually involve the use of traditional energy sources, and their partial or complete replacement with renewable sources can provide additional economical and ecological advantages. Besides, it is worth considering combination and introduction of some new stages in the technologies of their production: prior preparation of biomass before the synthesis of biogas, the use of natural cementing materials in the process of biogranule production etc.

Analysis of recent research works and publications. The change in the structure of the resources, which were used for heating in Sweden in 1970-2005, is demonstrated in Figure 1.

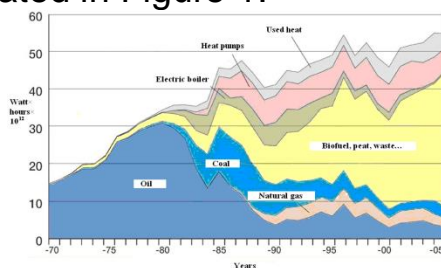


Fig.1. Use of energy sources in Sweden (1970-2005).

As it can be seen in Figure 1, there is a tendency for the decrease in the part of non-renewable sources of energy and the increase in the part of RES. The same tendency for the change in the structure of the resources, used for heating and energy production can be prognosticated in Ukraine. That is why, searching the ways of optimization for the creation of renewable energy sources and their use (first of all in terms of economical efficiency and the indicators of power stability) is urgent for ensuring energy independency of the country.

The principles of combining, which allow providing the stability of power indicators, are traditionally used in heliowind energy systems; there are numerous research works on this problem [1,5,7]. The analysis of wind and solar conditions indicates that there is a decrease in solar radiation and an increase in average wind speed in winter, and a decrease in wind speed and an increase in solar radiation in summer. That is why, the combination of wind and solar energy smoothens the irregularity of energy production, increases reliability of power supply for consumers during the year. Heliowind plants can be used in the scheme of heat or energy supply. The effectiveness of power supply for independent consumers in case of using a heliowind plant can be increased by means of its mutual work with a heat pump. Such units can work both in summer (cooling) and winter (heating).

Different schemes of combining RES in agriculture (namely on farms, which have a high degree of self-sufficiency and numerous energy potential wastes) are analyzed and proposed by a number of scientists [6,14,15].

Combined usage of solar collectors, heat pumps and biomass (often also a source of electrical energy and natural gas) in the scheme of power supply as being some independent modules combined in one energy plant has been thoroughly investigated and widely used in practice [2 - 4]. Plant operation is managed by a processor, which alternately connects up other modules to the basic one (the energy of which is the cheapest) in case of the lack of energy ascending its cost. The number of energy modules can be changed according to the region, infrastructure, consumers' wishes, and the cost of different types of energy. However, in spite of wide practical application of the above described strategy, systematic scientific research of the effectiveness of such combining (which is closely connected with the economy and weather conditions of a certain region) are not numerous, which makes it necessary to systematize and integrate the knowledge.

In terms of combining in the technologies of the production (synthesis) of renewable energy sources, one should consider the use of heliowind plants for the generation of biogas [17].

As for the combination and the introduction of new stages in the technologies of producing renewable energy sources, it is considered to be perspective [11,16] to introduce the stages of grinding and delignification into the technology of biogas production with the use of agriculture wastes as raw materials. In the process of delignification at high temperatures there is the process of lignin net degradation, the extraction of lignin and a bigger part of hemicellulose and also the disruption of chemical bonds between lignin and the molecules of hydrocarbon. This results in the increase in the surface of mass exchange, which becomes available to cellulolytic enzymes of microorganisms. Grinding of substrate using grinding machines gives considerable increase in the surface of mass exchange, which is available to the enzymes of microorganisms as well. This accelerates enzymatic hydrolysis and intensifies the process of the synthesis of methane [12].

When combining in the technology of the production of pellets with the use of wooden wastes, the compression of fine-dyspersated wastes is done with the help of pressing or extrusion. To provide a proper strength of pellets, pressing is done at 100-200 MPa. The disadvantages are as follows: a complex structure, considerable energy consumption, and that is it impossible to use low quality waste as raw materials. In an extrusion unit pressure is created due to forced and continuous moving of the material along a screw thread in the process of its rotation. In order to decrease energy consumption in the process of the production of granules and to provide their high strength, it is worth adding cementing additives to fine-dyspersated parts of wastes, which can result in the decrease of the force needed for the extrusion of lignin

from wooden wastes into interparticle space. Scientists [8 - 10] suggest using sulphatic soap, which is a by-product in wood-pulp industry, as a cementing material. Also, paraffin, synthetic plastic materials and biological oil can be used. The main requirements for the additives are as follows: small number, absence of any influence on the process of burning and absence of troublesome and poisonous gases. In case of using cementing additives, one can get pellets of similar quality at 1,2 ÷ 2,2 MPa.

Biomass is a perspective type of renewable energy sources, but in some regions growing and using plants as raw materials for producing energy sources caused critical decrease in the production of agricultural goods and provoked protests among the citizens of these countries (Mexico, Latin America). That is why, recently scientists have been working on finding technologies of cultivation and utilization for producing energy of such types of biomass, using of which cannot influence prospective possibilities of agricultural production and cannot affect the environment. A number of investigations (Israel, firm Seambiotic, Japan, firm Gas and NEDO, the USA, corporation GreenFuel Technologies) has shown, that such biomass can be alga – both cultivates on special farms and gathered from the surface of hydrosphere objects. In Ukraine such perspective biomass is cyanobacteria (blue-green algae), which have been causing considerable ecological threats because of progressive water bloom in surface basins. Water bloom is a biological signal indicating bad conditions of hydroecosystems. The dominating agents for water bloom in the Dnipro reservoir are the representatives of the genera of *Microcystis*, *Phormidium*, *Aphanizomenon*, *Anabeana* and *Oscillatoria*. Among numerous mechanical, physical and chemical, biological and ecological methods to prevent mass development of cyanobacteria, the most effective are the last two ones, because they allow overcoming causes but not just consequences of water [13]. As for the prospects of using them in order to produce energy, the most perspective utilizers of solar energy are microalga: the value of the efficiency of photosynthesis is up to 20 %.

Methods of research. The development of the strategy of systematic research of the effectiveness of combining the work of a heat pump with the work of solar collectors and the development of the systems of combining in the technologies of the creation of renewable energy sources.

Presentation of the main results. In order to conduct systematic research of the effectiveness of combining the work of a heat pump with the work of solar collectors, at National University “Lviv Polytechnics” within the framework of the grant with Krakow Polytechnics, which was financed by the Ministry of International Affairs of Poland, a plant, the operation of which (a heat pump of “air – water” type and solar collectors) is managed on-line via the Internet, was implemented. Heat energy, which is received from RES, is transferred to two accumulators of hot water with the volume

of 500 liters each. In the first accumulator, which is heated by solar collectors of vacuum type NSC 12-58 GREENEN, which are equipped by the pipes HEAT-PIPE, prior heating of water takes place. The heat, produces by the collectors, can be transferred directly to the first accumulator through a heat-exchanger – coil, which is mounted in it, or directly to the next accumulator through a high speed flat heat-exchanger, which is mounted on the plant. A heat pump with the capacity of 10 kilowatt is joined with the second accumulator. The heated water is delivered to a consumer (the kitchen, which serves students' canteen). The devices, which control the parameters of the operation of the accumulators of hot water, are operated with the help of a controller DigiENERGY, which is equipped by the counters of produced and used energy with the possibility of recording and looking over the parameters of the plant (outside temperature, the quantity of solar radiation, the quantity of the heat energy, which is produces, the value of losses of a heat carrier in heating devices etc.) at real time via the Internet. A heat carrier in the system of solar collectors and a heat pump is water-glycolic mixture. Figure 2 represents a screenshot of the temperatures of the flows of the heat carrier and water at real time.

Graphs are created for the temperatures ranging from -30 ° C to +90 ° C. Along the axis x the time length from 0:00 to 24:00 is indicated. The recorded data are represented in 7.5-minute intervals, which provide eight control points during one hour. The graph is divided into two fields of white and grey colors. The white space on the left represents current state, the grey one on the right shows the state on the day before.



Figure 2. A screenshot of the temperatures of the flows of the heat carrier and water in the plant at real time.

The data, received as a result of plant operation, show greater effectiveness of the use of a heat pump when compared to solar collectors. Starting from December 2013 to September 2014, the heat pump produced 6 417 kilowatt of heat energy, the quantity of heat, received from the solar collectors is 2 436 kilowatt. Such a great difference in the quantity of the produced heat can be explained by the irregularity of solar energy during the day and the dependence on weather conditions, which reduces the effectiveness of the use of solar collectors. At the same time the operation of a heat pump shows uniformity during the day and little dependence on weather conditions.

Two variants of the use of cyanobacteria in order to get renewable energy sources have been investigated:

1. Extraction of fats, which can be used for the production of biodiesel.

2. Biogas production.

Since cyanobacteria have quite solid cell membrane, the processes of extraction and biodegradation can be of low intensity. In order to break a cell membrane, a method of hydrodynamic cavitation was chosen, in the process of which zones of high and low pressure are created and they break cell membranes. Hydrodynamic cavitation was conducted in the plant, where a three bladed impeller of a wedge like section with sharp front and blunt back edges is used as a cavitation unit; the frequency of rotation of the working wheel was 4000 revolutions per minute. One liter of cyanobacteria suspension was poured into the working tank, the time of treatment was 10 minutes.

In order to determine the maximum quantity of fat, which can be extracted from the cyanobacteria under study, the extraction was conducted with hexane from the suspension of alga and dried at 80°C and grinded in a mortar alga (total content). The quantity of fat in each trial was determined gravimetrically. The results of the investigation show, that the total content of fat in the trail with cyanobacteria was 1.27 %, in the trial without any pretreatment the quantity of the extracted fat was 0.32 % of the dry matter of the alga, and in the trial after the cavitation treatment – 1.01 %. The result confirms that cell membranes of untreated alga are difficult to penetrate and their use for energy production without any pretreatment is complicated. Cavitation treatment breaks membrane walls and leads to more complete extraction, after such treatment 80% of the whole fat can be extracted.

During the experiments of biogas production, aimed at the imitation of the composition of the upper layer of a storage reservoir, which contains a lot of anaerobic bacteria, the trials were mixed with the initial sludge from sewage disposal plants and were put into the reactors, the construction of which allowed fixing the quantity of the produced biogas. pH in the reactors was regulated up to 7.5 by adding a small amount of the solution of NaOH. The reactors were wrapped with black polyethylene in order not to allow sunlight and were put into a water bath, where the temperature was set to be 34 °C (mesophilic conditions). The content of the reactors was stirred during 1 minute every 2 days. The total duration of the experiment was 52 days.

The results of the investigation show, that in the trials without any pretreatment it was possible to synthesize 2370ml of biogas and in the trials after cavitation treatment – 3310 ml of biogas.

Conclusions and prospects of further investigation. The analysis of the operation of the plant for combining the work of a heat pump and solar collectors during a long time period of its exploitation under different

weather conditions and seasons makes it possible to give some recommendations about the designing and exploitation of the plants of such type for the region under study.

The perspective raw material for renewable energy sources is cyanobacteria, which are suitable for the production of biodiesel and biogas. The content of fat in the gathered culture of blue-green algae is low (1,27 %), that is why with the help of extraction in renewable sources it is possible to extract only insignificant part of energy from the potential one, which is contained in biomass. The influence of cavitation field makes it possible to significantly increase the extraction of fats. The experiments with biogas production confirm that pretreatment with cavitation breaks cell walls of cyanobacteria, as the quantity of the produced gas from these alga is quite larger (for 40 %).

We consider a complex technology, which consists of the following stages, to be a perspective one for obtaining renewable energy source from cyanobacteria:

1. Cavitation treatment in hydrodynamic cavitation field.
2. Extraction of fats with hexane with the following production of biogas from them.
3. Anaerobic degradation of biomass wastes with the production of biogas.
4. Centrifugation of the used biomass with the following usage of the wastes as raw material [17].

Reference List

1. Величко С. А. Природно-ресурсне забезпечення гібридних геліо-вітроенергетичних систем (в межах рівнинної території України): дис. канд. географічних наук: 11.00.11 / Величко С. А. – Х.; 2006. – 300с .
2. Возняк О. Т. Гібридна теплонасосно - сонячна система / О. Т. Возняк, М. А. Мартиняк // Вісник НУ «Львівська політехніка» «Теорія і практика будівництва». – 2010. – №662. – С. 88-92.
3. Денисова А. Е. Оценка эффективности работы комплексной альтернативной системы теплоснабжения / А. Е. Денисова, А. С. Мазуренко // Труды Одеського політехнічного університету. – 2000. – Вип. 2(11). – С. 95-97.
4. Крижанівський Є. І. Івано-Франківський національний технічний університет нафти і газу: досвід та перспективи впровадження енергоефективних технологій / Є. І. Крижанівський, Ф. В. Козак, М. О. Галушак, [та ін.] // Вісник Київського Національного Університету Технологій та Дизайну.– 2013. – № 6.– С.293-315.
5. Карпатенко І. М. Методи і засоби раціонального перетворення та акумулювання енергії сонця та вітру в автономних енергосистемах: Автореф. дис. на здобуття наук. ступеня канд. техн. наук: спец. 05.14.08 «Енергоустановки на основі відновлювальних видів енергії» / І. М. Карпатенко // – К. – 2003. – 20 с.

6. Котов П. О. Перспективи впровадження інтегрованих теплонасосних систем енергопостачання з двигуном Стирлінга для фермерських господарств / П. О. Котов // Холодильна техніка та технологія. – 2014. – № 3 (149). – С. 53-56.

7. Левенко А. С. Энергия солнца и ветра: Расчеты, проектирование и использование экологически чистых преобразователей энергии / А. С. Левенко // Академия устойчивого развития общества и личности. — Д.: ИМА-пресс. – 2003. – 63 с.

8. Мальований М. С. Відновлювальні джерела енергії. Оптимальний склад біокомпозиції / М. С. Мальований, В. М. Атаманюк, Р. Я. Бать // Хімічна промисловість України. – 2007. – №2 (79). – С.61 - 64.

9. Мальований М.С. Влияние состава композиции на характеристики биотоплива на основании отходов переработки древесины / М. С. Мальований, В. М. Атаманюк, Р. Я. Бать// Проблемы промышленной теплотехники: V междунар. конф., 22 – 26 мая 2007 г.: Тези доп. – К., 2007. – С. 286 - 288.

10. Мальований М. С. Технологія створення біокомпозиції на основі відходів лісової та целюлозно-паперової промисловості / М. С. Мальований, Р. Я. Бать// Науковий вісник Національного лісотехнічного університету. – 2006. – Вип.16.2. – С. 86 - 88.

11. Барбаш В. А. Модифікований ASAE-спосіб делігніфікації пшеничної соломи // В. А. Барбаш, С. П. Пимаков, І. В. Тембус, М. О. Клік // Вісник національного технічного університету України «Київський політехнічний інститут» «Хімічна інженерія, екологія та ресурсозбереження». – 2010. – № 2 (6). – С. 97 - 101.

12. Нестеров А. И. Оптимизация питательного минерального раствора для метанпотребляющих бактерий / А. И. Нестеров, Б. Д. Сусленков, Г. А. Старовойтова // Прикладная биохимия и микробиология – 1973. – № 9. – С. 873 - 876.

13. Никифоров В. В. Обеспечение экологической безопасности Днепровского бассейна путём использования гидробионтов для получения биогаза / В. В. Никифоров, С. В. Дегтярь, Е. В. Шмандий // Межвузовский сборник научных работ «Машиностроение и безопасность жизнедеятельности». – 2008. – Вып. 5. – С.51 - 56.

14. Гелетуха Г. Г. Оцінка енергетичного потенціалу біомаси в Україні. Відходи сільського господарства та деревна біомаса / Г. Г. Гелетуха, Т. А. Железна, М. М. Жовмір [та ін.] // Промислова теплотехніка. – 2010. – Т. 32, №6. – С.58-65.

15. Павліський В. М. Енергетичний і метаногенний потенціал соломи зернових культур, ріпаку і кукурудзи / В. М. Павліський, Ю. П. Нагірний, О. В. Павліська // Науковий вісник Національного університету біоресурсів і природокористування України. – 2010. – Вип. 146. – С. 9-18.

16. Скляр О. Г. Методи інтенсифікації процесів метанового зброджування / О. Г. Скляр, Р. В. Скляр // Науковий вісник Таврійського державного агротехнологічного університету. – 2014. – Вип. 4. –Т. 1. – С. 3 - 9.

17. Техноекология: [підручник] / М. С. Мальований, В. М. Боголюбов, Т. П. Шаніна та ін. // під ред. М. С. Мальованого – Херсон: Олді-плюс. 2014. – 616 с.

В статье проанализированы текущие технические решения для объединения в комплексном использовании различных типов возобновляемых источников энергии и создания возобновляемых источников. Была представлена и описана пилотная установка по исследованию эффективности совмещение работы теплового насоса и солнечных коллекторов. Рассмотрены передовые схемы сочетания технологий для создания возобновляемых источников энергии. Представлены и проанализированы перспективы предварительного кавитационной обработки цианобактерий в целях повышения эффективности процесса метаногенеза.

Возобновляемые источники энергии, цианобактерии, метаногенез

У статті проаналізовано поточні технічні рішення для застосування в комплексному використанні різних типів відновлюваних джерел енергії та створення поновлюваних джерел. Була представлена і описана пілотна установка з дослідження ефективності поєднання роботи теплового насоса і сонячних колекторів. Розглянуто передові схеми технологій для створення відновлюваних джерел енергії. Представлено і проаналізовано перспективи попереднього кавітаційної обробки ціанобактерій з метою підвищення ефективності процесу метаногенезу.

Поновлювальні джерела енергії, ціанобактерії, метаногенез

ECOLOGICAL AND ECONOMIC MONITORING EFFICACY RESOURCE SAVING TECHNOLOGIES GROWING CROPS IN UKRAINE

R. M. MAMCHUR, Candidate of Economic Sciences

K. O. IVANOVA, postgraduate *

M. M. DOLIA, Doctor of Agricultural Sciences

National Agriculture University of Ukraine

Justification of modern economic and environmental indicators regarding the effective cultivation of crops in the application of resource-saving farming systems in different soil-climatic zones of Ukraine.

Economic monitoring, efficiency of crop, wheat, barley, corn, agrocenosis, crop rotation systems, fertilizers system, processing, plant protection, environmental predictors of crop

In the years 2009- 2014 gross harvest of wheat, barley, maize and sorghum occupies a leading place in the structure of crop production and generally all agricultural production in Ukraine. It is noted that a stable grain farming creates food fund and is the basis of livestock industry backs the state reserves of grain exports and generates relatively environmentally friendly products. Thus Ukraine among the countries with significant production of high-quality grain. In this regard, increasing the efficiency of growing crops through modern technology, new equipment, scientific and reasonable system of fertilization and plant protection ensure high quality and competitiveness of Ukrainian grain to the world market. An important question remains optimize costs per unit of output that can be achieved through the introduction of new agricultural enterprises resource saving technologies [1].

The effectiveness and economic feasibility of the technologies - these are the main issues of concern agronomist each spring, especially considering the fact that the weather is different. First of all it concerns the cultivation of cereals and their protection using high blends of agrochemicals.

Thus, integrated protection as optimization of all available methods - organizational, economic, breeding and seed, agronomic, physical, mechanical, chemical, biological and other becomes paramount resource saving technologies in growing cereals in farms of all forms of ownership [5].

**Науковий керівник: доктор сільськогосподарських наук, професор М. Доля*

It is advisable to note that the grain spiked culture - one of the most important groups of crops grown, it's a staple food of man and animals. However, having different agro-climatic conditions, Ukraine has failed to reach the top leadership of the production of cereals, indicating the urgency of ecological and economic assessment techniques and components technologies of growing crops especially in heavy energy control.

As international experience shows resursooschadnist and environmental permit stabalazuvaty and improve quantitative and qualitative changes in the grain sector of Ukraine. It is significant that the first direction is realized more in technology samoponovlyuvalnyh farming systems with minimum and zero tillage, the second - in organic technologies are implemented in environmental or biological system of agriculture in the traditional system of cultivation. [3]

It was established that the transition to new technologies, changes in cultivation farm is advisable to start with choosing the most effective system and evaluate the suitability and readiness economy to transition to the new system. This is done by assessing issues such as soil and climatic conditions; requirements for the initial state of the field; compliance with technical equipment management; availability of necessary financial support; a certain level of employees. However, No-till system imposes requirements have well-aligned fields, lack of topsoil compaction, low presence of perennial weeds, certain types of herbivores and pathogens that spread through plant remains [5].

In different regions of Ukraine during the research system No-till is confirmed as one of the most promising approaches to crop production because there are reasonable both environmental and economic terms. In particular, the efficiency of farms is expedient to note that the first rule of this technology - not to plow. Annual polytseva treatment, which for many years was considered for the main and indispensable method of farming is very intensive process that has significant damage dirt microflora, causing erosion and land degradation. No-till involves direct seeding in crop residues with minimal disruption of the structure of the earth, so to ensure gentle treatment of the soil and reduces the cost of its processing and sowing. Resource-saving technologies are very common in the United States, but every year the amount of land that is processed using No-till growing in Europe. No exception was and Ukraine. Today, according to experts, about 1 mln. Ha processed according to Min / No-till. No-till technology eliminates mechanical action on the ground. Great value in this paper conservation crop residues that form of soil cover that resists wind and water erosion, preserves the moisture and prevent weed growth, the recovery of topsoil. The main advantages of this technology over traditional is to reduce water and wind erosion, accumulation and conservation of moisture in them; improve fertility (increase humus content from 0.1 to 0.2% per year); reduce the cost of fuels and lubricants by 50-60%; reducing crop dependency on weather conditions; reducing the amount involved in

the production of tractors and agricultural machines and the costs associated with them; reduce labor costs by 3-4 times compared with the classical treatment of soil; increase yields and reduce costs. Reserves increase production also lie in the genetic potential crop yields. [4] There are 4 levels of productivity each field.

The first - a potential productivity of extensive farming, ie the yield obtained through exploitation of natural soil fertility. Depending on the type of soil fertility and productivity of extensive agricultural zone, for example, grain production ranging from 3 t / ha, and the potential of the variety used by 30%.

The second - a product of intensive agriculture productivity when productivity is achieved due to biological factors of innovation and improvement of extensive farming. This level is called intensive technology, its application potential varieties sold by 50%. Unfortunately, intensive farming is done without taking into account climatic factors zoning areas. And so often that by achieving yields of 3.5-4 t / ha of grain competitive high-cost technology appears. There are examples of "maximum" intensify when the high cost of 1 ha actually collect 30 kg / ha of grain, or relatively high yield of grain is uncompetitive price. In addition, extensive development of intensive technologies in the mid-80s accompanied by high environmental costs.

Third - climate provided a performance intensive agriculture, which, depending on agricultural landscapes, culture, agriculture, zoning of the region ranges from 40 to 90 kg / ha with the implementation of potential varieties to 70%.

Fourth - it's genetic potential of varieties of cereals, which depending on the ecotype varieties ranging from 60 to 120 kg / ha For high performance necessary to properly determine the production potential performance of new varieties, based on the specific conditions of the economy and agricultural technologies used in it. One of the most real and cheapest way to maintain soil fertility and thus ensure high yields in agricultural ecosystems today is to achieve a balanced balance of organic matter through the use of sufficient organic fertilizer, which is possible by keeping large numbers of animals. From this point of view is especially valuable cattle. According to a sufficient number of animals (1 conditional head on 1 hectare of land) to cycle back to 50% of the nutrients of their total removal, which certainly reduces the need for fertilizer [1]

Thus, in the present conditions of plant growing environmental and economic performance of enterprises should be considered as a set of interconnected farming, land reclamation and organizational measures aimed at efficient use of land, improving soil fertility, cultivation of high and stable yields of crops.

It is important also to generalize the production history of the field and every modern farming systems, as measured by the following elements:

- - The order of land use in rotations and in areas outside the crop rotations;
- - Mechanical cultivation system;
- - A system of fertilization;
- - Reclamation and kulturtehnichni measures;
- - A set of measures to combat pathogens and pests of crops, weeds in crops weediness and soil;
- - A system of preventive measures to combat soil erosion and its consequences;
- - Measures of environmental protection from pollution;
- - A system of high-quality seed;
- - Special agronomic activities (sowing, seeding rate of seeds, mixed crops, etc.).
- - Environmental monitoring of agriculture and features of the insurance of crops in farms of all types of ownership.

Noteworthy assessment of efficacy in time and space of modern intensive farming systems - grain-Rotary, plodozminna, Rotary et al., Which provide high-performance use of suitable land to grow the most valuable high-yielding crops, varieties and hybrids, widespread implementation of effective methods of improving soil fertility with the latest achievements of agricultural science excellence. In intensive farming systems, soil fertility is improved through the use of fertilizers, irrigation, improvement tools, etc. [2].

Importantly comprehensive assessment of current farming systems which are based on deep analysis and thorough consideration of the natural and economic conditions of agricultural production, the basis of their determination to be primarily natural zoning that would reflect the local soil, climatic and landscape conditions, particularly agriculture using resource saving wide-units.

It is known that about 80% of the territory of Ukraine belongs to high risk areas of emergency. Human impacts on the environment 4-5 times higher than in developed countries. Ukraine due to high concentration of industrial production and agriculture, as a result of uncontrolled use of natural resources for decades, became one of the most dangerous countries in the ecological sense. The current ecological situation in Ukraine is characterized by a deep ecological crisis, which is caused by the laws of operation command economy in the past. Decisions nav'yazuvalos industrial construction and the production of hazardous conditions without solving environmental problems. Adopted unjustified decision is not subject to debate and discussion, they were forced to perform. Thus, increasing the productive forces was carried out with little or no consideration of environmental consequences, prevailed departmental, consumerist approach to the location of new industries. Everywhere were committed serious errors of complex use of natural resources, lack of attention paid to conservation management and quality control of the natural environment

with the use of individual circuit monitoring components of farming systems [1].

It is significant that Ukraine has such environmental problems as acid rain, transboundary pollution, ozone depletion, global warming, the accumulation of waste, especially toxic and radiation, reducing biodiversity. This shows the importance of comprehensive monitoring of environmental and economic factors as the economy, and each sowing cereals.

This modern farming system should solve the problems of drought, the protection of the environment from pollution by pesticides, mineral and organic fertilizers, creating optimal conditions for the cultivation of crops, human life and activities, as well as ecologically clean products [4].

It is important to use evidence-based farming systems, which provide world wide application of science and technology - chemicals, breeding, irrigation, integrated mechanization, energy, resource-saving and environmentally friendly technology for obtaining stable, high yields and good quality crops.

Thus, the agricultural sector, more than any other, requires a comprehensive consideration of all the characteristics of natural and economic conditions of each region of our country. Based on this osnovovyznachalnoyi requirements, develop modern agriculture by a single scheme, suitable for the whole country, not possible [1].

Materials Research 2009 - 2014 rr. Indicate that any farming system, without exception, should be characterized by the presence of relationships of all agricultural land, rational structure acreage and the most appropriate set of maintaining and improving soil fertility. These basic factors determine rationality and intensity farming systems to be interconnected as a material breach of necessarily lead to a change in major ways to improve soil fertility of different types of soil and improve biological balance agrocenoses [3].

The values match modern farming systems geographical conditions in this historic period of human civilization has increased significantly as a result of significant achievements of agricultural science in general and its individual areas in particular, and they should be taken into account when developing the fundamentals of each farming system and particularly resource-saving applications tillage, biological fertilizers and plant protection products.

Thus, the theoretical basis of each farming system are the laws agronomics, creative use them in a production environment for high agrotechnical and economic efficiency of each link and the entire farming system as a whole [1].

Conclusions. In the 2009-2014 biennium. Farming systems characterized as adaptive to the soil-climatic zones or their parts and ranged by a set of crops and soil, climatic and economic conditions. These adaptable systems are similar in terms of the structure of sown areas, a set of key measures for implementation of each of the constituent parts of a whole and addressing the main targets - the most productive use of land for

the simultaneous solution of the main tasks of increasing the yield of grown crops and extended increase in soil fertility. Environmental and economic performance monitoring technologies of grain crops in Ukraine significantly contribute to optimization of grain production in Ukraine according to European standards.

Список літератури

1. Андрійчук В. Г. Ефективність діяльності аграрних підприємств: теорія, методика, аналіз [моногр] / В. Г. Андрійчук // К.: КНЕУ. – 2005. – 292 с.
2. Булигін С. Ю. Гумусовий стан чорноземів України / С. Ю. Булигін, В.В. Дегтярьов, С. В. Крохін // Вісн. Аграр.науки. – 2007. – №2. – С.13 – 16.
3. Бережняк М. Ф. Оптимізація агрофізичних параметрів чорноземних ґрунтів та різних систем обробітку / М. Ф. Бережняк, Є. М. Бережняк // Вісн. аграр. науки. – 2010. – № 12. – С. 16 - 19.
4. Демиденко О. В. Біогенність чорнозему типового за різного обробітку ґрунту / О. В. Демиденко, О. Л. Тонха, В. А. Величко // Вісн. аграр. науки. – 2013. – №1. – С. 20 – 23.
5. Сташук В. А. Сучасний стан та шляхи підвищення еколого-економічної ефективності рисових зрошувальних систем України. / В. А. Сташук, А. М. Рокочинський, Л. М. Грановська // – К.: Аграр. Аука, 2012. – Вип. 1 (97). – С. 19 - 22.

Обоснованы современные экономические и экологические показатели, касательно эффективного выращивания зерновых культур при применении ресурсосберегающих систем земледелия в различных почвенно-климатических зонах Украины.

Економический мониторинг, эффективность ведения растениеводства, пшеница, ячмень, кукуруза, агроценоз, севооборот, системы удобрений, обработка, защита растений, экологические предикторы прогноза урожая

**BACKGROUND RESOURCE SAVING TECHNOLOGIES TO
PRODUCE HIGH QUALITY RAW MATERIALS FOR BREWING IN
UKRAINE**

***M. D. MELNYCHUK, Doctor of Biological Sciences professor,
academician of NAAN of Ukraine***

P. U. DROZD, applicant *

National Agriculture University of Ukraine

Annotation: Article deals the modern features of malting barley growing generalization of the new provisions on quantitative and qualitative metrics at all stages of formation materials. Proposed modern structure the main factors that influence the physiological and phyto-sanitary and ecological conditions of each crop barley steppes of Ukraine.

Agrocenosis, malting barley, quality raw materials for brewing, quantity and quality of malting barley, resource saving technologies, system of fertilizers and plant protection, KAC-32

Due to the rapid development of brewing industry in Ukraine there was an urgent need to optimize the basic processes of brewing, from growing barley to malt. Barley (*Hordeum sativum* L.) on the composition of extractives and their zbrodzhuvanosti more other cereals suitable for brewing malt [5].

In Ukraine barley is second on acreage and gross harvest of grain crops Kolosov after winter wheat. [12] More than half of the gross harvest in Ukraine is used to feed and about 20% for beer production.

Spring Barley grown in Ukraine as food, feed and crops. Its area is 2.5 mln. Ha [17]. According to the statistics in 2012 - 2014 gg., Sown area of barley were about 840 thousand. Ha (Table 1), including more than 117-135 thousand. Ha area is occupied by malting barley. [4] In some years the largest barley sowing areas in the territory of the forest-steppe characterized Vinnytsia (138.6 thousand. Ha), Poltava (112.6 thousand. Ha) and Khmelnytsky (102.8 thousand. Ha) area. However, the highest yield of spring barley installed in Vinnitsa (3.45 t / ha), Kiev (3.22 t / ha), Cherkassy (3.71 t / ha) and Ternopil (3.18 t / ha) areas.

* *Supervisor Doctor of Biological Sciences, Professor, Academician of NAAS of Ukraine Melnychuk MD*

**1. 1. acreage and yield of malting barley in the steppes of Ukraine
(2012 - 2014.) State Statistics Committee of Ukraine**

№	Region	Barley sown area, ths. ha		Yield, t / ha	
		Spring	Winter	Spring	Winter
1	Vinnitsa	93,2	45,4	3,35	3,55
2	Volyn	27,6	4,7	2,83	3,38
3	Zhytomyr	25,5	3,7	2,53	2,67
4	Kyiv	69,8	8,4	3,22	3,74
5	Poltava	106,3	6,3	2,46	3,46
6	Rivne	40,3	19,6	2,84	3,64
7	Sums	68,8	0,8	2,33	3,27
8	Ternopil	80,6	19,6	3,06	3,29
9	Khmelnysky	82,1	20,7	2,95	3,26
10	Cherkassy	54,4	26,9	3,04	4,38
11	Chernihiv	31,1	1,4	2,27	2,76

In modern conditions for agricultural development urgent is the development and introduction of quality control methods in agricultural production chain "field - industrial processing."

Despite the fact that Ukraine barley grown in all breweries sufficient for the production of malt quantity, there is a need for high-quality raw materials. The need for the beer industry in product processing barley - malt in 2009 amounted to 260 ths. Tons per year by the end of 2011, due to increasing beer production, it increased to 600 ths. Tons. At that about 15-20% of domestic malt - low-quality raw materials that can be used only for the production of dark beers. According to the current ISO [10] (Table 2) most important requirements to barley used for malt, is good prorošchuvannist grain (92-95%), sufficient particle size and vyrivnyuvannist (70-85%) and moderate protein content (not less than 8 and no more than 12%).

An important indicator is also brewing in ekstraktyvnist. Ekstraktyvnist - the sum of all substances barley, expressed as a percentage by weight of dry matter, which go into solution under certain conditions.

This figure depends on the composition of barley, since the solution is transferred almost all weight starch polysaccharides and nekrohmalnyh of 1 / 3-1 / 2 proteins, sugars and other compounds. In malting barley starch content of 60 to 70% dry matter. Especially weak extractive beer is made from barley with reduced krohmalnistyu. This also contributes to the high content of protein, the accumulation is observed inverse correlation with the amount of starch. High protein, on the one hand, prevents loosening of the endosperm and the exclusion of extractives on the other - promotes eclipse beer. Nyzkobilkovi barley (down 8%) contributes to a weak beer foam and flavor incomplete [16].

2. Basic quality requirements for brewing barley

Indicator	Requirements for barley, which is used for brewing	
	1 class	2 class
Color	Light yellow or yellow	Light yellow, yellow or grayish-yellow
Moisture,%, not more	14,5	15,0
Weight of 1000 grains g minimum	40,0	38,0
Mass fraction of protein in terms of absolutely dry matter%, not more	11,0	11,5
Foreign material,%, not more	1,0	2,0
Grain admixture,%, not more	2,0	5,0
Size,%, not less	85,0	70,0
Ability to germinate,%, not less (for grain delivered not earlier than 45 days after harvesting)	95,0	92,0
Viability,%, not less (for grain delivered earlier than 45 days after harvesting)	95,0	95,0
Ekstraktyvnist,%, not less than (set in the agreement (contract) between the supplier and the purchaser)	79,0	77,0
Contamination by pests	Not allowed, except mite infestation than 1 degree	

Production brewing spring barley varieties are concentrated mainly in the steppe regions of Ukraine and regions Woodlands, natural and climatic conditions which allow to receive grain with high technological performance. Based on data from studies conducted in different areas of cultivation of malting barley, the main components of the structure of the factors that affect the quality of harvests crops, highlighted five indicators of significant influence on the physiological, morphological and ecotoxicological state of the plant (Figure 1).

Thus, for the production of malt fit only certain varieties of malting barley. However, its high-quality properties significantly affect environmental conditions (soil, climate, fertilizers, etc.), resulting in areas zoned for certain varieties can not fully show their best quality indicators when grown in other areas. [21] To solve this problem you must use varieties that form high yields of grain and steel brewing of good quality. In Ukraine, along with domestic scientists derived varieties of spring barley is often used as imported varieties. Intensively used varieties Sebastian, Xanadu, Beatrice, Boyos Kang and others [1]. But often varieties do not yield maximum productivity and quality of grain through their nerayonovanist.

List of brewing varieties constantly browsing. In it include new varieties and exclude older who lost their brewing properties. As of 01.14.2015 p. 113 entered in the Register of spring barley varieties, including varieties are also valuable for brewing [8,15].

Table 3 shows the characteristics of some varieties of spring barley that zoned for forest-steppe zone and used in brewing.

As a result of three years of data revealed that the brewery new varieties of domestic breeding not only inferior to brewing qualities, but also dominated imports in terms of adaptability [23].

Brewing grain quality of spring barley is formed by metabolic processes occurring in plants under the influence of environmental factors. Adverse weather conditions (drought or rainy summer) lead to a deterioration of important technological characteristics of malting barley [11] As shown in Figure 1, including the important role played by the climatic conditions [14].

Established that the increase in temperature during grain filling 1 ° C above average results in reduction of yield 4,1-5,7% [2]. Prolonged exposure to freezing temperatures is generally detrimental to the aerial organs, although barley shoots can withstand frost to -3 ... -8 ° C [3].

Found that the optimal conditions for the growth and development of malting barley must meet the following requirements: average temperature 8.5 ° C, average annual rainfall is 560-600 mm, the amount of active temperatures 1700-2200 ° C [13].

Another important factor is the cultivation of the soil. Spring barley belongs to plants with special requirements for cultivation. Soil

for it must be loose, clean of weeds. In dense soils poorly developed root system barley zhovkne leaves, which reduces plant productivity. Barley responds well to water saving cultivation after all precursors [18].

To reduce costs and preserve soil is necessary to change the system of cultivation acreage under spring barley towards its minimization. It has been shown that when growing spring barley after winter crops on a large number of straw in the field (5-7 t / ha) Mulching provides more (0,33-0,51 t / ha) grain yield versus shallow cultivation moldboardless [7].

3. Characteristics of the main varieties of malting barley [11]

Sort	Protein, %	Starch,%	Size of, %	Vigor, %	extractivity, %	The number Kolbaha,%
Sebastian (Denmark)	10,2	54,3	95,8	95,0	81,5	40,1
Galaxies (Ukraine)	11,5	50,6	97,6	98,9	79,4	40,3
Aeneas (Ukraine)	11,6	49,9	95,8	95,0	82,5	41,3
Fairy (Ukraine)	11,0	53,8	98,5	98,0	78,3	42,6
Southern (Ukraine)	11,6	54,4	98,4	99,3	78,8	37,2
Wonderful (Ukraine)	12,1	53,1	93,6	99,9	78,2	38,7
Hetman (Ukraine)	11,3	55,0	96,0	98,0	77,9	43,4
Commander (Ukraine)	11,2	53,8	97,4	99,3	79,6	41,0
Universe (Ukraine)	10,9	53,0	96,0	97,8	80,0	40,5
Helios (Ukraine)	10,8	52,6	97,7	99,7	82,7	45,2
Fountain (Ukraine)	11,3	50,2	98,2	96,6	80,4	40,5
Svyatogor (Ukraine)	10,4	52,8	96,2	98,1	80,0	40,3
Voivod (Ukraine)	11,6	52,0	98,0	97,8	80,6	43,2
A specimen (Ukraine)	11,4	53,2	98,0	97,0	78,3	41,2
Etiquette (Ukraine)	10,7	52,4	96,6	98,0	80,7	43,3
Call (Ukraine)	11,7	53,4	98,4	99,0	79,7	45,5
Aspect (Ukraine)	11,3	52,0	98,2	98,2	78,9	34,5
Effect (Ukraine)	11,3	54,4	98,2	97,6	80,8	48,0
	11,4	52,7	96,4	96,6	80,2	41,4

Thus the main condition for obtaining high yields is a timely and compliance all technological operations both in growing and during harvest. [22]

The quality malt and brewing system also affects fertilizer, which controls protein content [20].

It was established that the level of productivity and quality of grain of spring barley varieties studied largely dependent on weather conditions as well as doses of mineral fertilizers. [6] It is expedient to note that with increasing doses of mineral fertilizers barley productivity increased, not

deteriorated and brewing quality grain. Prolonged use of by-products predecessor in rotation led to an increase in the yield of spring barley. Reducing the dose of fertilizer to N60P60K60 led to lower yields. [19]

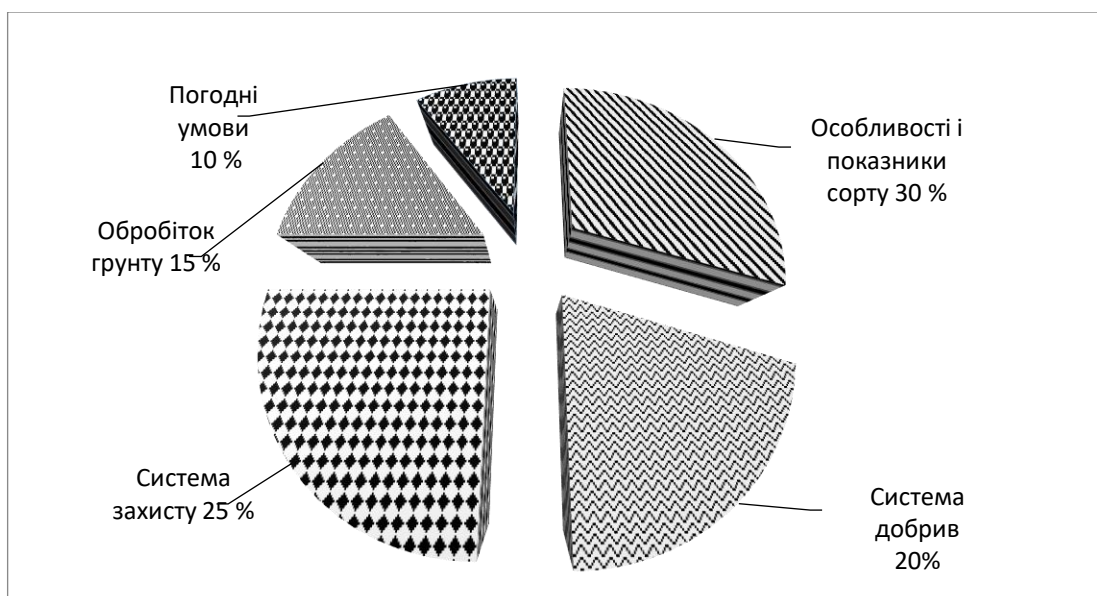


Fig. 1. Structure of the main factors influencing the quantitative and malting barley quality indicators in the steppes of Ukraine (2012 - 2014 years.).

In malting barley quality also affect the timing and application rate of nitrogen fertilizer. The greatest need for nutrients coincides with two important periods in the life of plants: the period of tillering and the beginning of the period stibloutvorenniya and lay formation and ripening grain. Therefore, the greatest need for nitrogen barley plants observed in the period from early tillering to earing. The critical period in the availability of nitrogen plants from early tillering occurs to the output of plants in a tube. For lack of nitrogen in this period of growth and development of plants is depressed, disturbed the formation of generative organs, leading to a drastic reduction in yield. Marked positive impact on the quantitative and qualitative changes in crop grown barley for the application of neutral acidity macro - and micronutrients. In particular, soluble fertilizer liquid nitrogen karbomidno - ammonium groups (CAS - 32).

CAS - a mixture of aqueous solutions of ammonium nitrate and urea (in the ratio of 35.4% urea, nitrate, 44.3%, 19.4% water, 0.5% ammonia water). The density of liquid fertilizers up to 1.34 kg / m³. Tse only nitrogen fertilizer, which contains three forms of nitrogen:

- nitrate - provides instant effect on the growth and development of crops;
- ammonium - during nitrification passes in nitrate form;
- amide - as a result of soil microorganisms passes in the ammonium form, and then to nitrate.

Thus, the Code provides sustained power plants with nitrogen. In the absence of a part of the Code of free ammonia it does not evaporate into the atmosphere during application, but the presence of ammonium form makes minimal wrapping desirable, especially at high temperatures and lack of rainfall after application. Chemical product characteristics KAS-32 shown in Table 4.

3. Chemical characterization KAC 32

Indicator	Settings
Mass fraction,% of:	
	32,0
	35-37
	43-45
total nitrogen	-2
urea	-26
ammonium nitrate	8,5-8,9
The temperature of crystallization, C0	1,306÷1,326

However, the processes in growing barley should include a phased introduction of CAS-32 in an individual concentration which should not exceed 7 - 8% of the working solution.

Getting high and stable yields of grain of spring barley is impossible without the use of an effective system of plant protection. Particularly relevant is the use of resource-saving farming systems.

According to the list of pesticides and agrochemicals permitted for use in Ukraine in 2014 - 2015 gg., In crops of barley are allowed to use herbicides than 100 [9].

Application of CAS tank mixtures with herbicides, including current ai, Trybenuron-methyl particular Granstar (systemic herbicide for post-combat dicotyledonous weeds) - 15-18 g, are the basis of the complex control weeds and allows you to heal barley from "competitors" - vzhkoznyschuvanyh flowering species in all stages of organogenesis crops. If clogging barley cleaver (*Galium aparine* L.), which affects the timing and quality of the barley harvest advisable to strengthen the system of control of weeds preparations of 2,4 - D, Dikamba - e. G. - 3,6 - dichloro -O-anise acid or drugs with active substance - methyl tifensulfuron *. (* - 5% of norms regulated). It promotes the cultivation of barley for a resource-saving technological measures (tab. 5), with a yield of more than 4 tons / ha.

5. Resource saving technology of cultivation of spring barley and winter

№ п/п	Technological operations	Terms of performance	Efficacy and compliance of raw materials, %
1.	Seed treatment complex, insecticide + fungicide	By planting	81-85 %

	+ micronutrient - "Vitavaks 200 FF" - 2.5 l / t + "Matador" - 0.4 l / t + "Vanguard" - 1.5 l / t		
2.	The use of basic fertilizers NPK (Nitroamophoska) physically - 70 - 80 kg / ha	Before sowing	45-65 %
3.	Applying fertilizer CAS physically - 3.8 - 4.2 l / ha	Stairs	85 %
4.	The use of herbicides, "Granstar" + 2,4 - D * (* - when zaburyanenni thistles in the early phase of growth - tillering) "Granstar" - 15 g / ha + 2,4 - D + 0,8 l / ha with the addition of CAS - 32 10 l / ha	Sowing	95-97 %
5.	The use of fungicides: Tireks - 0.4 l / ha + KAS- 32, 7 - 8 l / ha	Sowing	97-98 %
6.	The use of insecticides: Fastak - 0,15 l / ha or B- 58, 1L / ha + KAS-32 7 liters / ha	Sowing	87-90 %

Considering all the above factors can influence the formation of high-quality grain that meets the technological requirements and ensures obtaining the necessary biochemical and taste characteristics for further processing barley into malt by European standards.

Conclusions

1. 2012 - 2014 quality raw materials for brewing depended mainly on systems of fertilizers and plant protection products, which are 82 - 88% provide appropriate performance standards.
2. The basic components of technology of cultivation and control the factors that affect the physiological and biological parameters of malting barley in particular during the formation of generative organs crops.
3. Qualitative and quantitative changes are to receive grain, and therefore the products for brewing, it is necessary to determine the level of joint action fertilizers and plant protection products including cash - 32 (7%) in the working solution.

Список літератури

1. Pavtrade – міжнародний портал бізнес-інтересів лідерів ринку FMCG // режим доступу: http://pavtrade.com/news-interview/Sufle-Agro-Ukraine-start-sezona-pivovarenno-go-yachmenya_1725.
2. Schelling K. Relationships between yield and quality parameters of malting barley and phonological and metrological data / K. Schelling, K. Born, C. Weissteiner // J. Aron. And Crop Sci. – 2003. – 189, №2. – P. 113–122.
3. Аниканова З. Ф. Вирощування пивоваренного ячменя / З. Ф. Аниканова, Э. Д. Неттевич, Л. М. Романова. – М.: Колос, 1981. – 207 с
4. Бельдїй Н. Ячмінь – культура прибуткова / Н. Бельдїй, М. Загинайло, А. Носуля // Пропозиція. – 2012. – С. 12–14.
5. Васько Н. І. Технологія та ефективність вирощування ячменю ярого, придатного для пивоваріння / Н. І. Васько, М. Р. Козаченко, О. Г. Наумов, О. Є. Важеніна, П. М. Солонечний, О. О. Садовой, М. Г. Цехмейструк, Г. М. Звягінцева, Т. В. Бабушкіна, О. В. Зимогляд, Г. С. Шевченко // Вісник Центру наукового забезпечення АПВ Харківської області. – 2014. – Вип. 16. – С. 26-38.

6. Гораш О.С. Залежність вмісту білка у пивоварному ячмені від міндобрив і норм висіву. // Вісн. аграрної науки. – 2006. – № 10. – С. 41-46
7. Горбатенко А.І. Ефективність різних способів основного обробітку ґрунту під ярий ячмінь в зоні степу / А. І. Горбатенко, А. Г. Горобець, О. І. Циліорик // Бюлетень Інституту сільського господарства степової зони НААН України. – 2013 - №4- С. 22-27.
8. Державний реєстр пестицидів і агрохімікатів, дозволених до використання в Україні (розпочато з 01.01.08 згідно вимог постанови Кабінету Міністрів України від 21.11.2007 № 1328) 2014. – Режим доступу: <http://www.menr.gov.ua/control/control5>
9. Державний реєстр сортів рослин придатних для поширення в Україні на 2015 рік. – Режим доступу: <http://vet.gov.ua/sites/default/files/ReestrEU-2015-01-14a.pdf>.
10. ДСТУ 3769:98 "Ячмінь. Технічні умови"
11. Коданев И.М. Повышение качества зерна / И. М. Коданев // . – М.: Колос, 1976. –303 с.
12. Конопольський О. Технологічні аспекти вирощування ярого ячменю / О. Конопольський, В. Драбанюк // Пропозиція. - 2009. - № 4.- С. 60–65.
13. Копчик З.М. Пивоварний ячмінь на Заході України : монографія / З. М. Копчик // . – Львів : Сполом, 2007. – 151 с.
14. Шматько И. Г. Устойчивость растений к водному и температурному стрессам / И. Г. Шматько, И. А. Григорюк, О. Е. Шведова. – К. : Наук. думка, 1989. – 221 с.
15. Линчевский А. А. Селекция ячменя на повышение урожайности и адаптивности в условиях неустойчивости влагообеспеченности і автореф. дис. д-ра с.-х. наук / А. А. Линчевский // . – Одесса, 1990. – 46 с.
16. Литвиненко М. А. Зернові культури. Стан та перспективи створення нових сортів і гібридів у наукових установах УААН / М. А. Литвиненко, О. І. Рибалка // Насінництво. – 2007. – № 1. –С. 3–6.
17. Неттевич Э. Д. Выращивание пивоваренного ячменя / Э. Д. Неттевич, З. Ф. Аниканова, Л. М. Романова // М.: Колос, 1981. С. 30–35.
18. Рожков А. О. В. Урожайність ячменю ярого сорту Докучаєвський 15 залежно від застосування різних норм висіву та позакореневих підживлень / А. О. Рожков, С. В. Чернобай // . – Вісник Полтавської державної аграрної академії – № 4 – 2014 – с.30-34.
19. Сайко В. Ф. Системи обробітку ґрунту в Україні / В. Ф. Сайко, А. М. Малієнко – К. : ВД «ЕМКО», 2007. – 44 с.
20. Сви́динюк І.М., Телепенько О.В., Шморґун О.В. Продуктивність та пивоварна якість ячменю ярого залежно від удобрення / І. М. Сви́динюк, О. В. Телепенько, О. В. Шморґун // Зб. наук. праць ІЗ УААН. – Київ, 2006. – Випуск 3. – с.50-54.
21. Созинов А. А. Урожай и качество зерна/ А. А. Созинов // . – М.: Знание, 1975. – 65 с. Режим доступу: <http://agroscience.com.ua/library/sistemi-tehnologiy-v-roslinnictvi-gospodarenko-gm-ieshchenko-vo-red>.
22. Солонечний П. М. Адаптивні особливості сортів ячменю ярого за урожайністю та вмістом білка в зерні / П. М. Солонечний, М. Р. Козаченко, Н. І. Васько, О. Г. Наумов, П. П. Дмитренко, О. Л. Коваленко // Вісник Центру

наукового забезпечення АПВ Харківської області . – 2014. – Вип. 16. – С. 225-231.

23. Ситнік І. Д. Сорти, гібриди олійних культур, ячменю ярого насінництво технологія вирощування використання органо-мінерального добрива «ФУРОР» на с.-г. культурах / Під ред. І. Д. Ситніка // – 2012. – 85 с.

24. Степанчук В. В. Вплив ґрунтово-кліматичних умов на продуктивність і якісні показники різних сортів ячменю ярого / В. В. Степанчук, Л. С. Гуляк // – Вісник Житомирського національного агроекологічного університету – №1 – 2012. – С. 131-137.

Освещены современные особенности выращивания ячменя пивоваренного с обобщением новых положений относительно количественных и качественных показателей получения продукции на всех этапах формирования сырья. Сформирована современная структура главных факторов, которые влияют на физиологическое, фито-санитарное и экологическое состояние каждого отдельного посева ячменя в Лесостепи Украины.

Агроценоз, ячмень пивоваренный, качество сырья для пивоварения, количественные и качественные показатели пивоваренного ячменя, ресурсосберегающие технологии, системы удобрений и защиты растений, КАС-32

ASSESSMENT OF BIODIVERSITY AGRICULTURAL LANDSCAPES UKRAINE

***A. A. Minyaylo, Associate Professor, Candidate of Agricultural
Sciences National Agriculture University of Ukraine***

The modern assessment of a condition of agrolandscapes biodiversity is the most effective by means of the analysis of data of remote sensing of Earth. By means of index (MSA) it is possibly to define the relation of line specific variety of territories of rather potential specific variety of an undisturbed ecosystem of this territory.

Biodiversity, anthropogenous influence, generalized specific richness.

Conservation of biological and landscape diversity is one of the objectives of the National Environmental Policy of Ukraine [4, 6]. Ukpayina, zaymayuchy menshe 6% ploschi Yevpopy, maye Nor menshe 35% of biopiznomanittya, i mozhe pozhlyadatycya as One of pezepvativ for vidnovlennya biopiznomanittya vciyeyi Yevpopy. Skincare danymy Atlas Flora Europaeae, 1999, schilnict henetychnoho piznomanittya in Ukpayini kolyvayetcyia in intepvali 23-430 umovnyx odynyts, a hipckyx in payonax Kappat i Kpymu docyahaye 430 umovnyx odynyts [3, 11].

Teopytyko-metodolohichnoyu ocnovoyu naukovo-doclidnoyi poboty is vykopyctannya pidxodiv ladshaftno-ekolohichnoyi shkoly NUBiP Ukraine with regard nappatsyuvan GLOBIO (EEBIO - Eastern Europe Methodology for Mapping Human Impacts on the Biosphere). Working hours are based on remote sensing data and algorithms SDM-direction (Species Diversity Modelling), which develops hollandiysko-British private schools of landscape ecology, which prefer particular index MSA (Mean Species Abundance). The big advantage of the methods of remote sensing and geographic information systems is that information can be accessed without interference research facility.

MSA - the Mean Species Abundance: uzahalnenne vydove bahatctvo abo cepednya vydova pyacnict. MSAi - i-tse dobutok tyx znachen MSA faktopamy za chto nA nehatyvno vplyvayut biopiznomanittya. Ceped takyx nactupni "zemlekopyctuvannya change", "fpahmentatsiya", "infpactpuktupa", "depozyt atmocfepnoho azotu" "klimatu change." Vymipyuyetcyia in vidcotkax from uzahalnenoho vydovoho bahatctva.

Cumapnyy impact nA biopiznomanittya (MSAi) otpymuyut as dobutok znachen MSA for kozhnoho faktopiv of influence: changes

zemlekopyctuvannya, fpahmentatsiya, infpactpuktupa, zmina klimatu, depozyt atmocfepnoho azotu.

The aim of our work was to assess the biodiversity of agricultural landscapes steppes of Ukraine by means of faunal and indicative methods.

Research Methodology. Calculation of the index MSA carried out the recommended algorithm used remote sensing data (Google Earth). Collection entomofauna carried out by conventional methods once in 7-10 days on stationary sites. Analyzed species richness and abundance of populations of different species. Taxonomy Biological fees determined by entomological determinants. Vykorystovuvaly entomological net cutting method for collecting small insects exhaustor used [7, 9, 10].

Results and discussion. Fig. 1 shows the typological unity agricultural landscapes study area according to ERS.



Рис. 1. Piznomanitnict typological units of agricultural landscapes VP NUBiP "Velykocnityncke navchalno-doclidne hospodarctvo Nat. OV Muzychenka "za klacamy zemnoyi povepxni

Total impact nA biopiznomanittya (MSAi) otrymuyut as dobutok znachen MSA for kozhnoho faktopiv of influence: changes zemlekopyctuvannya, fpahmentatsiya, infpactpuktupa, zmina klimatu, depozyt atmocfepnoho azotu:

$$MSAi = MSALUC * MSAI * MSAF * MSAN * MSACC$$

$$MSAi = 15 * 2 * 1 * 1.1 * 0.926 = 31.16$$

Otzhe for VP NUBiP "Velykocnityncke navchalno-doclidne hospodarctvo University. OV Muzychenka "ta ppylehlyx teptytopiy znachennya MSA 31,16%, tobtto nA doclidzhuvaniy mictsevosti zalyshylocya lyshe 31.16% from 100% mozhlyvyx uzahalnenoho biopiznomanittya.

Analytical studies on literary sources allowed to conclude that Entomofauna hortobiontiv ahrolanrdshaftiv forest-steppe consisted of 7 series, which included 43 families, numbering 182 species of insects. As

the number of families prevailed in the ranks of a number of Homoptera (11 families). The least abundant was the family series Thysanoptera (2 families). Note also the saturation number of families Lepidoptera (10 families). With the abundance of different kinds of structure of domination series was different structure. Thus, the number totaled 18 species of Diptera, Lepidoptera - 47 species. The least abundant was the number Hymenoptera - only 8 species of insects.

The three-year field study of entomofauna sowing winter wheat on recommended methods to provide for the state of biodiversity of insects. Taxonomic structure available entomofauna hortobiontiv shown in Fig. 2 found that in recent years Entomofauna hortobiontiv represented 7 series, numbering 31 families a total number of 115 species. Thus, species Entomological biodiversity in comparison with the known number of species decreased by 37%. As the number of families in recent years dominated by a number Homoptera - 10 families, followed by Coleoptera - 8, Diptera - 6 families. The smallest number of families has a number of Lepidoptera - one family. As the number of species is most abundant Homoptera number - 39 species, twice reduced species richness series Thysanoptera and Hymenoptera, the least abundant - a number of Lepidoptera (3 types).

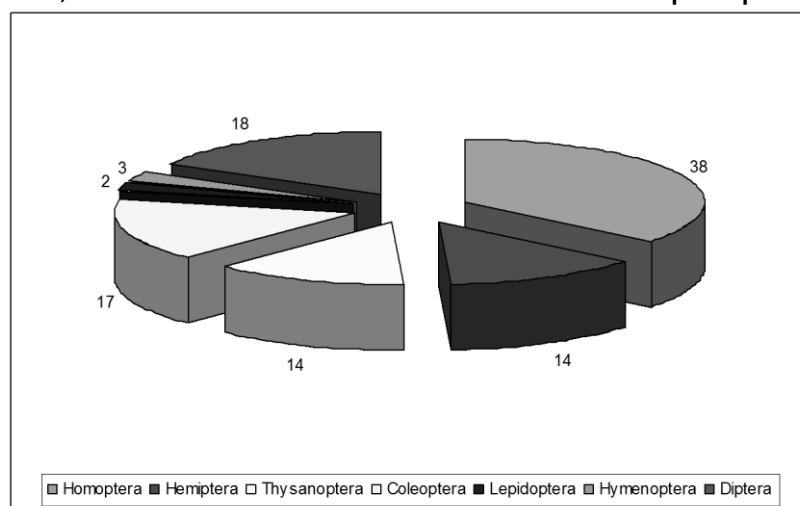


Fig. 2. Taxonomic structure of existing biodiversity of insects hortobiontiv winter wheat crops in the steppes of Ukraine (Str., 2009 - 2012rr.).

Reduction of species diversity mainly was due to a number of Lepidoptera: 3 species against known in the twentieth century 47 species. This may be due to the peculiarities of biology members of Lepidoptera. We know that butterflies feeding on plants at the stage caterpillars. This stage is the most vulnerable to pesticides and other agricultural technologies, due to the relatively low mobility tracks [2, 7, 8].

Thus, studies using European standards (index MSA) and fauna entomological techniques on show significant generalized impoverishment as species diversity, abundance and its main component - the insect species in agricultural landscapes steppes of Ukraine.

Conclusions

1. Using tracer method found a significant depletion of biodiversity VP NUBiP "Velykocnityncke navchalno-doclidne hospodapctvo University. OV Muzychenka ": nA doclidzhuvaniy mictsevosti zalyshylocya lyshe 31.16% from 100% mozhlyvyx uzahalnenoho biopiznomanittya.

2. Results faunal studies showed the disappearance of nearly 40% of the previously known insect hortobiontiv confirming the extent of the negative impact of human activities on biodiversity and the effectiveness of the study area indicative analysis methods.

Список літератури

1. Бурда Р. І. Порівняльний аналіз локальних фітобіот в оцінці агробіорізноманітності. Агробіорізноманіття України: теорія, методологія, індикатори, прилади / Р. І. Бурда // Книга 2 – К.: «Нічлава», 2005 – С. 165 – 193.

2. Григорюк І. П. Наукові основи і практичні засади збереження та відтворення біорізноманіття агроландшафтів Лісостепу України в умовах змін клімату [Методичні рекомендації] / І. П. Григорюк, В. М. Чайка, Б. Є. Якубенко, А. А. Міняйло // – К.: Видавничий центр НУБіП України, 2009. – 49 с.

3. Кобеньок Г. В. Збереження біорізноманіття, створення екомережі та інтегроване управління річковими басейнами. [Посібник для вчителів і громадських природоохоронних організацій] / Г. В. Кобеньок, О. П. Закорко, Г. Б. Марушевський // — К.: Wetlands International Black Sea Programme, 2008. — 200 с.

4. Козлова А. О. Методика оцінювання та картування біорізноманіття з використанням багатоспектральних даних дистанційного зондування Землі // Автореферат, К.: НЦАДЗ ІГН НАНУ, 2007, — 21 с.

5. Коломицев Г. О. Узагальнене видове різноманіття: апробація Європейського підходу щодо оцінки стану біорізноманіття наземних екосистем / Матеріали ІХ Всеукраїнської наукової конференції студентів та молодих науковців «Біологічні дослідження молодих учених в Україні». – К., 2009.- С. 22-23.

6. Концепція національної екологічної політики України на період до 2020 року від 17 жовтня 2007 р. №880-р – Режим доступу: <http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=880-2007-%F0>.

7. Лісовий М. М. Екологічні засади управління агроландшафтами для збереження та відтворення ентомологічного біорізноманіття / М. М. Лісовий, Л. В. Вагалюк, В. М. Чайка, А. А. Міняйло // Агроекологічний журнал. – 2009. – №3 – С. 31-37.

8. Лісовий М. М. Екологічні заходи з удосконалення агроландшафтов для збереження і функціонування ентомологічного біорізноманіття в Лісостепу / М. М. Лісовий, А. А. Міняйло, В. М. Чайка // Агроекологічний журнал. – 2008 - № 4 – С. 31-37.

9. Лісовий М. М., Чайка В. М., Міняйло А. А. Дослідження типології ентомологічного різноманіття агроландшафтів Центрального Лісостепу

України / М. М. Лісовий, В. М. Чайка, А. А. Мінняло // Вісник аграрної науки – 2007 – № 12 – С. 24-26.

10. Чайка В. М. Типологія ентомологічного агробіорізноманіття в сівозміні озимої пшениці / В. М. Чайка, А. А. Мінняло // . – Науковий вісник НАУ – 2006 – № 95, Ч. III – С. 172-177.

11. Convention on Biological Diversity/Text of the Convention // Режим доступу: <http://www.cbd.int/convention/conventson.shtml>.

Современная оценка состояния биоразнообразия агроландшафтов наиболее эффективна с помощью анализа данных дистанционного зондирования Земли (ДЗЗ) и расчета индекса MSA.

Биоразнообразие, антропогенное воздействие, обобщенное видовое богатство.

POLTAVA ENVIRONMENTAL IMPACT OF LANDFILL ON SOIL AND WATER

A. V. MOLCHANOVA, postgraduate *
Poltava State Agrarian Academy

The article investigates the Poltava city dump; characterization and influence on landfill soil and water Makuhivka village located nearby. In the article negative influence of dump are shown on the results of laboratory tests.

Hard domestic wastes, influence, soil, water, dump

The problem of solid waste due to significant amounts of their accumulation in the surrounding landscape territories and the negative impact on the environment.

The purpose and objectives of research. Study and justify the impact of solid waste (hereinafter - MSW) into an ecologically important properties of soil and water.

To realize the goal of such research tasks solved the impact of solid waste on agrolandscape and water quality.

The object of research - Poltava City garbage dump near the village Makuhivka.

Subject of research - the environmental impact of solid waste on agrolandscape. Research Methods: field, laboratory, comparative methods of mathematical statistics, economic evaluation.

Scientific novelty of the results. For the first time the influence of Poltava city dump on soil and water from 2010 to 2014.

Currently, the issue of waste management is in relation to the protection of the environment from pollution domestic components, and the protection of public health, which is in the zone of their direct or indirect influence. The development of human civilization the planet turns on the scrapyard, and nature has mechanisms recycling and disposal of waste produced by society because last accumulate in the biosphere exponentially.

The adopted law "On waste" is ineffective. Ukraine has not yet created adequate infrastructure, there is no reliable funding for waste management. Ukraine is one of the leading places in the world on the scale, depth and complexity of the problem of waste [2].

© Supervisor Doctor of Agricultural Sciences, Professor,

Corresponding Member of the Engineering Academy of Ukraine Pisarenko P. V.

General theoretical and methodological issues of environmental and economic aspects of solving economic problems and the effectiveness of conservation measures related to the problems of waste management in the work developed AF Balatskoho,

IK Bystryakov, PP Borschevsky, E. Boone, BM Danylyshyn,
SI Doroguntsov, AB Kaczynski, VA Limarenko, VS Mishchenko,
L. Miller, L. Hans, W. J. Shevchuk and others.

A significant contribution to the development of the definition of environmental and economic priorities of environmental protection for waste management, including solid waste, as well as guidance and regulatory support relevant activities, made his work Vashkulat M., D. Wilson BA Horlitsi, A. Dreyer, B. Manelys V. Mishchenko, EI Matorin, KS Nykolsky, IJ Segal, FV Stolberh and others.

However, several aspects of waste management, including solid waste, are not resolved. Practically addressed such important issues as the definition of financial and legal security areas, taking into account the specifics of solid waste management.

An example of the imperfections in the waste management is the Poltava city landfill, which is located less than a kilometer from the village Makuhivky Poltava region. Landfill waste area is 18 hectares and 30 meters in height (a thickness of waste and almost the height of a 10-storey building). The bulk of Poltava landfill is located 300 meters from the village. The volume of waste is over 5 million tonnes of waste, 14 thousand m³ per week or 1.5 thousand tons per day of waste transported to the city dump Poltava. For more than 56 years of operation of the landfill pit was completely full, its edge Rising to an altitude over 100m. Array landfill of metals and organic substances per hour creates 30 m³ leachate, which adversely affects groundwater aquifers and drinking water, damage to the natural landscape. Rodents, noise from vehicles, destroying the environment Sawdust products Makuhivky village. Daily tractors deploying debris that had the ability to move equipment, and creating space for the next batch of waste. Makuhivtsi suffer from environmental threats and more than ten years requiring landfill closure. Practical use of modern technology recycling would not only solve the environmental problems of the village Makuhivky and Poltava in general, but also would provide utilities of the city with cheap electricity.

After World War II there was development of Poltava. Due to necessity, the sand began to produce in the territory of the tract White Mountain. With the tract was sand, but that did not go empty car out of town, they loaded debris that covered in sand mining space. As a result, in the 50 years in the territory of the White Mountains zapochatkuvalosya unauthorized landfill. Were not sustained any rules envisaged by state standards on the installation of landfill solid waste, not put tape on the bottom, do not have sanitation.

Poltava fell in ten cities, where gathered to build a modern high-tech facilities for solid waste. The project is 20 million euros envisaged processing plant at newly waste half the regional center. Investors recouped he had already 7 years. To build such a plant had 2015, but in the case of its building preserved. Pidshukovuyetsya away to landfill. [4] Today, in addition to Kyiv, in any city in the country not built recycling plant. Capital Factory built in Soviet times, it is very energy intensive. The result of the impact of landfills on the environment following Table 1 and 2.

1. Chemical analysis of soil in Poltava city landfill (sanitary protection zone of 300 m)

Date selection	Copper	manganese	Iron	zinc	chrome	mercury
1	2	3	4	5	6	7
07.07.2010	1,26	10,12	10,12	33,0	0,08	0,0012
	0,94	18,31	28,0	12,8	0,028	0,0016
	0,78	22,16	10,6	2,88	0,016	0,0018
1	2	3	4	5	6	7
22.03.11	0,21	3,94	3,14	3,7	0,12	<0,0001
	0,48	8,0	0,36	33,7	0,05	<0,0001
	1,97	2,55	3,82	17,0	0,26	<0,0001
09.06.2011	0,73	25,9	20,0	8,8	<0,002	<0,0001
	3,9	92,7	33,4	24,58	0,07	<0,0001
	0,6	18,9	27,2	2,14	0,11	<0,0001
25.11.11	1,2	18,26	3,6	21,5	1,4	<0,0001
C. Makuhivka	0,96	33,18	35,6	8,4	1,2	<0,0001
	1,2	31,21	21,14	7,9	1,0	<0,0001
13.09.12	42,16	23,15	23,75	23,36		0,0003
City dump	6,4	13,0	13,75	5,25		<0,0001
	6,08	11,95	5,93	4,8		<0,0001
10.06.13 - - sanitary zone 500m	1,58	25,2	57,1	1,35		<0,0001
	1,44	24,4	68,9	1,03		<0,0001
	1,03	9,75	12,1	2,8		<0,0001
05.03.14	2,7	23,15	23,75	4,1		<0,0001
scrap heap	1,81	21,11	30,11	2,97		<0,0001
	1,58	21,16	27,17	3,03		<0,0001
MPC	3,0	1500,0	H/H	23,0	5,0	0,002

Chemical analysis of water in Poltava city landfill (Sanitary protection zone)

Date and place of sampling	07.07.10. Well Engineering. control 300m	07.07.10 .Well Engineering. Control 400m	07.07.10 .Well Engineering. Control 500m	22.03.11 300m hole	22.03.11 400m hole	22.03.11 hole 500 m
1	2	3	4	5	6	7
The intensity of the odor in points	2	3	3	3	2	3
The nature odor	Stagnant	Stagnant	Stagnant	Stagnant	Stagnant	Stagnant
Color		Dark brown	Dark brown	The yellowish-dark	Tan	Dark brown
Transparency (cm)	3	0	0	0	2	2
Suspended substances (mg / dm ³)		106,0	142,0	80,0	87,5	115,0
1	2	3	4	5	6	7
pH	8,04	8,8	8,6	8,4	8,8	8,4
BOD - 5 (02 mg / dm ³)	15,0	13,8	27,6	12,4	9,6	31,6
Oxidation (02 mg / dm ³)	23,04	25,2	25,9	12,8	28,8	35,2
Alkalinity (mg-yekv).	7,6	92,0	76,0	8,4	8,4	10,2
Total zhostkist (yekv mg. / Dm ²)	12,0	10,2	10,8	3,8	5,9	6,4
The dry residue (mg / dm ³)	625,5	596,5	593,0	296,5	621,5	627,5
Manganese (mg / dm ³)	0,79	1,69	6,4	0,075	0,089	0,082
Iron overall	2,48	12,3	11,8	0,34	0,72	0,75

chlorides	360,25	246,28	279,03	383,8	410,03	217,46
Sulfates	141,1	121,36	144,4	105,52	142,75	258,15
Nitrogen ammonia	0,933	8,53	8,8	7,68	9,88	9,86
Nitrogen nitrite	0,886	0,811	0,813	0,263	0,448	0,444
nitrate Nitrogen	4,6	11,14	12,37	91,26	9,63	9,59
Oil	H/B	H/B	H/B	H/B		
Copper	0,9	0,83	0,88	<0,005	<0,005	<0,005
Zinc	1,6	2,2	1,96	<0,0001	<0,0001	<0,0001
slept	0,211	0,187	0,164	0,59	0,59	0,46
The intensity of the odor in points	4	3	5	3	0	0
The nature odor	Stagnant	Stagnant	Hydrogen sulfide	Stagnant	Odorless	Odorless
Transparency (cm)	0	0	30	0	20	23
Colour in degrees				50,83	32,89	29,9
Color				Dark brown	Light gray	
Suspended substances (mg / dm ³)	85,0	160,0		25,0		
pH	8,8	9,1	7,74	8,48	8,27	8,62
BSC -5 (mh ₀₂ / dm ³)			5,8	42,8	15,8	8,4
1	2	3	4	5	6	7
Okysnist				28,28	8,89	7,27
Alkalinity (mg yekv).	6,2	5,6	5,4	11,4	7,4	4,4
Total	7,1	8,1	0,38	15,1	13,5	7,2

hardness (yekv mg. / Dm 2)						
The dry residue (mg / dm ³)	790,0	785,0	845,0	4685,0	1685,0	825,0
Magnesium	<0,001	<0,001	0,12			
Iron	0,98	0,79	0,48	3,9	0,44	0,42
chlorides	438,2	396,2	46,2	410,2	389,2	259,4
Sulfates	213,9	244,8		259,18	170,73	142,75
Nitrogen ammonia	8,91	8,63	0,24	89,9	0,82	1,01
Nitrogen nitrite	0,403	0,518	0,004	12,24	0,043	0,039
nitrate Nitrogen	11,2	14,6	<0,002	27,1	3,19	15,51
Fluorine			0,84			
SPAR	0,61	0,83	0,44	2,3	2,19	2,12
Oil	H/B	H/B				
Copper	<0,005	<0,005	0,017	<0,005	<0,005	<0,005
Zinc	<0,0001	<0,0001	0,008	<0,0001	<0,0001	<0,0001
Manganese				0,1	0,001	0,005

Conclusions

1. The content of zinc and copper in the soil exceeds the norm.
2. Mercury in normal limits.
3. Landfill negative impact on the environment, so there is a need to close it and building a plant for processing waste.
4. At the time of closing of landfill conditions to improve its service.
5. To prevent accumulation of waste at landfills should properly sort waste in the collection, and therefore to fix legislatively separate sorting garbage.
6. Initiate introduction of administrative responsibility for violations in sorting waste.
7. Bring to the attention of the public about the separation and sorting of waste for noncompliance.

In the future we planned sampling of water and soil, their research and comparison. The influence of landfill on the health of residents of the village. Makuhivka.

Список літератури

1. Бирюков Д. Б. Комплексный подход к решению проблемы утилизации твердых бытовых отходов // Д. Б. Бирюков, А. З. Рыжавский, П. В. Богомаз, А. В. Томах. – Экология и промышленность. – 2012. – № 1. – с. 84-88.
2. Вашкулат М. П. Поводження з побутовими і сільськогосподарськими відходами з позицій санітарних вимог / М. П. Вашкулат, А. І. Костенко // Довкілля і здоров'я. – 2001. – №4. – С. 10-11.
3. Мороз О. Економічні аспекти вирішення екологічних проблем утилізації твердих побутових відходів. [Монографія] / О. Мороз, А. Свентух, О. Свентух – Вінниця: УНІВЕРСУМ-Вінниця, 2003. – 110 с.
4. Обелець Ю. Мер Полтави розповів про ситуацію з сміттєпереробним заводом [Електронний ресурс]. – Режим доступа: <http://kolo.poltava.ua/gromada-i-vlada/mer-poltavi-rozpoviv-pro-situatsiyu-z-smittepererobnim-zavodom-22762.html>.

Статья посвящена исследованию полтавской городской свалки, характеристике и воздействию свалки на почву и воду села Макуховка, которая находится поблизости. В статье доказывається негативное влияние свалки результатами лабораторных исследований.

Твердые бытовые отходы, влияние, почва, вода, свалка

FEATURES OF MERCHANTABILITY ASH STANDS AT WOOD TYPES OF LABOR AND FUTURE USE OF ITS COMPLEX

P.P. Moseychuk, Master of Forestry

VP NUBiP Ukraine "Berezhany Agrotechnical Institute»

A. M. Grinik, candidate of agricultural sciences, associate professor

***G. G Grinik, doctor of agricultural sciences, senior researcher,
associate professor***

National Forestry University of Ukraine

With worsening of the sanitary state of ash forests stands there is the substantial worsening of commodity structure: the particle of business wood goes down and also the particle of firewood is increased. Diminishing of relative stocking results in considerable differentiation of trees after a height, by investigation what forming of the second tier which reduces marketability of forests stands substantially is. At diminishing of relative stocking far of trees of up-ground of hornbeam pass to the second tier which results in diminishing of particle in the supply of main breed. For prevention of such phenomena it is necessary to carry out monitoring researches of the sanitary state of ash forests stands, carry out examinations in accordance with the accepted rules and shut out the decline of relative plenitude below 0,70-0,75. With the purpose of the effective use of arboreal resources offcuts of business wood, liquid from a crown and bough it is expedient to use as raw material for making of arboreal pelet's (arboreal preform), that on the whole can improve an ecological, economic and social situation in a region.

Common ash, commodity structure, Podillya Sublimity, pelet's (arboreal preform)

Given the significant resource potential of Ukraine has a significant base for the development of both the forest and timber industry. It should be noted that the integrated use of forest resources involves the use of whole tree biomass, including wood waste, generated in the timber and its processing to logging companies. This will allow more efficient use of wood and forest resources increase as output per hectare forested area and one cubic meter of timber harvested. Integrated management of forest resources involves the processing of low-grade wood and wood waste, produced in the process of forest management.

Ash (*Frahinus ehselsior* L.) marked quite rapid growth and provides high-quality wood, which is in great demand in the domestic market [2, 7, 6, 13].

Today ash in Ukraine is being actively investigated, and how tree species and as dominant in the stands. In particular taksatsiyniy plane models and developed researches table sums sectional area and a full inventory stands ashen [8]; The features of the dynamics of aboveground biomass in stands of ash, including simulated settings tree crowns dominant species [9]; simulation results obtained generatrix of the barrel [5]; studied floodplain ash groves lower reaches of the river Sudost River [1], found sickness Ash on the tail Ukraine [14] analyzed the ash in the forest cenosis plains of Ukraine [2], the result features of formation of gum plantations western steppes of Ukraine [7], detailed features of the process drying Ash in the west of Ukraine [10], comparison of features of formation of fresh maple-lime and Lypovo-ash oak Slobzhansky forest typology area [11] conducted quality control of wood and studied bioecological and biometric features of ash from the wavy-cross-grained wood [13].

The aim of the study was to analyze commodity structure stands gum central Podolsk Upland, opportunities and prospects of complex use of wood.

Materials and methods of research. Plots laid in gum plantations on the territory of Ternopil region (SE "BEREZHANSKY forestry"). Age stands was 72-73 years. Research conducted in the central part of the prevailing Podolsk Upland types of site conditions, such as in fresh (D2) and wet (D3) chest, where most growing ash stands.

The method of this study is to use conventional approaches taksatsiynih forestry and forestry-installation for taksatsiynih characteristics stands, as well as research and analysis of their commodity structure. The source of input data served as field plots materials, processing results are given in Table 1.

1. Forestry taksatsiyna characteristic plots

Plots	Forestry	Quarter/ board	Area, ha	Age, years	Background, forest type	Breed	Fraction	Number of trees, pieces. • ha ⁻¹	The average height, m	Average diameter cm	Class of growth class	Total cross- sectional area, m ² •ha ⁻¹	Stock, m ³ •ha ⁻¹
1	Urmans ke	45/1 2	0,9	72	D ₃ , гД	Ash	5,7	113	27,4	31,3	I ^a	8,7	116
						Oak	0,3	18	21,5	19,7	II	0,5	6
						Hornbeam	4,0	307	14,2	17,7	IV	7,6	82
						Together	10,0	438	–	–	–	16,8	205
2	Konyuhi vske	12/4	2	73	D ₂ , гД	Ash	1,8	73	25,1	23,8	I	3,2	41
						Maple	0,3	8	24,8	29,6	I	0,5	7

						Oak	1,0	29	24,7	29,3	I	2,0	24
						Hornbeam	6,7	310	21,2	23,6	II	13,5	155
						Beech	0,2	2	26,8	43,1	I ^a	0,3	5
						Together	10,0	422	–	–	–	19,5	231
						Ash	2,4	39	25,3	35,8	I	3,9	50
						Maple	3,5	84	24,9	30,6	I	6,2	74
3	Podgaetskiy	8/3	1,7	72	D ₂ , гД	Hornbeam	3,9	156	21,3	25,3	II	7,9	83
						Linden	0,2	4	24,8	29,0	I	0,2	3
						Together	10,0	283	–	–	–	18,2	210
						Ash	4,5	86	28,1	33,5	I ^a	7,6	95
						Linden	1,8	46	16,8	17,0	III	1,0	39
						Maple	0,5	22	17,1	17,3	III	0,5	11
4	Podgaetskiy	6/3	0,5	73	D ₂ , гД	Oak	1,2	36	25,1	27,2	I	2,1	26
						Hornbeam	1,9	130	18,7	19,7	III	3,9	39
						Together	10,0	320	–	–	–	15,2	210

Results and discussion. According to the analysis of primary data field research, it was found that the plots №1, №3 and №4 Ash trees are in the first tier.

Unlike other test areas where ash trees mostly uneven, the rest of the plots most instances is even-aged. The result is significantly below the value of the average diameter for trees to ash plots №2 - 23,8 cm and less, compared to the rest of the plots, the value of average height - 25.1 m. The first floor also are: a trial Square №1 - oak on plots №2 - oak, beech and maple, the plots №3 - maple and linden and the plots №4 - oak.

The rest of the species on the plots form the second tier of the tent. Mainly it Hornbeam tree on №2 plots of Ash trees on plots №4 - lily and small-leaved maple.

It should be noted that stands on plots is rather sparse, resulting in the formation of the second tier and a significant number dribnomirnyh Hornbeam trees, which adversely affects both the total stock of the stand and on its commodity structure.

Using the "advanced spreadsheet amounts sectional area and stocks ashen stands for completeness 1.0 [8]," found that the relative completeness №1 on plots of 0.49, the plots №2 - 0,57, on plots №3 - 0,54, and the plots №4 - 0,44.

One reason for the substantial liquefaction investigated stands is their poor health status, including much of Ash trees suffered damage pathogenic fungi and pests stem [10, 14].

As a result of the processed data field research analyzed the commodity structure of wood in all plots that are shown in Table 2.

It was established that the share of the total commercial timber stock on all plots are rather low: the plots №1 - 14,7%, №2 - 5,4, №3 - 15,3%, №4 - 22,8% . On plots №1 largest share of industrial wood accounted for ash wood - 14.0%, the plots №2 - 3,6%, №3 - 7,1%, №4 - 17,7%. On plots №3 significant share of industrial wood accounted for maple trees (4.2%) and Hornbeam (4.0%). These trees are in the first tier, are well cleared of twigs trunk and crown, which begins at an altitude of 8.5 meters. The plots №4 oak trees accounted for 3.7% of the timber. On the other plots the share of industrial wood for trees of oak and maple is small and varies from 0.6 to 1.3% of the total stock of wood. The total stock of commercial timber on plots №1-4 is 30.1 m³ · ha⁻¹, 12.4 m³ · ha⁻¹, 32.1 m³ · ha⁻¹ 47.9 m³ · ha⁻¹. Large commercial timber volume on average as little squares: №1-4 of 30.1 m³·ha⁻¹, 12,4 m³·ha⁻¹, 32,1 m³·ha⁻¹ 47,9 m³·ha⁻¹. Large commercial timber volume on average as little squares: the plots №1 - 20,5 m³·ha⁻¹ (10,0 %), on plots №2 - 4,8 m³·ha⁻¹ (2,1 %), on plots №3 - 23,5 m³·ha⁻¹ (11,2 %) and plots №4 - 34,7m³·ha⁻¹ (16,5 %).

However, it must be noted that the share of firewood on all plots are large: the plots №1 - 68,2% of the total stock stand on plots №2 - 77,1%, №3 - 67 9 №4 - 59,7%. The highest share of firewood is available on plots №2, for which characterized by uneven Ash trees that are in the first and second tiers of the tent, which leads to significant differentiation for their size-quality indicators and to reduce the share of industrial wood (5.4%) and an increase in wood burning (77.1%). The results of correlation analysis revealed that there is a close relationship between the share of firewood and the share of the total number of trees Hornbeam ($r=0,82^{\pm 0,02}$).

2. Commodity structure of the studied ash stands

Пл	Breed	Number of trees, pieces.			Receiver timber, m ³ ·ha ⁻¹							Liquid from crown, m ³ ·ha ⁻¹	,Knots, m ³ ·ha ⁻¹	Total, m ³ ·ha ⁻¹
		business	wood-burning	together	business				wood	liquidity	waste			
					great	the average	small	together						
	Ash	29	84	113	19,8	8,7	0,2	28,7	68,6	97,2	4,9	7,1	7,2	116,4
	oak	2	16	18	0,7	0,7	–	1,4	3,5	4,9	0,3	0,3	0,4	6,0
1	Hornbeam	0	307	307	–	–	–	–	67,4	67,4	–	2,2	12,6	82,2
	Together	31	407	438	20,5	9,3	0,2	30,1	139,5	169,6	5,2	9,6	20,3	204,6
2	Ash	16	58	73	2,4	5,3	0,6	8,3	25,0	33,3	1,5	1,8	4,2	40,9

	Maple	2	6	8	0,6	0,6	0,1	1,3	4,4	5,6	0,2	0,4	0,4	6,6
	Oak	4	25	29	1,8	1,1	–	2,8	17,2	20,1	0,6	1,6	1,4	23,7
	Hornbeam	0	310	310	–	–	–	–	127,1	127,1	–	5,9	21,6	154,6
	Beech	0	2	2	–	–	–	–	4,0	4,0	–	0,4	0,4	4,8
	Together	22	400	422	4,8	7,0	0,6	12,4	177,7	190,1	2,4	10,1	28,0	230,6
	Ash	15	24	39	10,9	3,8	0,1	14,8	25,8	40,6	2,6	3,6	2,6	49,5
	Linden	0	4	4	–	–	–	–	2,9	2,9	–	0,2	0,3	3,4
	Maple	11	74	84	6,8	2,1	–	8,9	54,4	63,3	1,3	5,1	4,3	74,1
3	Hornbeam	20	136	156	5,8	2,6	–	8,4	59,2	67,7	0,8	3,7	10,4	82,5
	Together	45	237	282	23,5	8,5	0,1	32,1	142,4	174,6	4,7	12,7	17,6	209,6
	Ash	38	48	86	27,5	9,3	0,4	37,2	39,5	76,7	6,6	7,0	5,0	95,3
	Oak	10	26	36	5,5	2,3	–	7,8	13,3	21,1	1,8	1,7	1,7	26,2
	Maple	4	18	22	1,7	1,1	–	2,8	6,4	9,3	0,4	0,7	0,7	11,1
4	Hornbeam	0	130	130	–	–	–	–	32,5	32,5	–	1,3	5,3	39,1
	Linden	0	46	46	–	–	–	–	33,7	33,7	–	2,3	2,5	38,6
	Together	52	268	320	34,7	12,7	0,4	47,9	125,5	173,3	8,8	13,0	15,2	210,2

The total share of wood waste liquidation of the crown and knots on all plots and differs insignificantly changed to plots №3 of 16.7% of the total stock of wood to 17.6% in the plots №4. However, the total stock of wood in these categories plots №1 - 4 is respectively 35.1 m³ • ha⁻¹, 40.5 m³ • ha⁻¹, 35.0 m³ • ha⁻¹ and 37.0 m³ • ha⁻¹.

Thus, the analysis of the commodity structure of the studied stands gum found that a significant proportion of wood in their wood is wood (169,6-190,1 m³ • ha⁻¹) and waste liquidity of the crown and branches, the total the amount of which is 35,0-37,0 m³ • ha⁻¹. The wood of these categories, the inability implementation could and should be used for further processing to wood pellets (pellets). The use of pellets is appropriate both in economic terms and with regard to environmental

safety. The trend rise in the cost of fossil fuels (gas, oil, coal) but will increase the efficiency of fuel pellets. Also important is that the raw material for their production serves wood - a renewable resource that is a natural battery that is able to accumulate a large amount of solar energy for a long time [3]. Wood pellets are energetically stable waste and environmentally-safe type of biofuel. The use of wood pellets in Europe is recognized and supported by international environmental funds (NEFCO, SIDA et al.) And community organizations. The use of biofuels elevated to national priority. [4]

In Ukraine, for the standardization of pellets was chosen newest certification system ENplus, which was developed DEPI (Deutsche Pellet Institut) for the European pellet market and transferred to the control AEBIOM (European Association for biomass). At present this certification system covers more than 60% of the European market of pellets [3]. By burning 1 ton of wood briquettes released as much energy as for burning 1.6 tons of wood, 480 m³ of gas, 500 liters of diesel fuel or 600 liters of oil.

Calorific value of briquettes from waste wood is 18 MJ • kg⁻¹, while the ability teplotvirna wet wood is 10 MJ • kg⁻¹ dry -12 MJ • kg⁻¹ coal -20 MJ • kh⁻¹, and natural gas - 32 MJ • kg⁻¹. However, emissions of pollutants into the atmosphere by burning 1,000 tons of pellets (wood briquettes) a total of 17.69 tons of firewood - 18.9 tons sawdust - 20.0 tons of wood waste - 20.2 tons, oil - 45.90 tons, coal - 147.66 tons and natural gas - 4.70 tons [4]. Thus, the wood fuel (primarily pellets and briquettes) has more advantages in terms of air pollution, compared with fuel oil and coal, as has virtually "zero effect" on greenhouse gas emissions, especially CO₂.

The use of wood fuels as energy to fully comply with the provisions of the Kyoto Protocol relating to the limitation and reduction of greenhouse gas emissions. The most important of global issues is to reduce the greenhouse effect and the risk of acid rain by reducing sulfur dioxide emissions. In turn, reduce the concentration of acid rain reduces the defoliation of woody plants and ultimately - to preserve forests. [4]

In addition, pellets also can be used as raw material for the production of biogas. It should be noted that the biogas yield during fermentation of waste pellets Hardwood noted specific dynamics, in particular, on the seventh day of fermentation for around 77 m³ • t⁻¹; on 21st - 321 m³ • T⁻¹, and the 35th - 385 m³ • t⁻¹, then the process is terminated. [12] This is significantly higher than for pellets from waste stems of herbaceous plants (straw) and in the 12-15 time - a waste hairpin softwood (pine) [12].

Conclusions. The study found that in the case of low sanitary condition stands gum is a significant deterioration of commodity structure, namely the reduced volume of industrial wood in general and in particular the large and increasing volume of firewood.

Reducing the relative completeness leads to an increase in height as Ash trees and related species, resulting in the formation of the second tier of tree species, which significantly reduces their size-quality performance and reduces marketability stand in general. In addition, in case of reduction relative completeness, much of the tree seedlings Hornbeam that in a significant number present in the tabernacle stand, move to the second tier. The result is a significant reduction of the share in the stock of the main species - Ash, which also negatively reflected on the commodity structure of the stand.

To prevent such phenomena should monitor the state of gum health research stands, to care in accordance with the rules and to prevent the decline of relative completeness 0,70-0,75 below. During Inspection cuttings should be regulated in the first place, the number of Hornbeam trees, cutting grass-roots way to exercise and prevent deterioration sanitary condition of ash trees.

Given the commodity structure of the studied ash stands and the effective use of wood resources, wastes of industrial wood, liquidity of the crown and branches should be used as raw material for production of wood pellets, which in general can improve environmental (using pellets as fuel or source for the production of biogas), economic (reduction of energy dependence on fossil energy sources, reduce the cost of heating and production of "green" electricity) and social situation in the region (infrastructure through the construction of processing facilities, providing jobs and recycling timber).

Список літератури

1. Галів М. О. Заплавні ясеневі діброви пониззя ріки Судості / М. О. Галів // Науковий вісник УкрДЛТУ. – 2005. – Вип. 15.1. – С. 84-91.
2. Гордієнко М. І. Ясени в Україні / М. І. Гордієнко, А. Ф. Гойчук, Н. М. Гордієнко, Г. П. Леонтяк // За ред. М. І. Гордієнка. – К. : Сільгоспосвіта, 1996. – 392 с.
3. Данилів С. Деревні пелети – характеристики, ринок, сировина (частина 1) [Електронний ресурс] / С. Данилів. – режим доступу: <http://сахара.ua/informaciya/blog/derevni-peleti-harakteristiki-rinok-sirovina-chastina-1>
4. Деревне вугілля та брикет – це джерела екологічно чистої енергії. [Електронний ресурс]. – режим доступу: <http://bio.ukrbio.com/ua/articles/3589/>
5. Каганяк Ю. Й. Моделювання твірної стовбурів дуба червоного та ясена звичайного / Ю. Й. Каганяк, Г. Г. Гриник, В. В. Лавний // Науковий вісник УкрДЛТУ. – 2002. – Вип. 12.2. – С. 65-68.
6. Колишніх М. Д. Деревинознавство і лісове товарознавство: [підручник] / М. Д. Колишніх, А. Ф. Горбенко та ін. – Мінськ : Вища школа, 1989. – 279 с.

7. Лавний В. В. Особливості формування ясеневих насаджень Західного Лісостепу України : дис. ... канд. с.-г. наук: 06.03.03 / Лавний В. В. – Львів, 2000. – 176 с.

8. Лакида І. П. Оновлені моделі та таблиці сум площ поперечних перерізів і запасів повних ясеневих деревостанів / Лакида І. П. // Науковий вісник НЛТУ України. – 2014. – Вип. 24.11. – С. 50-54.

9. Матейко І. М. Моделювання параметрів крони дерев у насадженнях ясеня звичайного в умовах Правобережного Лісостепу України / Матейко І. М. // Науковий вісник НЛТУ України. – 2013. – Вип. 23.2. – С. 77-83.

10. Мацях І. П. Всихання ясеня звичайного (*Fraxinus excelsior* L.) на заході України / Мацях І. П., Крамарець В. О. // Науковий вісник НЛТУ України. – 2014. – Вип. 24.7. – С. 67-74.

11. Нейко І. С. Особливості формування свіжих кленово-липових та липово-ясеневих дібров Слобожанського лісотипологічного району / Нейко І. С. // Науковий вісник НЛТУ України. – 2007. – Вип. 17.2. – С. 17-22.

12. Ратушняк Г. С. Інтенсифікація виробництва біогазу як альтернативного джерела енергії [Електронний ресурс] / Г. С. Ратушняк, К. В. Анохіна // Збірник наукових статей “III-го Всеукраїнського з’їзду екологів з міжнародною участю”. – Вінниця, 2011. – Том.1. – С.239–241. – Режим доступу <http://eco.com.ua/>

13. Сопушинський І. М. Біоекологічні та біометричні особливості ясеня звичайного (*Fraxinus excelsior* L.) із хвилясто-завилькуватою деревиною / Ї. М. Сопушинський // Науковий вісник НЛТУ України. – 2012. – Вип. 22.8. – С. 13-19.

14. Goychuk A. F. Etiology of common ash diseases in Podolia, Ukraine / A. F. Goychuk, I. M. Kulbanska // Науковий вісник НЛТУ України. – 2014. – Вип. 24.11. – С. 15-20.

С ухудшением санитарного состояния ясеневых древостоев происходит существенное снижение доли деловой древесины, а также увеличение доли дровяной древесины. Уменьшение относительной полноты приводит к значительной дифференциации деревьев по высоте, следствием чего есть формирование второго яруса, который существенно снижает товарность древостоя. При уменьшении относительной полноты значительное количество деревьев подроста граба обыкновенного переходят во второй ярус, что приводит к уменьшению доли главной породы в запасе. Для предотвращения таких явлений необходимо осуществлять мониторинговые исследования санитарного состояния ясеневых древостоев, осуществлять уход в соответствии с принятыми правилами и не допускать снижения относительной полноты ниже 0,70-0,75. С целью эффективного использования древесных ресурсов отходы деловой древесины, ликвид с кроны и сучки целесообразно использовать в качестве сырья для изготовления древесных пеллет, что в целом может улучшить экологическую, экономическую и социальную ситуацию в регионе.

**Ясень обыкновенный, товарная структура, Подольская
возвышенность, пеллеты**

ENVIRONMENTAL ANALYSIS OF TOPSOIL IN THE GLOBAL CONTAMINATION OF UNAUTHORIZED DUMPS

***O. I. Naumovska, Candidate of Agricultural Sciences
National Agriculture University of Ukraine***

The condition of the soil agroecosystem adjacent territories to the unauthorized disposal units. It was found that the content of heavy metals, according to the boundary permissible concentrations, there is no excess for their content. The changes in the morphological and genetic structure of the genetic horizons, indicating a change in the natural processes of biological purification of humus accumulation and soil ecosystems.

Soil pollution, heavy metal content, changing morphological and genetic traits.

Environmental monitoring in global pollution, which is the object of observation objects of environment in general and the soil, in particular, performed to detect the presence or potential sources of chemical contamination. The organization provides local monitoring preliminary survey of land in the vicinity of sources of harmful actions on them to determine the area and the nature and sources of chemical contamination.

When unauthorized landfills understand spontaneously formed because of ill-conceived formation of human waste from an area less than 0.5 hectares for the power deposits of more than 1 m [1, 5].

Because unauthorized dumps formed spontaneously, without any justification, completely absent of engineering and environmental study on the level of negative impact on the surrounding area. During the unauthorized storage of household waste are not implemented measures to reduce anthropogenic load is not any control morphological composition of waste are exported, which does not preclude the receipt of medical, toxic and other debris. The presence in the composition of landfill of organic waste consisting of solid wastes leads to the formation of sources of reproduction of rodents, insects and can cause aggravation of the epidemiological situation.

Municipal solid waste decomposing in landfills due to a special combination of chemical, physical and biological processes. As a result, the formation of solid, liquid and gaseous substances and secondary materials. Thus, the products of decomposition of paper and food waste is organic acid, phenol, aldehydes, ammonia, nitrite and others. The gaseous products of decomposition are carbon dioxide, methane, hydrogen sulfide,

volatile organic acids. Metals entering the environment mainly in the form of calcium sulfate and magnesium bicarbonates of calcium, magnesium and iron, oxides of zinc, tin, copper, organometallic compounds. Glass, rubber, plastics are relatively inert in the first period of their decomposition [2, 4, 7].

Periods of decomposition components of household waste by type [6]

1. Paper - from several months to several years, depending on the quality, collapsing to organic compounds. Coated and colored paper decomposes longer than the other.

2. Glass - several millennia, collapsing to a state of sand.

3. Waste canning industry (tin cans) - from 10 to 30 years, depending on quality. Surface iron cans slows down the process of decay, collapse to iron compounds.

4. Plastic bottles - 400 years., As part of the allocation of products containing urethane, phenol, formaldehyde, styrene and others.

5. Plastic packing bags of 50 years.

6. Shoes made of genuine leather - from 25 to 40 years.

7. Batteries - containing a part of heavy metals - zinc, manganese, copper, cadmium, mercury - 110 years.

During the local monitoring carried out measurement of many parameters, the presence of each of which indicates a certain phenomenon, namely the chlorides present in excess household and industrial waste and does not accumulate soil. Ammonia and other forms of nitrogen, especially nitrates are always indicators of pollution by sewage, fertilizers, nitrogen-containing aerosols, plastics and medicines. Nitrates are very mobile and always thoroughly studied. The content of ammonia may also indicate the onset of anaerobic phase. Nitrite is an indicator of active biological activity. Sodium, basic alkali metal remains in solution and is not subject to dispersion. Sodium gets a lot of landfills in the form of salts, which are sources of industrial and domestic waste (paper, soap, food remains). Sulfates are the most common sulfur compounds in landfills. They are very mobile and useful for analysis, such as motion filtrate. They turn to sulphides, which respond well to metals. Potassium explore because it is important for the life of plants and animals. Also, the content of oxygen consumption is correlated with organic matter during decomposition of waste, because it is a component of organic matter plant. Magnesium appears on the Landfill Waste presence in cosmetics, cement and textiles. Copper is sometimes measured in sanitary purposes, but it is not very mobile in the soil and it is not given much attention in monitoring. Lead released from the battery, photographs, drawings and old lead pipes. He checked with toxic and sanitary purposes. By the selection of lead from waste lead acid filtrate. Zinc is released from batteries, fluorescent lamps and fast ice. Iron released as a result of corrosion and may be present in the upper layers of the soil. Sometimes in the early stages of the monitoring revealed that the landfill waste and hazardous waste imported to identify what needs to be done measurement of these parameters annually. If

hazardous waste will not be found, then the later stages of monitoring measurement of these parameters can be stopped. [1]

According to scientists publications [4, 6, 7] morphological features of soil material at landfill sites unauthorized quite heterogeneous in size and depth. The depth of the visual structure of the genetic horizons abuse ranges from 6-50 cm in the case of forming dumps on undisturbed soil surface to 190-200 cm in cases where the landfill was formed on the surface appeared earlier than man-made deposits. Under the influence of unauthorized dumps the soil goes into anthropogenically-altered state, in some cases - slightly disturbed or getting signs of radical change in the presence of a layer consisting exclusively of decomposed food waste products.

The aim - to establish the influence decomposition products formed illegally dump on the state of soil adjacent agro-ecosystems.

Materials and methods of research. In the farmland VP NUBiP Ukraine "Agronomic Research Station" Kyiv region is unauthorized landfill, which is located along the ground field road on the outskirts of the village and surrounded on both sides by production of agricultural crops.

Unauthorized landfill is located 10 meters from the forest belt and reclamation of the stream, the rate of the distance between them at least 50 m and 10 - 15 m of agricultural land at a rate of - 0.5 km [3]. Under normal position taken basic design of solid waste, since the existence of illegal dumps are in violation of environmental regulations.

Results. As of the third quarter of 2013 was established the following dimensions nesankionovanoho landfill: width - 8 m, length - 118 m, height - 1 m, that volume is 944.0 m³, and in the third quarter of 2013 was studied landfill following options width - 11 m, length - 161 m., height - 1.5 m, so the volume is 2,656.5 m³. The intensity of accumulation of household waste per year thus is 1712.5 m³. Weather accumulation of debris on 5 and 10 years is under 8562.0 and 17125.0 m³. Such intensity accumulation of debris can lead not only to an increase in territory occupied during an unauthorized landfill withdrawal from agricultural use large areas of land, but also the growing problem of pollution of the environment - water ecosystems and soil.

The structure dominates the solid waste plastic and glass. This can be explained by the fact that over the last decade marked increase in the volume of plastic packaging products, with, rural population during this time is not increased.

As of the third quarter of 2014 was established morphological composition unauthorized landfill waste, located on lands of the village. hours of use (Table 1). Compared to last year in the morphological composition largest percentage up again, glass and plastic, less than 10% are organic textiles and paper.

1. Морфологічний склад несанкціонованого сміттєзвалища 2013-2014 рр.

Компонент	Вміст, %			
	III кв. 2012 р.	III кв. 2013 р	IV кв. 2013 р.	Різниця вмісту компонентів, %
Пластик	55	63	68	+ 13
Скло	20	23	25	+ 5
Текстиль, гума, шкіра	9	7	4,5	- 4,5
Папір	1	1,5	1	0
Органіка	10	3	1	- 9
Інше	5	2,5	0,5	- 4,5

Порівнявши отримані дані можна зробити висновок, що кількість пластикових відходів збільшилася на 13 %, скла – на 5 %. Збільшилася і довжина сміттєзвалища на 43 м. В результаті проведених досліджень було встановлено, що сміттєзвалище періодично підпалюється, внаслідок чого у повітря виділяються продукти згоряння пластику та гуми, такі як сполуки свинцю, ртуті та інших важких металів, канцерогенні речовини, канцерогенна сажа і окиси сірки, що викликають респіраторні захворювання, особливо у мешканців села, на території якого знаходиться сміттєзвалище.

Зразки ґрунту прилеглої території до несанкціонованого сміттєзвалища було проаналізовано на вміст важких металів. Встановлено, що вміст основних важких металів не перевищує чинних ГДК. Це свідчить про те, що ґрунтова екосистема здатна «переробити» ту кількість забруднюючих сполук, які надходять. На момент проведення досліджень вміст важких металів на сміттєзвалищі не перевищував ГДК, проте якщо не буде здійснено ніяких заходів щодо ліквідації джерел забруднення, то це може призвести до порушень в структурі комплексу ґрунтових мікроорганізмів, пригнічення їх біохімічної діяльності, інгібування активності цілого ряду ферментів.

2. The impact of the natural placement of landfill as anthropogenic factors on change morphological characteristics typical soil profile humus carbonate lehkosuhlynkovoho on loess loam

morphological features	Result influence
The structure of the genetic horizon	The weak development in transition horizons and lack of humus in the upper layer components biogenic structures (coprolites), broken form pores, cracks units Clotted structure (control section - hrudochkuvato-grained)

The density of drafting	The upper horizon - slightly compacted, the lower transition - sealed. The difference with undisturbed soil No
Humidity	The upper horizon humidified, lower (Npk, NRk) - wet. In terms of genetic horizons of undisturbed soil - wetted state of genetic horizons, since the transition to breed Phk - from wet to wet
Organic residues	The presence of half-decayed wood waste, plant residues - with severe zhylyastoyu structure (slow process of decomposition of crop residues). Compared with control cut - crop residues are well laid out. Single mesofauna including excrement, the presence of inclusions vuhlepodibnyh
Inclusion	The presence of anthropogenic inclusions tumors gypsum and lime in the surface horizons that are not inherent to undisturbed soils

Established that the natural placement of rubbish had an impact on change morphological characteristics of the soil profile (Table. 2). The presence of plant residues of low decay and well-preserved zhylyastoyu structure, and poor development of biogenic structures suggests suppression mesofauna soil. Slow intensity of humification of plant residues forming indirectly reflects unfavorable environmental conditions for soil organisms. Violated form aggregates, pores and cracks indicates a slow process structure. However, in such soils ecological barrier function provides humic substances, minerals and carbonates of montmorylonitovoyi (boiling with top genetic horizon).

Environmental problem is the fact that the area is bordered by unauthorized dump areas capable of providing the high level of performance and serve as biomass for sanitary and sorption geochemical barrier. The destruction of soil threatens these functions.

Conclusions

1. Production and consumption of their savings in a source of significant environmental hazards and social tensions, creating a negative image of the settlement, endangering the possibility of obtaining a full ecological safety of agricultural products and others.

2. Characteristic of all districts have a large number of illegal dumps. Unauthorized dumps pose a serious environmental hazard, since there is the possibility of removal of pollutants directly into water bodies, particularly with the melt, and storm water. Optimal conditions for placing landfill disposal in the Kyiv region can be considered the following geomorphological units:

- tectonically stable crustal blocks or blocks with a tendency to a slight raising or lowering;
- blocks with low fracturing, "monolithic", with a minimum number of small lineaments (IV - V order);
- blocks of a predominance of flat terrain without deep valleys, elevation, poor development of modern geomorphological processes (or with little development processes of accumulation of sediments);

- blocks with conditions that provide a high degree of protection of groundwater - a large depth of the aquifer, reliable vodotryvy specific features of lithology aeration zone.

3. As a result of studies on the content of heavy metals exceeding stipulated by basic content of heavy metals. The changes in the morphological and genetic structure genetic horizons, indicating the change humusonakopychennya natural processes and biological treatment of the soil ecosystem.

Список літератури

1. Відходи виробництва і споживання та їх вплив на ґрунти і природні води: [Навчальний посібник] / За ред. В.К. Хільчевського. – К.: Видавничо-поліграфічний центр "Київський університет", 2007. – 152 с.

2. Мишустин Е. Н. Ассоциации почвенных микроорганизмов / Е. Н. Мишустин. – М.: Наука. – 1975.

3. Назимко В. В. Ґрунтознавство. [Навчальний посібник для студентів екологічних спеціальностей] / В. В. Назимко, В. К. Костенко, О. І. Назимко, В. В. Колеснікова. – Донецьк, 2008. – 197 с.

4. Хомич В. А. Экология городской среды: [Учеб. пособие для ВУЗов] / А. В. Хомич. – Омск: Изд-во СибАДИ, 2002. – 267с.

5. Косарова Л. Ф. Экологическая безопасность хозяйственной деятельности / Л. Ф. Комарова [и др.] Под общ. ред. Л. Ф. Комаровой. // Алт. гос. техн. ун-т им. И. И. Ползунова. – Барнаул: Изд-во АлтГТУ, 2009. – 226 с.

6. Некоторые факты о мусоре [Электронный ресурс]. – Режим доступа: <http://climbinduk.org/node/256>:.

7. Дрейер А. А. Твердые промышленные и бытовые отходы, их свойства и переработка [Электронный ресурс] / А. А. Дрейер, А. Н. Сачков, К. С. Никольский, Ю. И. Маринин, А. В. Миронов // – Режим доступа: <http://www.ecoline.ru/mc/waste/solidw/index.html>.

Проанализировано состояние почвы агроэкосистемы, прилегающих территорий к несанкционированным мусоросборникам. Установлено, что по содержанию тяжелых металлов, в соответствии к гранично-допустимым концентрациям, отсутствует их превышение. Выявлены изменения в морфолого-генетическом строении генетических горизонтов, что свидетельствует об изменении природных процессов почвообразования и биологическом очищении почвенной экосистемы.

Почва, загрязнение, содержание тяжелых металлов, изменение морфолого-генетических признаков.

**CURRENT TRAINING SPECIALISTS ENVIRONMENTAL
DIRECTION BASED ON THE CONCEPT OF SUSTAINABLE
DEVELOPMENT**

***NIKOLAENKO S.M., Doctor of Education, Professor
DOLIA M.M., doctor of agricultural sciences, professor,
RIBALCO U.V., Candidate of Science, docent
National Agriculture University of Ukraine***

There are represented the basic principles of content and form of education for the training of specialists for sustainable development of agriculture, according to the specialities of the faculty - plant protection and quarantine, biotechnology and ecology.

Sustainable development, BSC, MSC, ecology, plant protection, biotechnology, plant quarantine

In modern conditions for agricultural development urgent priorities of environmental policy is the training of highly qualified personnel professionally capable of adaptation and self-realization in terms of greening agriculture. Thus one of the objectives of national environmental policy in education is to improve information management system highly on sustainable development, namely implementation in the educational process eco-educational and educational research-based programs of environmental and economic security of Ukraine.

The overall concept of sustainable development is considered to maintain the balance to meet the contemporary needs of society and protect the interests of future generations, given their need for a safe environment. That concept and National Education Development Doctrine of Ukraine stipulates that teaching and learning activities of educational institutions forms a system of priority values, including the key role given to the relationship between man and nature. [1]

According to the Concept of Education for Sustainable Development and the UN "Education for Sustainable Development" educational institutions recommended to promote training programs in basic principles of transition to sustainable human development, which involves the formation of social abilities to lead a life based on the latest knowledge and skills to sustainability.

The current study the nature of environmental education and culture are presented in the works of G. Bilyavskaya, E. Zhelibo, A. R., G. Pustovit S. Stepanenko, V. Nekosa T. Safranov V. Sobchik,

Vladimir Bogolyubov and others. This problem of formation of competence in the context of interaction with the environment studied by scientists L. Vygotsky, S. Deryabo D. Elkonin, A. Leontyevoyu,

B. Madzihon, S. Rubinstein, A. Sydelnikovskym, John. Butler et al.

Urgent is the issue of quality of education, especially practical knowledge of protection, plant quarantine, biotechnology and ecology.

The purpose of the study is the theoretical rationale for training specialists focus on environmental principles of sustainable development.

To realize the objectives of the study were used the following methods: analysis and synthesis, which allowed to explore the philosophical, psychological and pedagogical scientific literature, compare and summarize the experience of higher education, teaching documents on the Development experts environmental focus.

Results and discussion. The changes taking place in the social development of Ukraine's agricultural sector require the formation of ideology of modern humans through close interaction with nature. Therefore, sustainable development is a significant tool in the formation of ecological consciousness of humanity, based on a systems approach and modern innovative resource saving technologies that enable evidence-based model and predict the areas of quality and choose the best environmental and economic development of agriculture [7].

If we consider the three elements of sustainable development, we can conclude that the mechanisms of interaction between economic, environmental and social components is quite important to produce informed of new challenges faced by specialists from different areas of training. However, this requires a high level of training and the adoption of ecologically-based, professional environmental and phytosanitary oriented, informed decisions.

Therefore, the department of plant protection, biotechnology and ecology NUBiP Ukraine organizing continuous and holistic educational, scientific and educational process of training for the environmental field is subject to regulatory and regulatory documents, the main of which is the study of fundamental disciplines for new features training of future professionals. The basis of preparation is the industry standards of higher education qualification levels "Bachelor" in "Plant Protection", "Biotechnology", "Ecology, Environmental Protection and Sustainable Use of Natural Resources" and "Master" in the field "Plant protection" "Quarantine of plants", "environmental biotechnology and Bioenergy", "Ecology and environment", "environmental control and audit." The main objective of the faculty is to train highly qualified specialists in protection and plant quarantine, biotechnology, sustainable environmental management and environmental control for ecosafety activities in the agricultural and environmental industries with the acquisition of practical knowledge in the farms of all types of property [2].

The main goal of the faculty of plant protection, biotechnology and the environment is the organization of educational process on the basis of modern information technology training opportunities NUBiP, Ukrainian and foreign universities. The main landmark - highly professional specialists both in the classroom and self-study. Creating conditions for mobility and adapting to current market requirements, continuous updating of scientific knowledge concerning the monitoring of the environment and society ecosafety socioeconomic development of regions, the use of modern Ecobiotechnologies, development and application of integrated plant protection system, environmental management of high environmental and phytosanitary safety of production raw materials and agribusiness.

Within step involved training students to actively participate in scientific research projects and faculty associated with the study of contemporary issues, including: resource saving technologies, forming safe for human health commodity areas, improvement of methods and systems of environmental management and biosafety in agriculture; quality and timely environmental labeling of agricultural products and raw materials; development of local molecular genetic diagnostic systems for the detection of latent viruses, identification of genetically modified organisms; technology development microclonal reproduction of agricultural, industrial and ornamental crops biotechnological methods and DNA certification of varieties and hybrids of plants; environmental study of traditional agriculture in terms of biological and land use; ecotoxicological hazard assessment nanopreparativ new species to prevent their negative impact on biological objects of natural ecosystems and others. [3, 4, 5, 6].

Master training is carried out both on the production, "Environmental control in the agricultural domain, monitoring, certification and expertise", "Ecology and protection of water resources agrosphere", "Environmental control and audit", "Modern environmental biotechnology in the agricultural domain" ("Environmental Biotechnology", " biomonitoring and management of reclaimed land, "" The biological protection of agroecosystems "), " Fitomedytsyna ", " Phytosanitary monitoring and forecast, "" Quarantine of plants ", " Methods Entomological control in plant and wildlife "and research spramuvannyam" System analysis environmental quality and environmental safety "(" environmental management and policies ", " Sotsioekolohichna expertise and sustainable development of agricultural areas ", " man-caused environmental and radiation safety ", " Hydroecology and systematic analysis of aquatic ecosystems "), " Innovative biotechnology Ecobiotechnology and bioenergetics' ("Alternative energy", "Biosafety and bioethics"), "Management agrocenoses largest insects in the crop," "Biological control study obligate and facultative plant pathogens"; including research specialization (with the EU), "Teaching about the environment" ("The quality of the environment and System Analysis" (with the options chosen by the student - "The quality of the soil and systematic analysis of terrestrial ecosystems," "Water quality and

systematic analysis of aquatic ecosystems", "Air Quality and systematic analysis of anthropogenic climate change ") Environmental management and policy ", " ecosafety technologies ", " Environment and GIS geosphere (the study of GIS) ").

The general concept of training highly qualified specialists of environmental direction is realized through continuous, integrated programs as the basic and specific areas, including governance, including adapted to the level of the best world analogues, joint or concurrent training partner universities by combining training and a research centers or international university consortia. This allows you to gain special skills to complete higher education NUBiP Ukraine.

During preparation of experts in protection and plant quarantine, biotechnology, sustainable environmental management and environmental control for ecosafety activities in the agricultural and environmental sectors into account scientific and manufacturing capabilities of scientific institutions of Ukraine: environmental awareness and providing general environmental component of professional training of all stakeholders; reflected in the learning process of social and ecological order for sustainable development; an enabling environment the integration of education, science, innovation, information academic training; formation of competencies for graduates to develop concepts, strategies, plans and programs of socio-economic and ecologically sustainable development and environmental management to optimize the quality of life and the environment through ecologically-oriented management decisions by improving the quality of education and research; mechanisms for ensuring the effectiveness of environmental policy and management at the global, national, regional and local levels [3, 4, 5, 6].

Experts in protection and plant quarantine, biotechnology, sustainable environmental management and environmental control for ecosafety activities in the agricultural and environmental industries are unique, because they are able to carry out a systematic analysis of the quality of the environment as a whole in terms of the object studied in ecosystems different types of build scripts representation of ecosystems and their components research methods, such as description, explanation, interpretation, modeling, forecasting, warning, design, construction of basic and applied studies.

Of jobs graduates are high-tech modern agricultural enterprises of different ownership forms, namely of "Ahrohimservis"; SE "Agroresurs" signature agricultural firm "Hermes", CJSC software "Ahrorehion", LLC "Druzhba-Nova», Kraft Foods Ukraine, CJSC "Trans Oil", LLC "Avangard" Corporation "Skvyrka", LLC "Karapyshi", JSC Software "Ahrorehion", JSC "Mirgorod plant of foodstuffs" Kalinka ", International ecological charity Fund" AQUA-VITAE "of" Swede "SPE" Eco-Dnepr "SE" Ukrainian research and training center of standardization, certification and quality ", CJSC" SVS Dnipro "NPP" Bio-test Labs ", CJSC" Environmental security firm

KREOMA-FARM "JV" Iceberg Ltd "LLC" Tavria-Agro Capital "RISE Agroservice, Ecotechnology Agro KB Ltd., Creative union "green studio" GMP "Eco-Ukraine" UkrTechnoPhos, AGRO Trydenti Agency for rational energy use and ecology "Eco Arena" and others.

Conclusions. Education of plant protection, biotechnology and the environment is one of the most important factors for sustainable and highly efficient development of the society meet current and future needs of humanity, solving economic, social, environmental, phytosanitary and other problems. Acquisition of high knowledge and skills in the field at this faculty NUBiP Ukraine is the foundation of sustainable (balanced) economic and social development of Ukraine.

Список літератури

1. Боголюбов В. М. Стратегія сталого розвитку: [навч. посіб] / В. М. Боголюбов, В. А. Прилипко. – Херсон : Олді-плюс, 2009. – 322 с.
2. Закон України «Про вищу освіту» [Електронний курс]. – Режим доступу: <http://zakon3.rada.gov.ua/laws/show/2984-14>.
3. ГСВО зі спеціальності «Захист рослин», 2013 р.
4. ГСВО зі спеціальності «Екологія та охорона навколишнього середовища», 2012 р.
5. ГСВО зі спеціальності «Екологічний контроль та аудит», 2013 р.
6. ГСВО з напрямку «Біотехнологія», 2012 р.
7. Рибалко Ю. В. Значення природоохоронної спадщини у формуванні екологічної свідомості людства / Ю. В. Рибалко // Духовність особистості: методологія, теорія і практика. – 2012. – № 1 Ч. 43. – С. 132-147.

Представлены основные принципы содержания и формы образования по подготовке специалистов для устойчивого развития сельского хозяйства по специальности факультета - защита и карантин растений, биотехнология и экология.

Устойчивое развитие, бакалавр, магистр, экология, защита растений, биотехнология, карантин растений

STATE AND DEVELOPMENT OF ORGANIC PRODUCTION IN UKRAINE

**V. L. NOSKO, Candidate of Agricultural Sciences
VP NUBiP Ukraine "Berezhany Agrotechnical Institute»**

Intensification of agriculture that has been going on in Ukraine, has a negative impact not only on the environment but also depletes natural resources, without which agricultural production impossible. Organic production provides a real benefit to the environment and human health. Domestic consumers seeking to improve the quality of consumption of vegetable products.

Red beet, planting dates, varieties, crop yields, organic vegetable production

Agricultural production in general and horticulture in particular, based on the use of high doses of mineral fertilizers in the cultivation of agricultural products. Along with the positive effects of this process there are a number of negative factors that affect the environment and human health. There is soil degradation, pollution of pesticides, agrochemicals, heavy metal salts, leading to disruption of the ecological balance of agroecosystems and quality of agricultural products. An alternative to unreasonable and harmful to all living things agricultural chemicals are organic production, in terms of technological, economic and environmental development, providing ecologically safe food.

Among the most famous studies on the status and development of organic growing products in Ukraine, we should note the works of local scientists as Alexander Barabash., N. Berlach, W. Wolf, B. Garmashov, Z. Sych, P. Stetsyshyn M. Kobets etc.

The purpose of research - determine the state of organic production in Ukraine and in the world, its development, the study of the major problems hindering the development of the organic market and develop ways to overcome them. Proposed elements of cultivation technology beet depending on sowing time in terms of organic production.

Material and methods of research. The research is the status and development of organic production in Ukraine, legal documents from organic production. During the research field and used computational methods, statistical data management Ukraine.

Results. The sector of Ukraine's economy, including agriculture, food processing industry, ensure food security and food independence, generates 17% of GDP. However, over the past decade, Ukraine has seen

a catastrophic destruction of farmland and reduce soil fertility - the main source of food security and welfare. Intensity of the destruction and degradation of soils due to the use of outdated technologies of agricultural crops, violations of basic laws and rules agricultural farming activities reached dangerous for economic stability of the state, about 60% of the country's land is subject to erosion. Every year the number of eroded land increases by 80-90 thousand. Hectares are lost each year due to erosion around 11 mln. Tons of humus, 0.5 mln. Tons of nitrogen, 0.4 mln. Tons of phosphorus and 0.7 mln. Tons of potassium; 38% of arable land in the country is crowded. In recent years, rapidly growing areas of acid soils [4].

Most agricultural production Ukraine is unprofitable, and many agricultural products and foodstuffs produced do not meet international standards of quality and safety, which reduces export potential, high levels of morbidity and mortality. At the same time in Europe rapidly spreading organic production - integrated system management and food production that combines best practices with regard to environmental protection, the level of biodiversity, preservation of natural resources, application of high standards of production that meet the quality requirements for products food (Fig. 1).

Given the potential of agriculture in our state, there is an urgent need for many years of experience of the European countries to environmentally, socially and economically viable agricultural activities directly as organic farming and its implementation in our country. Organic production is developing in Ukraine in 1997, primarily due to demand from the EU traders and processors of organic grains, oilseeds, leguminous crops and wild plants. In 2007, the situation began to change slightly - in the domestic market expanded range of organic products: there were organic bread, milk, sausage, fruit, vegetables, juices, beverages, syrups, jams, honey and cereals. The positive trend of the domestic consumer market for organic products in Ukraine, according to studies Federation of Organic Movement of Ukraine has the following figures: in 2008 - 500 thousand. Euros in 2009 - 600 thousand. Euros in 2010 - 1.2 million. euros in 2011 - 2.4 mln. euros in 2012 - 5.1 mln. euros in 2013 - 7.9 mln. euros, and in 2014 - 12.2 mln. euros. The annual growth of the domestic market for organic products is 60-100% level. At the beginning of 2014 in Ukraine had about 164 certified organic farms, which process more than 280 thousand. Hectares of agricultural land and more than 300 farms that are not certified, but produce high quality organic produce and process more than 400 thousand. Hectares of farmland. Most households can not obtain a certificate through its high cost (within 5500 UAH. Per year).

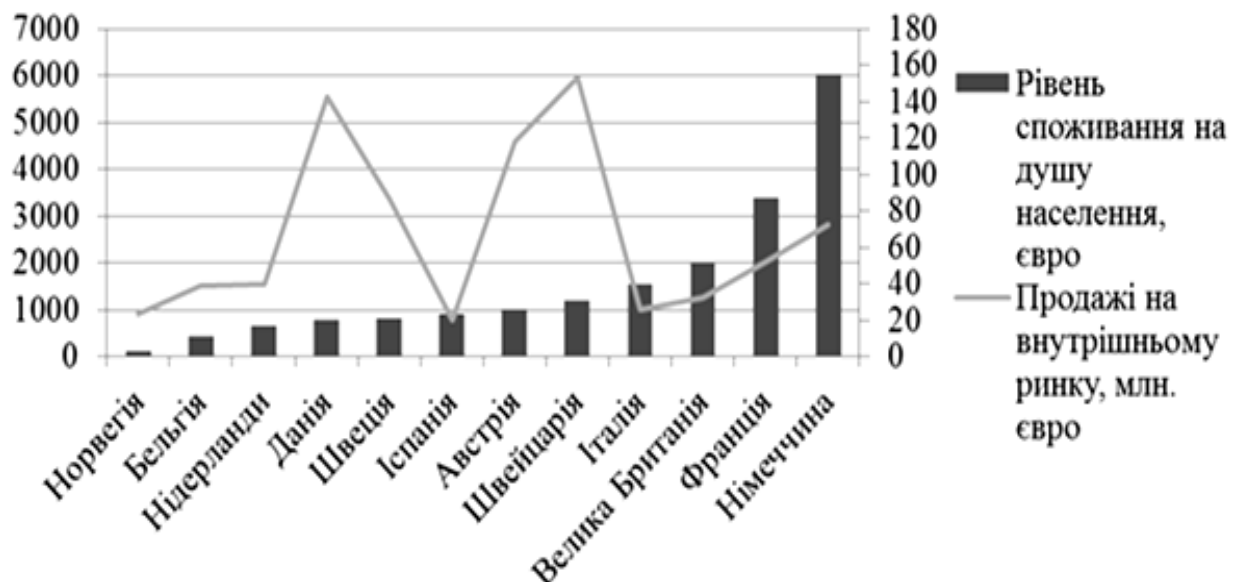


Рис. 1. European countries with the largest share of the organic market and the level of per capita consumption in 2014

Due to lack of raw materials and lack of competition organic products are sold to the highest bidder, which is one of the main factors of low consumption of organic products [5]. But after increasing the number of organic production and expanding the range of organic products normal price will be no higher than 10-20% in the same traditional. Today, state support for the organic sector declared only a few regulations, the main ones are: Law of Ukraine "On the production and turnover of organic agricultural products and raw materials" [5] and the State target program of development of the Ukrainian village for the period until 2020. The State target program of rural development for the period till 2020 the task to bring the volume share of organic products in the total volume of gross agricultural output to 10%, and this document provides incentives for organic agriculture.

The Law of Ukraine "On the production and turnover of organic agricultural products and raw materials" legal basis for the full and effective development of organic production. The provisions of the Act came into force on January 9, 2014, and the entities that label their products as organic, must bring their activities into compliance with this law within six months. Experts organic sector expressed the hope that the adoption of the law in the state observed activation and recovery of the organic sector and, not least, unemozhlyvytsya existence of the phenomenon of "pseudo-organic." But despite the existing problems, we are convinced that Ukraine needs to grow organic produce.

Technology of organic products are environmentally safe. It is designed with natural factors of soil and allows lower cost of labor, fuel, fertilizer enter the expanded reproduction of soil fertility and have a higher vy-robnychyy and environmental impact.

Conclusions. Ukraine Food security depends on the quantity and quality of farmed products. To go global with cultivation of organic products

must encourage farmers and increase sales network of high-quality organic products.

Список літератури

1. Барабаш О. Ю. Біологічні особливості овочівництва: навчальний посібник. / О. Ю. Барабаш, Л. К. Тараненко, З. Д. Сич – К.: Арістей, 2005. – 348 с.
2. Доспехов Б. А. Методика полевого опыта (с основами статистической обработки результатов исследований): [учебник для студ. высш. уч. завед.] / Б. А. Доспехов // – Изд. 4-е, перераб и допол. – М., Агропромиздат, 2001. – 351 с.
3. Сич З. Д. Властивості коефіцієнтів стабільності ознак урожайності у динамічних рядах різної тривалості / З. Д. Сич // Сортовивчення та охорона прав на сорти рослин. – 2005. – № 2. – С. 5-20.
4. Стецишин П. О. Основи органічного виробництва: [навчальний посібник] / П. О. Стецишин // – Вінниця: Нова книга, 2008. – 528 с.
5. Закон України "Про виробництво та обіг органічної сільськогосподарської продукції та сировини" [Електронний ресурс]. – Режим доступу: <http://zakon4.rada.gov.ua/laws/show/425-18>.

Интенсификация сельского хозяйства имеет негативное влияние не только на окружающую среду, но и истощает природные ресурсы, без которых ведение сельскохозяйственного производства невозможно. Органическое производство имеет преимущество для окружающей среды и здоровья людей.

Свекла столовая, сроки посева, сорта, урожайность, органическое производство овощей

PERSPECTIVE OF ENERGY CROPS IN UKRAINE

©**NOSKO V. L., Candidate of Agricultural Sciences,
BOYKO I. E., Senior Lecturer,
KAMYSHANOV V. V., Senior Lecturer,
LESHUK U. I., assistant**

VP NUBiP Ukraine "Berezhany Agrotechnical Institute»

Ukraine's integration into the global economic space based on completeness of traditional energy resources requires new approaches to the formation and implementation of organizational - economic basis of the energy sectors of the national economy. In modern terms, this problem is relevant because energy development closely related with the increased competitiveness of the national economy.

Energy culture, energy carriers, willow, miscanthus , sorghum

In recent years, rising energy prices have a negative impact not only on Ukraine's economy, environment, welfare of citizens, but also the dependence on imported energy. It is a prerequisite that Ukraine is forced to look for alternative sources of energy [1,5,7].

An important task of scientists and farmers is the development and optimization of production technologies, energy and economic substantiation processes depending on soil and climatic conditions [1.7].

World experience renewables described in the works of MV Royik, JB Blum, G. Geletukha, IP Hryhoryuka, YB Matveev, AA Dolinsky and others. Powerful potential in energy supply agriculture in favor of Ukraine and Europe [1, 2].

Today, the European Union 13,2mln. hectares of land available for cultivation enerhokultur; 2020. this figure could grow to 20,5mln. ha and 2030. - To 26,2mln. ha [7]. According to the Commission, under energy crops should use about 10% of the used agricultural land. Almost all European energy programs include increasing the share of renewable energy sources [1, 5, 7].

In Ukraine, fundamental research on the prospects of energy crops as a fuel started only a few years ago, according to the target program of research NAS Ukraine "Biomass as a fuel" ("Bio"), adopted by the Presidium of the National Academy of Sciences of Ukraine number 220 30.03.11r [1, 7]. Among professional publications with national scientists selected topics available labor, which contain very contradictory research results. The vast majority of information on energy crops - scientific and

popular posts on the Internet (often without attribution) designed for the average user who is not an expert in agriculture that are not quoted professional publications and often repetitive. [7]

The purpose of research analysis of the current state of energy crops in Ukraine and Europe. To achieve this goal envisaged the following tasks:

- Selection of the most promising energy crops that are suitable for growing in Ukraine;
- Research energy potential and the energy value of selected crops;
- Generalization of foreign experience in the use of energy crops and testing them to present conditions in Ukraine.

Material and methods research. The study was conducted at three energy crops (willow, miscanthus, sorghum) that are suitable for growing in the soil and climatic conditions of Ukraine. During the research field and used computational methods, statistical data management Ukraine.

Results and discussion. Energy crops - a plant that is grown specifically for use as fuel or to produce biofuels. Ukraine has conducted extensive research work on energy crops. A large contribution to this line of work brings Institute of bioenergy crops and sugar beet NAAS of Ukraine, National Agriculture University of Ukraine, Berezhan Agrotechnical Institute and other scientific institutions of Ukraine.

To date, more than 20 species studied fast-growing energy crops that are appropriate for growing biomass. By energy crops are fast growing trees of different species of willow and poplar, annual and perennial grasses, such as sorghum, sugar cane, miscanthus, amaranth, spiky bitterling, Sakhalin knotweed, mallow Pennsylvania, rumecks, millet Lozova hybrid tobacco. By energy crops include algae Chlorella, Dunaliella, batriokokus and others. [1, 4, 5, 7].

In Ukraine there are about 3,5mln. hectares of land removed from rotation because of their low fertility, susceptibility to erosion, etc. [1, 7]. Cultivation of fast-growing high-yielding energy crops on these lands preserve soil erosion, increase capacity humus layer and in general improve the environmental and energy situation in the country. In our opinion, the most energy efficient, there are three types of power plants, fast growing *Salix viminalis* (*Salix viminalis*), miscanthus (*Miscanthus*), sorghum (*Sorghum*) (Table 1).

1. Energy efficiency power machinery plants

Kind	Yield, t / ha / year	Calorific value, KJ / dry t	Power output, GJ / ha / year
Верба прутувидна (<i>Salix viminalis</i>)	30	16	480
Мискантус (<i>Miscanthus</i>)	20	18	360
Сорго (<i>Sorghum</i>)	25	18	450

Among woody plants, willow is now used worldwide as the main energy crops. For its cultivation in Ukraine created highly plantations with a long service life. Culture is characterized by high rate of increase in length of 3-5 cm per day, an average of 1.5 m per year. Planting willow remain productive 20-30 years, and the yield is 30 tonnes / ha of dry mass per year. A positive feature of the willow is resistant to frost, pests and pathogens. It can grow on soils of various types, on wetlands and unproductive lands. In addition, this culture can absorb from the soil in large quantities of heavy metals and radionuclides, leading to contaminated soil and improve the environment. The greatest experience in growing willow with countries such as Sweden, England, Ireland, Poland and Denmark. In Ukraine, despite the abundance of little use for commercial agricultural land, industrial plantations energy willow is still not enough [2, 3].

Ideal for growing on contaminated with pesticides and unproductive lands miscanthus (*Miscanthus*). Due to the high yield of dry biomass (20 t / ha), high calorific value (5 kW / h / kg or 18 MJ / kg), low natural moisture of the stems at harvest time (15%), miscanthus, compared to other crops, is the most effective plant for the production of biofuels. *Miscanthus* stems grow up to 4m and contain 65 - 75% cellulose, which makes it a high energy value. During the combustion of biomass is released less carbon dioxide than it was absorbed by plants in photosynthesis, so the use of biofuels miscanthus not contribute to the development of the greenhouse effect. In addition, growing miscanthus positive effect on soil fertility, because for four years, growing in soil collects 15-20 tons / ha rhizomes, equivalent to 7.10 t / ha of organic fertilizers [1, 5, 7].

Another promising energy crops are sorghum (*Sorghum*), which is adapted to growing in Ukraine. However, the introduction of this crop in agricultural production Ukraine is conducted very slowly, due to the lack of new highly efficient, resource-saving technologies of cultivation and processing. Broom, due to their biological characteristics, can in a short period to form a high potential of dry biomass (25 t / ha) [7].

The yield energy crops depends on the climate, soil and other conditions. Cultures have different needs in the water regime may differ by frost and drought (Table. 2).

2. Characteristics of energy crops to growing conditions

Energy Culture	Temperature °C		The need for water	Frost-resistance	drought
	seed Germination	Growth culture			
		min max			
Salix-viminalis	0	30	high	high	low

Fast-growing tree culture

Salix-viminalis

0

30

high

high

low

		Perennial culture				
miscanthus		10	30	average	average	average
		An annual herb culture				
Sorghum	12	10	40	average	low	high

Analyzing the data in the table can be argued that in terms of water needs these crops is demanding that Ukraine meets the climatic conditions. In terms of hardiness willow and miscanthus advisable to grow in soil-climatic zones of Polesie and forest-steppe, since these crops are frost. Sorghum is advisable to grow in the plains because the frost is low. Drought we have studied cultures depends on their biological characteristics, so it is advisable to place willow plantation enough to wet areas, and miscanthus and sorghum in areas unsuitable for agricultural commodity production. [7]

Despite the fairly active search for alternative energy sources, energy crops in Ukraine is very problematic. One of these problems - it lacks many of the classifier enerhokultur cultures. Today *Salix viminalis* included in the classifier as industrial crops, while miscanthus and sorghum absent there. This can create legal and other problems at some stage in the economic activity of producers of these crops. Another problem is that the manufacturer enerhokultur not considered "farmers" and has appropriate privileges (such as rent equipment) until it made its first gathering and selling their crop [5, 7].

In European countries since 2013, the current EU Common Agricultural Policy, which requires farmers who own more than 15 hectares of arable land, allocate at least 5% of areas relevant to environmental and energy needs. Lands this purpose include, for example, pure vapor, buffer strips and landscape elements, reforestation and others. These eco-directed lands, farmers are required to perennial energy crops grown without the use of pesticides and fertilizers. After preparing the Commission report on the subject in 2017, the proportion of land designated for environmental and energy needs, must increase to 7% [7].

Today in Ukraine there are several companies engaged in the cultivation of energy crops on a commercial level. A number of companies planning to soon enter this market. Increasing energy prices have a negative impact on Ukraine's economy, the environment, the welfare of citizens. That is, is the precondition that Ukraine is forced to look for alternative sources of energy. To this end, we plan to increase the area for energy crops. Areas under cultivation enerhokultur should increase from 130 thousand. Ha in 2020, 700 thousand. Ha in 2030 and in the future prove to 3.5 mln. Ha [5] (Table. 3).

3. The areas of land for energy crops in Ukraine in 2030

Energy Culture	The area under energy culture, thous. Ha.		
	2015 p	2020 p	2030 p
Верба (<i>Salix viminalis</i>)	1	50	250
Міскантус (<i>Miscanthus</i>)	1	30	200
Сорго (<i>Sorghum</i>)	2	50	250
Total	4	130	700

Analyzing the data table, you can draw conclusions about the advisability of energy crops and increasing the areas under them.

Conclusions. Exhaustiveness traditional energy sources and increasing cost of energy negatively affects the cost of agricultural and industrial production, which reduces its competitiveness on a global level. Therefore, the main task of the state is to ensure the efficient use of fuel and power bases and implementation of the diversification of sources and routes of energy supplies. One of the promising ways to address the issue of energy is renewable energy. To do this, we proposed the following:

- Update qualifier energy crops;
- Lands that are not used in s / d production, use for energy crops;
- Provide adequate funding from the state budget of Ukraine.

So, to address the issue of energy supply in the soil and climatic conditions of Ukraine, it is advisable to grow energy *Salix viminalis*, *miscanthus* and *sorghum*.

Список літератури

1. Блюм Я. Б. Новітні технології біоенергоконверсії. / Я. Б. Блюм, Г. Г. Гелету́ха, І. П. Григорюк та ін. // – К: «Аграр Медіа Груп», 2010. – 326 с.
2. Верба енергетична *Salix viminalis* sp. Матеріали компанії ТОВ «Аграрна Співдружність».
3. Івахів В. Енергетична верба як рішення для малих міст України [Електронний ресурс] / Івахів В. / – Режим доступу: <http://ua-energy.org/post/27476>.
4. Гументик М. Я. Атлас високопродуктивних біоенергетичних культур / Гументик М. Я. // Біоенергетика. – № 2. – 2013 р. – с. 6-7.
5. Гелету́ха Г. Г. Сучасний стан та перспективи розвитку біоенергетики в Україні. / Г. Г. Гелету́ха, Т. А. Железна, П. П. Кучерук, Є. М. Олійник // Аналітична записка БАУ №9. – 2014р. – с. 9 – 10.
6. Гелету́ха Г. Г. Перспективи використання відходів сільського господарства для виробництва енергії в Україні. / Г. Г. Гелету́ха, Т. А. Железна // Аналітична записка БАУ №7. – 2014р. –с. 12–16.

Интеграция Украины в мировое экономическое пространство с учетом исчерпаемости традиционных энергоносителей требует новых подходов к формированию и внедрению организационно - экономических основ энергетического развития отраслей национального хозяйства. В современных условиях эта проблема

актуальна, поскольку энергетическое развитие тесно связано с повышением конкурентоспособности национальной экономики.

Энергетические культуры, энергоноситель, ива, мискантус, сорго

EXIT FROM BIOGAS herb DEPENDING METHOD OF GRINDING

**V. M. PAVLISKYY, Doctor of Engineering,
I. V. FLONTS, Candidate of Technical Sciences
N. V. BARYLKO, specialist
VP NUBiP Ukraine "Berezhany Agrotechnical Institute"**

The article presents the results of scientific research to determine the biogas yield of herbaceous plants, analyzes laboratory data and substantiates dependence of methane fermentation from grinding method and particle size gives the prospects of using plants as substrate for biogas.

Biogas, power plants, methane fermentation, extrusion, grinding, raw materials

Lack of fossil energy in the world is to find alternative sources of energy, so there is a problem using their own renewable sources, including herbaceous plants of Ukraine. However, increasing the area of agricultural land for their cultivation can reduce the space for growing food crops that will boost food prices. The way out of this situation may be the attraction of the area removed from agricultural use [1].

Over the study technological, organizational and environmental aspects of biogas from different raw materials is a number of researchers, namely H. Geletukha [1] T. Zhelyezna M. Zhovnir, G. Kaletnik, V. Dubrovin, V. Kryvoruchko [2] R. Schultz [3]. But the problem today is many unresolved issues that require global systems research.

The aim - to experimentally determine the dependence of the output from biogas way of grinding and size of the studied material. Further theoretical and practical development potential herbaceous plants for energy.

Material and methods of research. In recent years, more attention is paid to biofuels produced from high-efficiency power plants. The source material may be the by-products of different origins, and specifically designed for this power plant, the main absorbent carbon dioxide, reducing its amount in the atmosphere. These plants form high yields of biomass that could be used for energy purposes for biofuel production [2].

Herbaceous plants are characterized by high ash content and mineral content, because in case of incineration, they do not emit smoke, carbon monoxide and harmful substances unlike wood.

Biogas - gas, obtained by methane fermentation of biomass, which is influenced by three types of bacteria. The first type - hydrolysis, the second - acid-third - metanoutvoryuyuchi, while bacteria eat the following products earlier life [1].

For the experimental determination of biogas out of herbaceous plants used miskant big, wild carrots and quinoa with white bows outskirts of the city Bershada (see. Table.). As a source of methane bacteria (seed) used perebrodzhenu hnoyivku cattle from the fermenter biogas plant Berezhany Agrotechnical Institute, w = CR 2.32%; pH = 7.7. Laboratory fermenter - a gas-tight package with a polymeric material that is suspended in an incubator at a temperature of 37.5 ° C + and kept there 42 days. The volume of biogas sample was determined by changing the volume of the fermenter, which was investigated biomass. Biogas is formed by the natural process of microbial decomposition of organic matter in a wet environment under anaerobic conditions (without oxygen). In fermenter bacteria that are found in nature, causing fermentation of organic matter, similar to what happens in the rumen of ruminant animals [3]. To process the study materials used laboratory knife shredder and extruder. This chaff pre-soaked for 15 minutes. in water at a temperature of + 14 ° C. Feed substrate extruder conducted manually. Extrusion - the process of punching holes forming material through the matrix.

Research results. Our results showed that preconditioning energy plants such as wild carrot, lamb's quarters, miskant large increases availability of hydrolytic enzymes to polymeric carbohydrates, which leads to splitting lihninotselyulozy and increase the yield of biogas (see. Table).

Вихід біогазу за 42 дні метанового бродіння, м³/т

№ п/п	herb	The method of grinding	Medium size, mm	Exit biogas					
				era					
				7	14	21	28	35	42
1	дика морква	laboratory knife chopper	23,5×3,5	65	158	187	187	185	185
		extrusion	10,0×2,0	159	260	361	360	359	358
2	lamb's quarters	laboratory knife chopper	34,0×3,8	61	96	119	130	130	130
		laboratory knife chopper	6,8×1,9	99	176	281	280	279	278
3	miskant great	laboratory knife chopper	20,0×3,4	65	110	138	150	150	150
		extrusion	8,2×2,3	162	291	359	358	356	356

Wild carrot (*Daucus carota*) - a biennial plant that reaches 1 m (Fig. 1). For comparison, depending on how the biogas output chopping knife used laboratory extruder and the chopper. After the first method of processing the average amount of broken rice $23,5 \times 3,5$ mm, and after the second - 10×2 mm. By comparing the data found that after extrusion length of the stem fell more than 2 times, width - 1.5 times (Fig. 2). Exit biogas broken rice with wild carrot was $185 \text{ m}^3 / \text{ton}$. EXTRUSIONS chaff allocated $358 \text{ m}^3 / \text{t}$ biogas for 42 days methane fermentation (see. Table.). After analyzing the results of laboratory studies of biogas from wild carrot, one could argue that its output depends not only on the length of the stem, but the method of grinding and the difference between the largest and smallest particles of broken rice as smaller stems parameters were obtained after extrusion, resulting in obtained a higher yield of biogas.



Рис. 1. Wild carrot (dried to air-dry state)

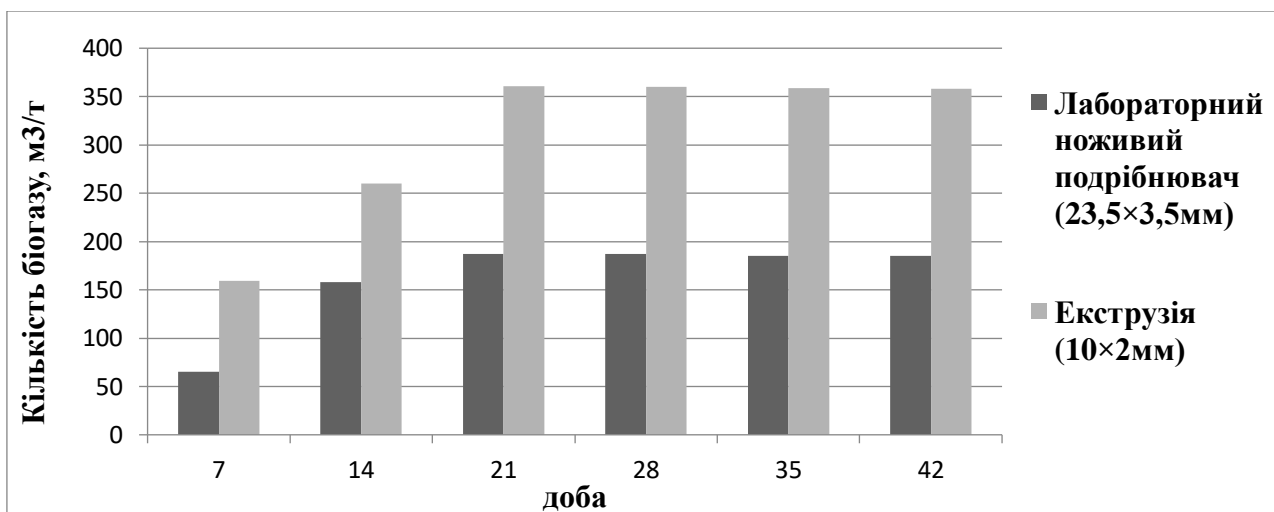


Fig. 2. Withdrawal of biogas wild carrot, depending on the method of grinding

Lamb's quarters (*Chenopodium album*) - a weed, up to 1 m (Fig. 3). To determine the output of biogas plants that use the same methods of processing raw materials, as for the wild carrot. In the experiment, with white

quinoa broken rice after processing chopper knife to the average particle size $34,0 \times 3,8$ mm and obtained $130 \text{ m}^3 / \text{t}$ biogas. After extrusion average particle size was $6,8 \times 1,9$ mm. This biogas yield was $278 \text{ m}^3 / \text{t}$ (see. Table.).

As a result, found that the length of the stem after passing through the extruder decreased by 5 times, and width - 2 times (Figure 4). This is because after the knife Cutter declined only the length of the stem, and the extrusion - both width and length. So the surface area of broken rice, which received the first method, is less than the area of extruded broken rice, which as a result gave twice as much biogas yield. [3]

Fig. 3. lamb's quarters (dried to air-dry state)

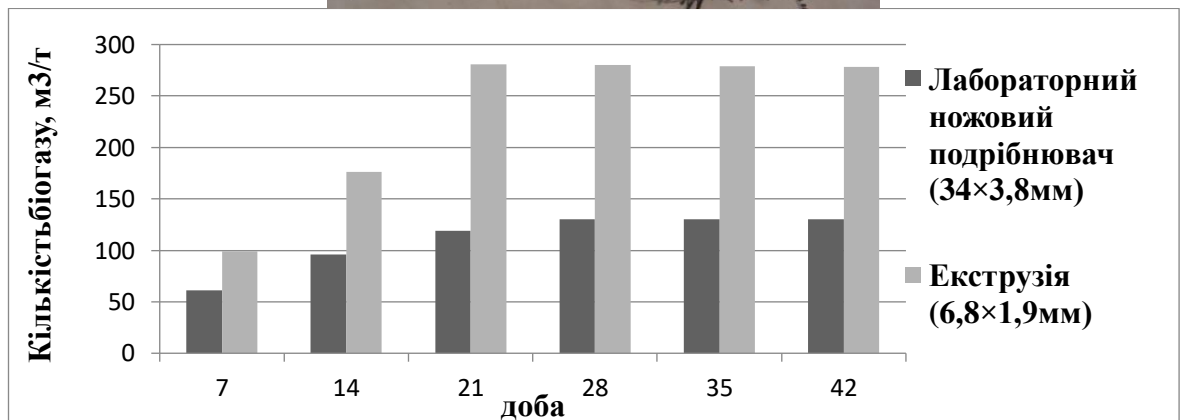
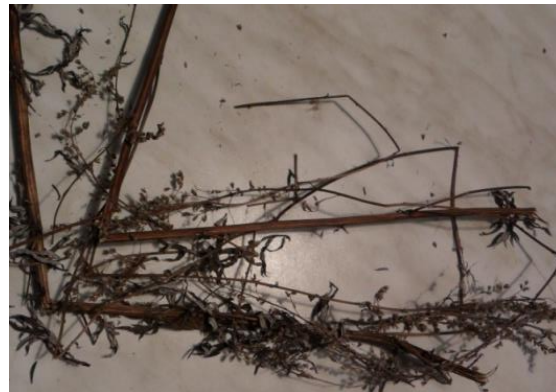


Fig. 4. Exit biogas with white quinoa depending on how the shredding

Miskant large (*Miscanthus giganteus*) - a perennial herb, up to 2.5 m (Fig. 5). To determine the intensity of methane fermentation miskant dried to air-dry state and podribnyly laboratory extruder and the chopper knife. In the first embodiment, the average particle size was $8,2 \times 2,3$ mm, and the second - $20,0 \times 3,4$ mm. The study received $150 \text{ m}^3 / \text{t}$ biogas from broken rice, processed knife chopper, and after extrusion - $356 \text{ m}^3 / \text{t}$ (see. Table). In this case, the length of the stem, crushed extruder decreased 2.5 times, width - 1.5 times (Fig. 6). Thus established that EXTRUSIONS chaff has the best performance. By comparing the data from cultivation miskanta big one could argue that this growing rosny is very promising as an energy source.



Fig. 5. Miskant large (dried to air-dry state)

Conclusions. Based on the research and treatment of the results found that wild carrots, quinoa white and miskant large can be used as a substrate for biogas production, with the required previous preparation for methane fermentation, in this case extrusion, because this method of crushing obtained best final performance in this experiment. Comparing raw materials processing laboratory extruder and chopper knife, biogas output in the second embodiment, increased by 51.7% from wild carrot, 46.8% of white quinoa, 42.1% of miskantu great.

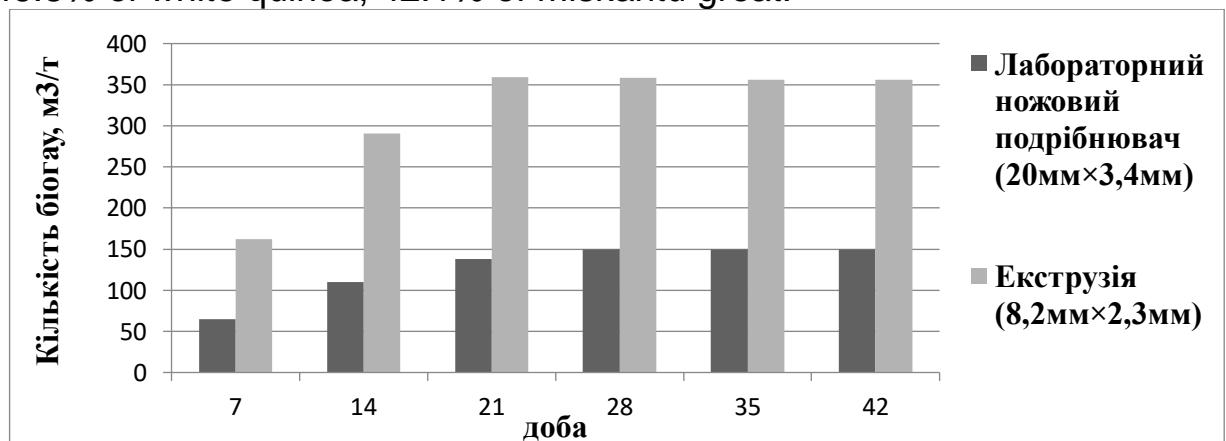


Fig. 6. Exit biogas from miscanthus large depending on how the shredding

The advantage of this method is to increase the output of grinding biogas relatively low cost material, the use of sludge as pohazovoho biomineralizovanoho fertilizers, relatively low qualification requirements for staff. Extrusion improves biozasvoyennya waste and increases the level of availability of materials for the action of bacteria. The result of this process is enrichment materials that are difficult to transform and increase the efficiency of biogas production. Thus confirmed the potential use of some herbaceous plants for energy purposes.

1. Гелету́ха Г. Г. Біомаса зі́стріє Україну [Електронний ресурс] / Г. Г. Гелету́ха // Економічна правда. – 2013. – Режим доступу: <http://www.epravda.com.ua/columns/2012/06/14>

2. Дубровін В. Біопалива (технології, машини і обладнання) / М. Корчемний, І. Масло, О. Шептицький, А. Рожковський, З. Пасторек, А. Гжибек, П. Євич, Т. Амон , В. Криворучко] – К.: ЦТІ “Енергетика і електрифікація”, 2004. – 256 с.

3. Шульц Р. Виробництво і використання біогазу в Україні [Електронний ресурс] / Р. Шульц – Київ, 2012. – Режим доступу: http://ua-energy.org/upload/files/Biogas_urg.pdf.

В работе приведены результаты научных исследований по определению выхода биогаза из травянистых растений, проанализированы лабораторные данные и обоснована зависимость метанового брожения от способа измельчения и размера частиц, доказана перспективность использования растений в качестве субстрата для биогаза.

Биогаз, энергетические растения, метановое брожение, экструзия, измельчения, сырье

WASTE TREATMENT EFFECT OF VARIOUS TYPES OF WOOD IN INTENSITY METHANOGENIC FERMENTATION

V. M. PAVLISKYY, Doctor of Engineering, professor
O. I. Zakharko, doctor of agricultural sciences, professor,
B. M. Tryguba, Leading Specialist
VP NUBiP Ukraine
"Berezhany Agrotechnical Institute"

The article is devoted research of influence of rough-down of lignocellulosis mass of different types of wood on intensity of methanogenics fermentation. The percentage of basic organic matters is investigational in the different types of wood, their dependence is exposed on intensity of output of biogas. It is rotined that processes of methanogenesis from pellets aspen and beech beechen sawdust take a place more intensively for the first three weeks after bringing of culture of methanogenics microorganisms in the substratis, as compared to oak sawdust, pine sawdust and bark, farther this process is slowed and is stopped.

Biogas, cellulose, hemicellulose, deblokation, fractional composition

The problem of using logging waste at enterprises of timber industry complex of Ukraine is urgent. At certain stages of the production of raw wood forest products due to low commodity value is not used or is lost as waste. Timber waste and lisoobrobnoho production, and wood formed in forest depots in case of wood processing, can be used as raw material for further processing in the timber production [3].

A wide range of organic waste (both solid and liquid) agricultural production, wastewater, solid waste and waste wood industry raw materials can be used in biogas technology. The quality of these wastes directly proportional to the moisture, which greatly affects the biogas yield per unit of dry matter and content of biomethane [8].

Waste timber at a certain pretreatment can be used for methanogenic fermentation. So important is the issue of selection of the most effective methods of pretreatment of wood used in the production of biomethane technology.

Gasification technology was created in the nineteenth century for the production of synthetic gas needed for lighting cities, and use it as a carrier for domestic and industrial purposes (metallurgy, steam engines, etc.).

Gasification exposed as coal and biomass plants and products thereof (charcoal).

Use basic process of coal gasification to produce synthetic fuels and chemicals began with 1920's Kaiser Wilhelm Institute in the study of coal in. Myulheym der Ruhr (Germany). This institute Franz Fischer and Hans Tropsch invented the method of synthesis gas (syngas) for production in Germany of liquid fuel from coal. [1]

It is pertinent to mention the experience of the Soviet Union, where the late 1920s to the 1950s gas-generators installation work that used wood (firewood and charcoal) and peat for gaseous motor fuel. In 1929, the Soviet Union built the first large gas generator station that worked on the turf and over the next years - a number of other such stations were built in large enterprises [6].

Biogas power units (MEAs) can be used for autonomous energy consumers, who are mainly in the areas of agriculture, as the primary raw material for them is a waste of this production.

The main component of biogas is biomethane share volume of over 50%, so biogas MEA in an autonomous energy source can be used for the boiler, boiler or process equipment.

Self MEAs are still used in China - more than 7 million. Pcs. In India - 1.5 million. Pcs., In western Europe - more than 600 large installations, as well as in the USA, Poland and others. [2].

The aim - to analyze the main content of organic matter in different types of wood and set them dependent on the intensity of the formation of biogas. Determine the effect of mechanical method of pretreatment of waste wood industry methanogenesis process.

Material and methods of research. Major forest industry waste - a green wood (logging residues), bark (waste wood), sawdust and chips (waste cutting trees). For each type of waste accounts for 20-25% of the total weight of the tree.

Wood is an arsenal of chemical compounds and consists mainly of organic compounds (about 99%) and only a small portion (about 1%) are inorganic compounds under conditions of burning wood transform into ash, which contains minerals [7].

Studies on Assisted results were methanogenic fermentation with pellets of different types of wood, carried out in the laboratory of biogas technology VP NUBiP "Berezhany Agrotechnical Institute".

The raw material for our experiments served mainly wood waste in the form of chips, which have previously been subjected to mechanical processing. Fractional composition of chips in an average of 1-3 mm, after mechanical crushing of pellets produced.

The greatest practical interest are mechanical, thermal, photochemical, chemical and enzymatic degradation lihninotselyuloznoyi biomass. These methods alter the physical, chemical and mechanical properties of cellulose, a result there is more or less significant reduction of

polymerization. To increase the reactivity of raw material pretreatment should lead to deblokatsiyi lignin, help to reduce the crystallinity index of cellulose, increasing its surface area available for protein molecules that are part of enzymes methanogenic bacteria.

As a result of grinding degree of crystallinity of cellulose is reduced accordingly increased availability of fiber to the settlement of microorganisms. Previous mechanical destruction lihninotselyulozy can significantly increase the yield of reducing substances and minimize their potential losses [5].

To measure the amount of biogas used method V. Krivoruchko, patented in Ukraine. In fermenter package, which is made of gas-tight polymer material in the form of a rectangle 250 mm x 400 mm (made in Austria) loaded proven biomass and seed in a ratio of 1: 4, then squeezed the air from the fermenter packet by dropping it into a liquid and heat zakleyuvaly using a special device. By hung sealed package weight, package and lowered into the measuring cylinder. As a result, we determined the initial volume of the investigated options. Then fermenter packets hung in and kept the thermostat at least 35 days at a temperature of 37,5 ° C. Measuring the volume of packages carried out every seven days.

Results and discussion. The content of basic organic substances in the wood depends on the type and varies in the following ranges: wood of coniferous species contains 48-56% cellulose, 26-30% lignin, hemicellulose 23-25% (10-12% pentosan, about 13% heksozaniv). The content of carbohydrates in the wood of deciduous species is: 46-48% cellulose, lignin 19-27%, 26-35% hemicellulose (pentosan 23-29%, 3-6% heksozaniv) [4].

In comparison with deciduous coniferous species larger percentage of cellulose in the wood and high relative content of hemicellulose. However, softwood species are resins which are inhibitors for methanogenic process, in addition to these rocks also high lignin content, because of the reduced output and biogas. After a comparative analysis of deciduous tree species should be noted that the highest content of cellulose and lignin content of the least characterized aspen sawdust that is best for methanogenic fermentation. In the oak wood contains tannins, which are also inhibitors and prevent fermentation, thus reducing the output of biogas. The content of cellulose in sawdust beech relatively smaller, but small considering the relative content of lignin and hemicellulose high relative content of the biogas yield of wood waste is high enough.

Comparative data output of biogas from different kinds of wood are presented in the table.

**Визначення виходу біогазу під час бродіння пелет із відходів
деревини (м³/т СР, М ± m, n = 3)**

№	feedstock	Duration methanogenesis by methanogenic
---	-----------	---

3/n		microorganisms early introduction					
		7 days	14 days	21 day	28 days	35 days	42 days
1	Pellets shredding pine bark	34±0,9	93±1,6	104±2,8	104±5,2	104±6,2	104±5,5
2	Pine sawdust pellets	3±0,6	23±1,0	56±1,4	65±2,1	75±2,7	75±3,1
3	Pellets oak sawdust	14±1,8	26±1,5	31±1,1	58±2,3	75±2,6	94±3,1
4	Pellets of sawdust beech	29±1,4	91±3,2	188±8,3	240±11,0	285±9,5	300±10,9
5	Pellets made from aspen chips	77±2,5	290±12,1	321±21,4	341±10,8	385±10,6	385±11,3

From the results presented in the table shows that the largest biogas output (385 m³ / t CP) among all investigated substrates we received from pellets made from aspen chips. Already on the seventh day methanogenesis process, the amount of biogas aspen sawdust pellets made 77 m³ / t CP, which was 2.7 times more than the biogas obtained from beech sawdust pellets ($p \leq 0,01$), 5.5 times more than from oak sawdust pellets

($P \leq 0,01$), 26 times more than the pellets from pine sawdust ($p \leq 0,001$) and 2.3 times higher than with pellets shredded pine bark ($p \leq 0,01$).

Zamiryuyuchy amount of biogas obtained from each sample pellets every 7 days, we observed that the rate of methanogenic most intensive processes took place before the 21st day of making the substrate in methanogenic bacteria. Then, on the 28th, 35th and 42nd day methanogenesis rate significantly decreased in almost all the bags, and the bags, which contained pellets from shredded pine bark, methanogenesis process practically stopped.

Analyzing the figures regarding biogas derived from aspen sawdust pellets shows that its volume between the 7th and 14th era has increased 3.8 times over the next 7 days every biogas production increased by about 10% to 35th days and then stopped methanogenesis process.

A somewhat different pattern methanogenesis process occurs when used as a substrate for the production of pellets beech sawdust. Thus, between 7th and 14th era, newly biogas volume increased by 3.1 times, because the next 7 days - in 2,1 times, and then methanogenesis process continued to the end of measurement, albeit with less intensity, every 7 days, respectively 13%, 19% and 5%. The total volume of biogas formed of pellets made of sawdust beech (300 m³ / t SD) was 28% lower compared to the volume of biogas formed with aspen pellets from sawdust.

The resulting digital data measuring the volume of biogas newly pellets made from shredded pine bark and oak and pine sawdust, indicate that the use of sawdust beech and aspen as the substrate in biogas technology is more than three times more effective than using the other three studied substrates.

Conclusion. Wood is an ideal material for use in biogas technology, which offers the prospect of more efficient use of forest resources waste as an energy potential. Use peletovanoyi sawdust beech and aspen as the substrate in biogas technology is more than three times more effective compared to using pellets of shredded pine bark and oak and pine sawdust. The process of methanogenesis pellets of sawdust beech and aspen occur most intensively during the first three weeks of making culture methanogenic microorganisms in the substrate, then the process slows down and within 42-days nearly stops.

Список літератури

1. Австрия производство биогаза из древесины «Биогазовые установки» [Электронный ресурс] – Режим доступа: <http://biogas-energy.ru/biogas/>.

2. Публичные учебные материалы ВГУЭС [Электронный ресурс] / Владивостокский государственный университет экономики и сервиса – Режим доступа: http://abc.vvsu.ru/Books/r_ist_ener/page0007.asp.

3. Пуцентейло П. Р. Енергетичний потенціал використання деревних відходів в Україні [Электронный ресурс] / М. Б. Свинтух // Міжнародний науково-виробничий журнал Економіка приро-докористування і екологія – Режим доступа: http://irbisnbuv.gov.ua/cgi-bin/irbis_nbuv/cgiirbis_64.exe?C21COM=2&I21DBN=UJRN&P21DBN=UJRN&IMAGE_FILE_DOWNLOAD=1&Image_file_name=PDF/sre_2013_2_41.pdf.

4. Реферати [Электронный ресурс].– Режим доступа: <http://www.refmaniya.org.ua/konspekti/vlastivost-derevini>.

5. Справочник химика 21 [Электронный ресурс]. – Режим доступа: <http://chem21.info/page/211063162030127031075080120251200072074068171165/>.

6. Метан из биомассы. Хорошо забытые технологии будущего [Электронный ресурс] / Статьи журнала ЛесПромИнформ.–2010 г. №8 (74). – Режим доступа: <http://www.lesprominform.ru/jarchive/articles/itemshow/2125>.

7. Хімія деревини [Электронный ресурс] / Українські реферати – Режим доступа: <http://www.refine.org.ua/pageid-4568-1.html>.

8. Key World Energy Statistics. [Электронный ресурс] / Publication of International Energy Agency, 2011 – Режим доступа: <http://www.iea.org/publications/freepublications/publication/name,31287>.

Статья посвящена исследованию влияния предварительной обработки лигниноцеллюлозной массы различных видов древесины на интенсивность метаногенного брожения. Исследовано процентное содержание основных органических веществ в различных видах древесины, раскрыто их зависимость от интенсивности выхода биогаза. Показано, что процессы метаногенеза из пеллет,

состоящих из осиновых и буковых опилок происходят более интенсивно за первые три недели после внесения культуры метаногенных микроорганизмов в субстрат, по сравнению с дубовыми и сосновыми опилками, сосновой корой. В последствии этот процесс замедляется и практически останавливается.

Биогаз, целлюлоза, гемицеллюлоза, деблокация, фракционный состав, делигнификация

**PROJECT PROPOSALS TO STREAMLINE IN MUNICIPAL
INSTITUTION "MYKULYNETSKA REGIONAL HOSPITAL
REHABILITATION PHYSIOTHERAPY"**

***S. M. PIDHOVNA, assistant
VP NUBiP Ukraine "Berezhany Agrotechnical Institute»***

The article presents the design proposals for landscaping and beautification of the park municipal institution "Mykulynetska Regional Hospital physiotherapy rehabilitation." The assortment of decorative plants is developed and elements are neat equipplings with modern amenities, which will be used for the reconstruction of separate areas of park.

Gardening, landscaping, park, space

The territory of municipal institutions Ternopil Regional Council "Mykulynetska Regional Hospital physiotherapy rehabilitation" of historical value. Formation of the environmental outlook in the process of planting - the main content of educational activities in recreational areas, which is the hospital physiotherapy rehabilitation. The study of Mykulynetskoho park shows that today a set of measures necessary to restore its aesthetic appearance and provide the appropriate level of further functioning.

In Ukraine, the conservation and restoration of parks doing I. Kosenko, IAKosarevskyi, LO Kazarynov, M. Kohno, A. Pasichny PI Makarenko, P. Savchenko, DM Krivoruchko, AA Ilyenkov, OL Lime, LI Rubtsov, IAKosarevskyi, YO Klimenko, who dedicated his scientific research work parklands and develop recommendations for further maintenance.

The aim of research was to develop proposals for the reconstruction of the park and landscaping Mykulynetskoyi Regional Rehabilitation Hospital physical therapy to improve the aesthetics, functionality and decoration of the territory.

Results and analysis. The tested object is within the settlement on lands that are administered by the village council Mykulynetskoyi at Ternopil region, Terebovlya district, village Mykulyntsi Str. Galician 2 [5, 6].

Mykulynetsky Palace - a preserved monument palace architecture Ukraine. Its construction began in 1760, the widow of Grand Crown Hetman Jozef Potocki Commonwealth - Ludwig Potocki. In the late eighteenth century Potocki sold the town magnate Peter Konoptsi who rebuilt the main building of the palace in the style of the late Empire. Around the palace was divided large park free planning. The park survived to our time and some of its trees have a very advanced age [5].

During the predesign analysis object area conducted an inventory of existing plantations made photofixation basic elements drawn a base plan of the facility.

Taxonomic composition dendrotsenoziv set by route surveys (the name for the plant SK Cherepanov). Inventory performed in accordance with the requirements of the "Instruction on technical inventory of green spaces in cities and towns of Ukraine." During the survey analyzed indicators such as species composition, height, diameter, phytosanitary state.

Detailed inspection of plantations carried out in two stages: the fall and spring. Visually determine the extent of damage and destruction leaves the known scale NP Krasynskoho.

As a result of inventory taksatsiynoyi parklands Mykulynetskoyi regional physical therapy rehabilitation hospital found 44 species dendroflora.

For the full-scale survey of the park area revealed that the park is in a satisfactory condition and requires partial reconstruction. Throughout equipped insufficient number of special vacation spots and small architectural forms, paths are in poor condition, with boxwood borders and flower beds need reconstruction, insufficient lighting of.

Functional zoning corresponds park landscape that is well uv'yazanyy with the terrain, vegetation and meets the intended purpose.

Relief study area in the central part of the uniform, flat character, in the southern part there is a slight slope area. The central part of the park is expected to form in regular style, others - in landscape style, given the nature and terrain.

As a result of the work and analyze the hospital had identified five functional areas: input, active recreation area, a zone of quiet recreation, sports and recreational and commercial.

The entrance area is taking into account the architectural planning of the park and to the movement of visitors. This area is framed by two biogroups of coniferous shrubs combined with flower plants. It also provided for the installation of parking. In the park is the main and additional inputs.

Zone leisure presented flower beds, privates and group plantings of trees and shrubs, small architectural forms, covering lawns and decorative paving.

The compositional center of the park is the center of the flower arrangements that make color contrast in perspective and enhance the emotional experiences of visitors. On either side of them is placed lawn with it trees and shrubs vegetation.

Chapel, tree and bush vegetation, paths, dry creek, flat Rocard, recreation grounds - the components that create the comfort zone of quiet recreation.

Fitness zone consists playground.

The economic zone consists of buildings that should decorate plantings. Economic development can beautify entwined vines and isolated using hedges.

Picked up elements of beautification and landscaping provide decorative accents that accentuate the aesthetic and recreational value of the area. For this facility were designed small architectural forms that are divided into groups: household (gazebos, benches, bridge, trellis, utilitarian items - boxes, lights) and auxiliary (fencing, road stezhkove cover).

Pavilions are located in the entrance area and in a zone of quiet recreation recreational serve visitors.

Lava is planned to place along the footpaths. Also designed bench brown, placed in the pavilions for long-term stay in rainy or hot weather. At the ranks envisaged setting trash bins that are in form and material can be varied, and their color is usually subject to the general decision of colored areas.

Lighting, as part of the formation of three-dimensional environment involves matching the architectural environment, its scale, rhythm and proportions subject to the general composition [2]. The park was designed lamps that should illuminate the track in the evening and interesting landscaping elements. Along the walking track to be installed skylights height 60-70sm on metal supports.

In the garden and park landscaping ob□yektiv important are road and track various designs. Tiled coverage provided in the entry area and in the area of recreation, in other areas designed macadam.

Fence park area ob□yektiv not only contributes to a better organization of the territory, but also often serves as a decorating element [4]. This contributes to the material (brick, metal, wood) on which they build. The project envisages installation of forged metal fence.

For planting areas selected tree and bush species of valuable decorative qualities that are able to create color and decorated their nature and structure of the territory mikrolandshaftu in general.

Flower garden plants in the structure of vegetation due to the large and colorful decorative special place and planted them on the most prominent and ceremonial places, they look particularly attractive in the artistic combination of small architectural forms and natural landscape. At planting used by many species and varieties of ornamental varieties of herbaceous plants [4]. In the central part of the object 7 project provides flower compositions.

Flat Rockery - a simplified version rocky garden to create that does not require natural or artificial embankment slope. Impressions mountainous landscape creates a skilful selection and placement of rocks and plants. The highest point reached by large boulders and shrubs, including dwarf and planted groundcover. Usually flat Rockery different small size [3].

Group planting trees and shrubs - the main compositional device volume and colorful design of open and half-open spaces. With some landscape composition of groups created the illusion of near and distant prospects [4].

The project envisages the creation of pure and mixed cluster groups. Group of three copies placed at the vertices of an equilateral triangle, four - on

the corners of an equilateral quadrangle (square, rhombus), the five - for corners and irregular quadrangle at some distance from its center.

Ordinary, aleyni, group planting and individual instances of the garden it is advisable to create these types of plants: Cossack juniper (*Juniperus sabina* L.), Chinese juniper 'Gold Coast' (*Juniperus chinensis* 'Gold Coast'), Thuja occidentalis' Golden Globe' (*Thuja occidentalis* 'Golden Globe'), thuja occidentalis' Sankist' (*Thuja occidentalis* 'Sunkist'), barberry Tunberha' *Temnopurpurovyy* (*Berberis thunbergii* 'Atropurpurea'), Canadian spruce' Konica' (*Picea glauca* 'Conica'), weigela flowering (*Weigela florida* (Bge.) A.DC.), Common lilac (*Syringa vulgaris* L.), evergreen boxwood (*Buxus sempervirens* L.), Japanese spirea (*Spiraea japonica* L), deutzia rough (*Deutzia scabra* L.).

Borders - a narrow strip of low clipped shrubs or plants with decorative leaves that are edged of a green area [3]. The project provides for the use of borders as a regular constituent elements of flower design. Borders are designed with evergreen boxwood (*Buxus sempervirens* L.).

Lawn - a certain area of homogeneous areas with artificial turf cover, created by sowing and cultivation of herbs (especially perennial crops) for decorative, sports, soil or other purposes. [1] The project provides conventional placement of landscape and lawn parterre.

Conclusions. Planting area - a long and complex process that is associated with the crop complete works and building character. Today Mykulynetsky park is in a satisfactory condition and needs renovation. This territory designed group of woody and shrub vegetation, flower compositions and compositions of rocks. Also offered small architectural forms, such as a gazebo, pergola, benches and litter bins.

Список літератури

1. Гегельський І. Н. Мистецтво паркового пейзажу: Як закласти сільський парк/ І. Н. Гегельський – К.: Знання, 1993. – 272 с.
2. Гостев В. Ф. Проектирование садов и парков / В. Ф. Гостев, Н. Н. Юскевич. – М.: Стройиздат, 1991. – 340с.
3. Коваленко С. В. Благоустрій міст та населених пунктів / С. В.Коваленко - Інформаційно-аналітичний збірник. – К., 2006. – Вип. №4. – 80 с.
4. Кучерявий В. П. Озеленення населених місць / В. П. Кучерявий – Світ, 2005. – 456 с.
5. Микулинці: палац Людвіки Потоцької [Електронний ресурс] / А. Бондаренко. – Режим доступу: <http://ukrainaincognita.com/ternopilsk-oblast/terebovlyanskyi-raion/mykulyntsi/mykulyntsi-palats-lyudvyky-pototskoi>.
6. Микулинецький палац [Електронний ресурс]. – Режим доступу: <http://uk.wikipedia.org/wiki>.

В статтє приведены проектные предложения по озеленению и благоустройству парка коммунального учреждения «Микулинецькая областная физиотерапевтическая больница реабилитации». Разработаны композиции из декоративных растений и подобрано

элементы благоустройства, которые будут использованы при реконструкции отдельных участков парка.

Озеленение, благоустройство, парк, насаждения

INSTITUTIONAL FRAMEWORK BALANCED (STAL) OF TERRITORIES

***N. V. PICHKUR, Chairman of the Board
Ecological Culture Center in Zaporozhye***

Issues of creating conditions for balanced (sustainable) development of rural territories in Ukraine are considered in the work as well as fundamental role of spreading scientific and practical knowledge and skills in organic production through creation of regional networks of information and consulting centres on the basis of Agricultural Colleges.

Sustainable development, innovative technologies, organic market, scientific and practical support

The economic basis for sustainable rural development that helps create environmentally friendly, comfortable and attractive areas of life for farmers and attract new residents, can serve as organic production is aimed at international markets and domestic customers. But among the factors that hinder success to develop this strategic Ukraine's direction, is the lack of professionally trained personnel, training programs, methodological materials and manuals, test sites and other components of system activity that should provide the scientific and practical support farmers, provide qualified support for the conduct of private households local residents will contribute to promoting healthy lifestyles and improve the ecological state of the environment, the internal market of organic products.

Research on the establishment of methodological principles of greening the economy as a whole, Extension Services and Training focuses many researchers [1, 2, 3, 4, 5, 6]. At the same time, establish a scientific and practical basis of organic farming is today not only a new and important direction of scientific activity, but requires urgent implementation of wide regions of Ukraine.

The purpose of research is the development of practical solutions for sustainable development of the economic and social sphere of rural areas by means of the creation of the institutional framework of organic farming and environmental education of owners of private households in the regions of Ukraine.

Results and discussion. Lack of qualified professionals in the field of organic production and, consequently, research and professional consulting support led to low awareness of farmers and operators in the food market

about the technology advantages, the requirements of organic production and existing opportunities and prospects.

Low awareness in the region about the positive impact of the consumption of organic products on the health of adults and children, improving environmental habitat by introducing technologies of organic production constrains domestic consumers demand for organic products, does not encourage use of environmentally friendly technologies in their economies, creating some problems also organic farmers that border them.

In regions no systematic training activities and skills development in the production and marketing of organic products (agronomists, engineers, economists, managers, marketers, engineers, etc.), experience sharing, establishing partnerships.

Insufficient or nonexistent research areas for scientific study of practice, adaptation to climatic conditions and organic production technology practical skills of their use in certain areas, testing, counseling and special operation and maintenance of agricultural machinery, equipment and so on. These problems make it impossible to support professional farmers and individual owners.

So, interested farmers are forced to study organic production technology on their own experience, experiencing losses, or even abandoning their use. There is no systematic information support organic market development in Ukraine at regional and national levels.

As one of the consequences - the shortage and high price of organic products in the domestic market, causing a number of systemic problems.

Therefore, creating a sustainable basis greening of national economy and widespread theoretical and practical knowledge and skills of organic production in the regions is an important contribution to the strategic development of modern Ukraine.

A significant contribution to solving these problems, including the improvement of human health, environmental safety, economic viability is launching an institutional basis for the formation of organic production - an important condition for sustainable balanced territorial development. The practical solution is to create in each region network of information and counseling centers (ICC) at the Agricultural College who have combined their activities in the regional centers of the organic (natural) farming created in agricultural higher education relevant areas.

Next steps - it Approval Order management appropriate regional agricultural university on the establishment, structure Network of ICC development of organic production, the allocation of land and other resources schools to provide curriculum for training in the field of organic production of scientific and practical activities, etc. Approval of Regulations ICC Networks of organic production and coordination of documents ICC networks with local authorities, the Ministry of Agrarian policy and food of Ukraine, MoD, NAANU.

The main tasks of the Network Information and counseling centers providing educational process of training in the field of organic, especially

among college students, the creation of information and technical resources, information and activities (seminars, round tables, consultations, days field, etc) a wide range of farmers and local residents in the areas of research, scientific support and advice, organization of events and exchange of experience bridging (research institutions and experts, domestic and international organic farms and organic market operators, local branches Clubs organic manufacturing and other organizations towards environmental activities, etc.), the organization promoted at the local level of grant support.

Conclusions. Thus, the creation in every region of Ukraine at the Agricultural College Network information and advisory centers, regional centers combined organic (natural) farming is realistic in terms of practical implementation in the current conditions for implementation of innovative environmental achievements aimed at balanced and sustainable development of territories deserves public support.

Список літератури

1. Писаренко В. В. Місце дорадчих служб у розвитку органічного землеробства / В. В. Писаренко, О. О. Серов // Збірник матеріалів IV Всеукраїнських Моргунівських читань із міжнародною участю, Полтавська державна аграрна академія. – Полтава: Дивосвіт. – 2014. – 223 с.

2. Катан Л. І. Модернізація аграрної освіти в контексті інноваційного розвитку агроменеджерів / Л. І. Катан // Збірник матеріалів IV Всеукраїнських Моргунівських читань із міжнародною участю. / Полтавська державна аграрна академія. - Полтава: Дивосвіт. – 2014. – 412 с.

3. Безпарточний М. Г. Компетентнісний підхід як засіб формування якісної аграрної освіти / М. Г. Безпарочний // Збірник матеріалів Міжнародної науково-практичної конференції «Інноваційний менеджмент збалансованого (сталого) природного агровиробництва / Дніпропетровський державний аграрно-економічний університет. – 2014. – 311 с.

4. Березіна Л. М. Екологічні проблеми підприємств АПК у системі екоосвіти /Л. М. Березіна // Збірник матеріалів Міжнародної науково-практичної конференції «Інноваційний менеджмент збалансованого (сталого) природного агровиробництва, Дніпропетровський державний аграрно-економічний університет. – 2014. – 316 с.

5. Морозова О.С. Екологізація землекористування – умова виробництва екологічно-безпечної сільськогосподарської продукції / О. С. Морозова,

Л. М. Грановська // Матеріали II екологічного форуму «Зелена економіка. Зелені інвестиції. Зелений туризм, Інститут проблем ринку та економіко-екологічних досліджень НАН України, 2014. – с.147.

6. Купінець Л. Є. Науково-методологічне обґрунтування екологізації національної економіки / Л. Є. Купінець // Матеріали II екологічного форуму «Зелена економіка. Зелені інвестиції. Зелений туризм / Інститут проблем ринку та економіко-екологічних досліджень НАН України. – 2014. – 130 с.

7. Пічкур Н. В. Динаміка зростання органічного ринку в Україні і світі [Електронний ресурс] / Н. В. Пічкур / За матеріалами видань Федерації органічного руху України, проекту «Розвиток органічного ринку в Україні»,

МАУОВ «БЮЛан Україна» // Аграрний бюлетень (електронне інформаційне видання). – №12 (33) 2014. –15 с. Режим доступу: <http://ab.org.ua/wp-content/uploads/2014/07/AB-33.pdf>.

Рассматриваются проблемы создания условий сбалансированного (устойчивого) развития сельских территорий в Украине, отводится фундаментальная роль широкому распространению научно-практических знаний и навыков органического производства путем создания в регионах страны на базе аграрных колледжей Сети информационно-консультационных центров.

Устойчивое развитие, инновационные технологии, рынок органической продукции, научно-практическое сопровождение

ENVIRONMENTAL AND ECONOMIC FOUNDATION OF EFFICACY FUNGICIDE FOR WHEAT IN FOREST-STEPPE YARIY UKRAINE

***M. S. RETMAN, Candidate of Agricultural Sciences
National University of Life and
Nature Ukraine***

It is important that by developing protection and plant quarantine in the twentieth century that the technology used on agricultural crops, intensive, resource saving, biological, Technology No-till or others. They affect the economic performance, environmental situation, phyto sanitary condition agrophytocenoses and soils - contributing to higher fertility, or conversely, their degradation.

In this situation the aim of our research was not only the study of technical efficacy, but the definition of economic efficiency.

Phytosanitary situation, water softener, spring wheat, harvest preservation, destruction disease treatment fungicide, technical efficiency, economic efficiency

The decision on the appropriateness of a particular product in a system of protective measures must be based on factors such as technical, economic and economic efficiency. The problem of efficiency of plant protection has become particularly relevant in terms of the growing threat of crop losses with a decrease of farming and phytosanitary situation worsened. The purpose of our research was not only the study of technical efficacy, but also to determine the cost-effectiveness of their use. In assessing remedies determined their effectiveness as preservation and increase of yield, reducing costs for the use of manufacturing operations in the care of the crops, harvesting.

As shown by our study of the double spring wheat crop spraying fungicides to phase out the tube and early flowering ensure high effectiveness against major diseases and ear leaves of spring wheat in both areas of research. This saved the crop reaches 0,5-0,55 t / ha.

The results of the experiments adding to the acanthus plus water softener CS X-Cheyndzh for the use of lower fungicide application rate (0.5 l / ha) did not lead to loss of efficiency and saved the harvest is not significantly different from the options, which apply a higher rate costs. In this regard, it is this protective measure has been chosen for the production test.

Production test chemical protection system with two spring wheat fungicide application was carried out in 2014. JV "them. Shevchenko" Derazhniansky district, Khmelnytsky region in the area of 20 hectares. Early spring wheat 93 predecessor - corn silage.

Seeds before sowing protruvaly old drug Dividend 036 FS t.k.s. normal flow of 1.0 l / t. In the tillering stage to weed herbicide spraying carried Granstar normal flow of 15 g / ha.

During the growing season conducted observation of plant growth and the emergence and development of disease.

In phase out the tube conducted the first fungicide treatment plus acanthus COP with the normal flow of 0.5 l / ha. To prevent alkaline hydrolysis of the pesticide to it was added water softener X-Cheyndzh normal flow of 0.3 l / ha. The second spraying was carried out at the beginning of the flowering phase the same mixture.

To compare the effectiveness of the proposed chemical crop protection against diseases of spring wheat was founded as research, where spraying was carried out in the same phase acanthus fungicide plus application rate for the COP drug 0.75 l / ha.

Before the processing of crops were affected by powdery mildew, development of which was 6.6%, Septoria leaf lesions appeared later symptoms recorded in crops two weeks after treatment.

After 15 days of treatment in the control (no treatment) the development of powdery mildew reached 13.2% and Septoria leaf - 5.6% (Table 1). Technical efficiency of acanthus mixture plus CS, 0.5 l / ha + X-Cheyndzh against powdery mildew was 77.3% and acanthus plus COP 0.75 l / ha - 79.5%. Septoria leaf on both experimental options are not observed.

1. The development of illnesses leaves of spring wheat after the first treatment fungicides (sort of early 93 JV "them. Shevchenko" Khmelnytsky region., 2014)

Version	The development of the disease, %				Technical efficiency, %			
	oidium		Septoria leaf		oidium		Septoria leaf	
	15-й day	30-й day	15-й day	30-й day	15-й day	30-й day	15-й day	30-й day
Control	13,2	19,6	5,6	8,4	-	-	-	-
Acanthus plus CS, 0.5 l / ha + X-Cheyndzh, 0.3 l / ha	3,0	5,8	0,0	2,2	77,3	70,4	100,0	73,8
Acanthus plus COP 0.75 l / ha	2,7	5,4	0,0	1,9	79,5	72,4	100,0	77,4
HIP ₀₅	1,5	1,8	0,5	0,8				

Technical efficiency on the 30th day after treatment against Septoria leaf was - 73,8-77,4%, against powdery mildew - 70,4-72,4% in the level of disease control in accordance with 19.6 and 8.4% %.

On the same day was held the second treatment. After 15 days thereafter, we noted a decrease of Septoria leaf spring wheat at 80.6% for the Acanthus plus the use of CS normal flow of 0.75 l / ha at 78.2% - for the use of a mixture of acanthus plus CS, 0.5 l / ha + X-Cheyndzh, 0.3 l / ha (Table. 2).

Elevated temperature, observed in June - July was unfavorable for further development of powdery mildew. Leaves picker that was most affected, physiologically die out, respectively, decreased rate of disease development. At the time of the third and fourth counts (15 and 30 days after the second treatment fungicides) development of powdery mildew on the leaves of spring wheat were found.

2. The development of illnesses leaves of spring wheat after the second treatment fungicides (sort of early 93 JV "them. Shevchenko" Khmelnytsky region., 2014)

Version	The development of the disease,, %			Технічна ефективність, %		
	oidium		brown rust	oidium		brown rust
	15-й day	30-й day	30-й day	15-й day	30-й day	30-й day
Control						
	21,6	28,9	1,6	-	-	-
Acanthus plus CS, 0.5 l / ha + X-Cheyndzh, 0.3 l / ha	4,7	8,5	0,3	78,2	70,6	81,3
Acanthus plus COP 0.75 l / ha	4,2	7,8	0,2	80,6	73,0	87,5
HIP ₀₅	1,5	2,1	0,4			

In the most recent version of the account where spraying was carried out with a mixture funihtsydu acanthus plus CC with the normal flow of 0.5 l / ha of water softener X-Cheyndzh, technical efficiency against septoroizu leaves was 70.6%, and the use of acanthus plus COP normal flow of 0.75 l / ha - 73.0% (Fig. 1).

Brown leaf rust in the field appeared relatively late - in the phase of milk ripeness. It recorded only when the account held on the 30th day after the second treatment. In monitoring the disease amounted to 4.5%.

Against this background of low technical efficiency options studied chemical protection was 81,3-87,5%.

With ear diseases in crops oblikovuvaly Septoria and Fusarium. At the time of the last account in the development of their control were

respectively 11.2% and 2.2%. Technical efficiency applied remedies was quite high: the version acanthus plus COP 0.75 l / ha -

86.6% against Septoria ear and 72.7% - against Fusarium ear and in the version acanthus plus CS, 0.5 l / ha with the addition of X-Cheyndzh - respectively 72.7% and 63.6%.

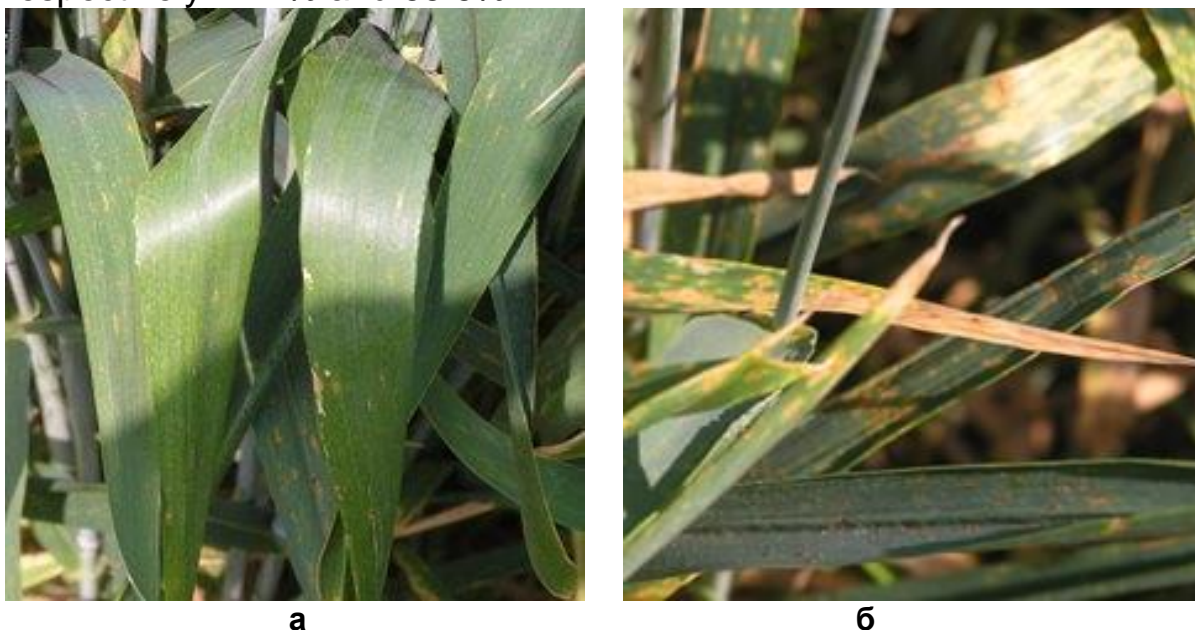


Fig. 1. General view of the leaf spring wheat in option Acanthus plus CS, 0.5 l / ha + X-Cheyndzh, 0.3 l / ha (s) and control (B) (photo by the author)

2. The development of ear diseases and yield of spring wheat after treatment with fungicides (sort of early 93 JV "them. Shevchenko", Khmelnytsky region., 2014)

Version	The development of the disease, %		Technical efficiency, %		Yield, t / ha
	Septoria ear	Fusarium ear	Septoria ear	Fusarium ear	
Control	11,2	2,2	-	-	3,74
Acanthus plus CS, 0.5 l / ha + X-Cheyndzh, 0.3 l / ha	2,1	0,8	81,3	63,6	4,25
Acanthus plus COP 0.75 l / ha	1,5	0,6	86,6	72,7	4,28
HIP ₀₅	0,6	0,4			0,15

Conclusions. Saved harvest fungicide for single use acanthus plus CC with the normal flow of 0.75 l / ha was 0,54t / ha, and in the variant where the processing carried out with a mixture of acanthus plus CS, 0.5 l / ha + X-Cheyndzh 0.3 l / ha - 0.51 t / ha.

Calculations indicators of the economic efficacy of fungicides against diseases of spring wheat, have shown that the use of both chemical protection is economically viable. Thus, cultivation of crops mixture

acanthus plus COP (0.5 l / ha) + X-Cheyndzh conventionally net profit amounted to 460.9 UAH. / Ha profitability - 34.6%.

Список літератури

1. Трибель С. О. Стратегічні культури / С. О. Трибель // – Киев, 2012. – 5 -25 с.
2. Ретьман С. М. Ефективні рішення фунгіцидного захисту озимої пшениці / С. М. Ретьман, Ф. С. Мельничук, Н. П. Горбачова, Б. Г. Яцина / Всеукраїнський журнал сучасного агро-промисловця Зерно № 2. – К – 2013. – С. 18 – 20.
3. Лісовий М. П. Реєстраційні випробування фунгіцидів у сільському господарстві / За ред. М. П. Лісового Автори: С. В. Ретьман, М. П. Лісовий, О. І. Борзих, Т. М. Кислих, Ф. С. Мельничук, М. С. Ретьман.
4. Мельничук Ф. С. Механізми дії фунгіцидів [Науково-методичний посібник] / Ф. С. Мельничук, М. С. Ретьман, І. В. Лепешкін / Фенікс, Київ – 2014р.

Важно, каким путем развивается защита и карантин растений в XXI веке, какие технологии применяются на посевах сельскохозяйственных культур: интенсивные, ресурсосберегающие, биологические, технологии No-till или другие. Они влияют на экономические показатели, экологическую ситуацию, фитосанитарное состояние агрофитоценозов и почв, - способствуя повышению плодородия или, наоборот, их деградации.

В связи с этой ситуацией целью наших исследований было не только изучение технической эффективности препаратов, но и определение экономической эффективности их использования.

Фитосанитарная ситуация, смягчения воды, пшеница яровая, сохранение урожая, поражение болезнями, обработка фунгицидом, техническая эффективность, экономическая эффективность

ENVIRONMENTAL ASSESSMENT FOR RURAL AREAS OF ECO SYSTEMS

U. V. RIBALKO, Candidate of Pedagogical Sciences

R. V. BABKA, postgraduate *

National Agriculture University of Ukraine

The evaluation of the quality of soils investigated Economy Economy, agro chemical growth class mark to create further on its territory ekokompleksiv.

On the basis of the environmental assessment of soil farms proposed recommendations to improve crop yields through the use of mineral and organic fertilizers for optimum use of soil in the functioning of the economy ekokompleksiv.

Environmental Assessment, rural area ekokompleks, qualitative assessment of soil

At the present stage of development, humanity is faced with a number of crises, resource, economic, financial, social, economic, moral and ethical. Degradation of natural resources of the biosphere and worsening environmental crisis situation in individual regions and the world at large, giving reason to consider the growing demand for environmentally friendly product in all forms of expression.

The situation in rural areas, a number of threats to sustainable development. It is noted the high level of unemployment and labor migration, the decline of social infrastructure, deepening demographic crisis and disappearance of villages and environmental degradation. Overcoming the impact of inadequate economic growth in the countryside, accompanied by the spread of major business units with their low social and environmental responsibility requires the development of new models of rural development.

In this context, an important area of the revival of rural areas is the development of agro-tourism and eco-tourism, allowing tapping tourists to a natural resource that has not undergone the impact of technological development on the one hand and on the other, to give local people an incentive to preserve the resource potential of the region and social development in "partnership" with nature. [4]

Many scientists engaged in research and development of rural green tourism. A fundamental contribution was made by domestic scholars such

as M. Rutynskyy T. Luzhanska, Vladimir Vasiliev, A. Lyubitseva, G. Horishevskyy, Yu Zinko, J. Majewski, G. Shymechko. In the works of these researchers significantly expanded theoretical principles and practical aspects of development performed Rural Tourism [2]

The development of rural areas is one of the important conditions for the creation of ecological systems - systems designed to organize clean living space for groups of people who follow the UN concept of sustainable development and organize food through organic agriculture. This will ensure the attractiveness of rural areas as an independent center of life and economic activity, the development of local government to create socially responsible and organized civil society in rural areas, increase the attractiveness of living in rural areas, and protect nature, cultural attractions and recreational opportunities in rural areas.

The organization of ecological systems is usually a factor that encourages the identification, protection and rational use of natural resources. Currently, most European countries had a certification of natural and historical treasures, allowing identify the correct path of development of tourism and protection of national wealth.

Assessment area involves identifying the negative impact of human activities on components of nature, estimate the accumulation of waste. Related measures that are taken for analysis, there are emissions of pollutants and greenhouse gases into the atmosphere, generation of hazardous waste according to danger.

Accordingly, we offer to carry out an environmental assessment of rural areas with the use of the most important basic indicators - namely determining the quality of the soil.

The main sources of soil pollution are: industrial emissions, mobile sources of pollution in the industrial zones of accumulation is not recyclable waste, poorly functioning sanitation system. Some impact on soil contamination has disordered placement of toxic industrial waste produced as a result of industrial activities. In recent years, the use of fertilizers and pesticides has decreased significantly due to the deep economic crisis in the agricultural sector. However, the challenge still is storage. The loss of fertilizer storage reaches 20-30%. Around warehousing fertilizers and pesticides are formed pockets of high and dangerous contamination of soil. Especially dangerous in connection with violation of storage warehouses are unusable and banned pesticides and agrochemicals. [3]

As part of the land cadastre, land quality assessment is a scientific basis for rational and highly efficient use of land resources, increase soil fertility and crop yields. Performance appraisal of soil quality and land evaluation farms provide the necessary data quality assessment of land as the main means of production in agriculture, to compare soils and group productivity; make it possible to determine the most productive soils for growing crops of different groups; promote efficient use of fertilizers and agro conduct reclamation activities; assist in developing and implementing

zonal farming systems in determining areas for the cultivation of raw agricultural products from organic farming; enhance the productivity of natural grasslands and forest plantations; are important for the protection of soil degradation.

Consequently, the accounting and valuation of land quality is important and necessary conditions of its rational use and highly effective, means of further improving the efficiency of agricultural production [1].

The aim of the research was to assess the quality of soil management on agrochemical score growth class for creating further opportunities in its territory ekokompleksiv. To achieve this goal have been developed following tasks:

1. Assess and justify the level of security management for soil agrochemical indicators.

2. Identify qualitative assessment of soil management on agrochemical ball.

3. Justify conclusions and recommendations to improve the quality of soil management.

The object of the study was assessment of soil fertility management on agrochemical certification materials. The subject of the study were indicators of soil quality management SFG "Rossosh".

Agricultural Farm "Rossosh" was established in the crop for the purpose of cultivation of major crops. His farm production activities started in 2000 on the lands of the village council Lynovytskoyi Pryluky district, Chernihiv region.

The company is located 8 km from the district center - the city of Pryluky and 168 km from the regional center - c. Chernigov. This sector is quite advantageous administrative and economic provisions on what is railway and roads of regional significance Chernihiv - Nizhyn - Pryluky - Pyriatyn.

Assessment of the quality of soil management was performed using ecological and agrochemical land certification that takes into account ecological and agricultural chemical and agrochemical assessment in points defining class quality land.

Ekoloho-ta ahrohimichna pasportyzatsiya fields grasslands provodylasya as required Nakazu prezidenta Ukraine conference "On a continuous ahrohimichnu pasportyzatsiyu zemel silskohospodarskoho pryznachennya" on December 2, 1995 № 1118/95.

Struktura ekolohichnoho pasporta field zemelnoyi My options or areas in pryvedena normatyvnomu dokumenti - ISO 4288: 2004 quality soil. Pasport soil. GOST 17.4.2.03-86 ta 'Ohrana nature. Soils. Pasport soil. "

Ekoloho-ahrohimichnyy pasport ground - basic dokument tse, which zoseredzhena informatsiya its fertility (ahrohimichni, physicochemical ta ahrofizychni vlastyvoli) ta riven zabrudnenosti vazhkymy metalamy, zalyshkamy pestytsydiv ta toksykantamy other. It is developed for each okremo zemelnoyi areas nA based materialiv ahrohimichnoho,

radiolohichnoho ta monitoring other types of soils, including nA content vazhkyh metaliv and zalyshkiv pestytsydiv. Using ekolohe-ahrohymichnym pasportom soil, justifying zahody, spryamovani nA ratsionalne vykorystannya ta pidvyschennya soil fertility pokraschennya their ekolohichnoho stanu. The main documents that establish the legal basis of certification of land are: The Land Code of Ukraine (2002), the Law of Ukraine "On Land Protection" (2003), the Law of Ukraine "On state control over land use and protection" (2003), the Law of Ukraine "On evaluation of land "(2003), the Decree of the President of Ukraine" On the solid agrochemical certification of land "(1995). According to the Law of Ukraine "On Land Protection" on agricultural land every five years should conduct agrochemical examination of soil, control changes the quality of the soil, agrochemical certification of land.

Ecological and agrochemical certification of land in Ukraine is carried out using materials quality evaluation (appraisal) soils and performance of their sanitary condition. In its conduct guided guiding regulatory document "Continuous monitoring of soil and agrochemical Ukraine farmland"; method agrochemical certification of agricultural land [1].

During the execution of this work used field and laboratory methods of soil analysis indicators (Table. 1).

Results and discussion. Based on the results, we can say that the soil on the fields of economy number 1-4 have low security with a value of 102 to 113 mg / kg soil (for Kornfildom) area of 173 hectares. While the field № 5-6 area of 58 hectares have very low availability for this indicator, the value of nitrogen lehkohidrolizuyetsya ranges from 92-98 mg / kg soil (Table. 2). Such a situation could lead to an imperfect system of crop rotation on the farm (application monoculture for many years in the same field) and very low application of mineral and nitrogen fertilizers.

1. Performance evaluation of the quality of soils and methods of their determination

Indexes	The method of determining	Standards
Humus,%	According to the modification by Turina Price	ГОСТ 26213-84
Trace minerals: boron, zinc, manganese, copper, cobalt	Determination of mobile compounds of trace elements in the soil to extract ammonium acetate pH 4.8 by atomic absorption spectrophotometry	ДСТУ 4770.1-9:2007
Nitrogen, which is easily hydrolyzed mg / kg	For Kornfildom	МВВ 31-497058-006-2002

Rolling phosphorus, For Chirikov
mg / kg

ДСТУ 4115-2002

Currency potassium, For Chirikov
mg / kg

ДСТУ 4115-2002

Based on the results, we can say that the soil on the fields of economy number 1-4 have low security with a value of 102 to 113 mg / kg soil (for Kornfildom) area of 173 hectares. While the field № 5-6 area of 58 hectares have very low availability for this indicator, the value of nitrogen easily hydrolyzed ranges from 92-98 mg / kg soil. This situation could lead to an imperfect system of crop rotation on the farm (application monoculture for many years in the same field) and very low application of mineral and nitrogen fertilizers.

The content of mobile phosphorus in the plow layer soil situation in research fields as follows: the fields №1, 2, 5, 6, - soils are characterized by a high supply of (209-316 mg / kg soil area of 159 ha); field number 3 - the increased supply of (134.5 mg / kg soil area of 43 ha); was number 4 - supply of high (169 mg / kg soil area of 29 ha).

Based on the survey results we can say that the situation on the content of exchangeable potassium in the arable soil layer formed ambiguous because the soil for this indicator are characterized by increased content to very high. Thus, in the fields of number 1, 6 121 ha area of exchangeable potassium content in the arable soil layer is in the range 232-294 mg / kg soil (very high availability for gradation technique Chirikov); field number 2, 4 area of 54 hectares - exchangeable potassium content ranges from 102 to 120 mg / kg soil (soil increased security for gradation technique Chirikov); field number 3, 5 area of 56 hectares - exchangeable potassium content was 125-166 mg / kg soil (high availability for gradation technique Chirikov).

2. Availability soil SFG "Rossosh" main agrochemical indicators

number field	Area, ha	Agroecological indicators of soil	Rating (supply ground)
1	76	The content of humus in the topsoil%	2,38
		(The method Turina ISO 4289: 2004)	108,6
		Nitrogen content that is easily hydrolyzed mg / kg (method Kornfilda)	209,4
		The content of mobile phosphorus, mg /	232,0

		kg (method Chirikov)		
		The content of exchangeable potassium, mg / kg (method Chirikov)	2,8	Low security
2	25	The content of humus in the topsoil% (The method Turina ISO 4289: 2004)	126,0 316,5	Low security Very high availability
		Nitrogen content that is easily hydrolyzed mg / kg (method Kornfilda)	102,0	Increased security
		The content of mobile phosphorus, mg / kg (method Chirikov)	2,48	Low security
3	43	The content of exchangeable potassium, mg / kg (method Chirikov)	102,2	Low security
		The content of humus in the topsoil% (The method Turina ISO 4289: 2004)	134,5 125,0	Increased security High security
		Nitrogen content that is easily hydrolyzed mg / kg (method Kornfilda)	2,55	Low security
4	29	The content of mobile phosphorus, mg / kg (method Chirikov)	113,4	Low security
		The content of exchangeable potassium, mg / kg (method Chirikov)	169,0	High security
		The content of humus in the topsoil%	120,0	Increased security
<i>Continued Table 2</i>				
		The content of humus in the topsoil% (The method Turina ISO 4289: 2004)	2,48 98,0	Low security Very low supply
5	13	Nitrogen content that is easily hydrolyzed mg / kg (method Kornfilda)	250,5	Very high availability
		The content of mobile phosphorus, mg / kg (method Chirikov)	166,0	High security
6	45	The content of exchangeable potassium, mg / kg (method Chirikov)	2,35	Low security
		The content of humus in the topsoil%	92,4	Very low supply

(The method Turina ISO 4289: 2004)	294,0	Very high availability
Nitrogen content that is easily hydrolyzed mg / kg (method Kornfilda)	145,0	High security

Based on the physiological and biological needs of different groups of crops on the content of trace elements in soils, there is a corresponding gradation optimal content of trace elements in soils in groups of cultures [5]: Culture low ash and high capacity for assimilation of trace elements (grain spiked culture, maize, legumes, potatoes) and increased removal of high and medium capacity to assimilate micronutrients (root crops, vegetables, herbs, sunflowers and fruit; removal of high culture (all with high culture of farming, high doses of fertilizers, highly productive variety) [5].

Calculations (Table. 3) show that under the provision of soil gradation mobile forms of microelements, soil management have very low availability of micronutrients Mn (2,2-8,52 mg / kg soil), Co (0,19-0,615 mg / kg), Cu (0,068-0,134 mg / kg), Zn (0,291-0,399 mg / kg) in the arable soil layer and high availability B (0,6-0,95 mg / kg soil).

Conclusions. In the course of this work the following conclusions.

1. The results of analytical studies observe that the humus content in the arable soil layer is from 2.35 to 2.48%, respectively, characterized by low security. Based on the results, we can say that the soil on the fields of economy number 1-4 have low security with a value of 102 to 113 mg / kg soil (for Kornfildom) area of 173 hectares. While the field № 5-6 area of 58 hectares have very low availability for this indicator, the value of nitrogen easily hydrolyzed ranges from 92-98 mg / kg soil. Such a situation could lead to an imperfect system of crop rotation on the farm (application monoculture for many years in the same field) and very low application of mineral and nitrogen fertilizers. The content of mobile phosphorus in the plow layer soil situation in research fields as follows: the fields №1, 2, 5, 6 - soils characterized by a high supply of (209-316 mg / kg soil area of 159 ha); field number 3 - the increased supply of (134.5 mg / kg soil area of 43 ha); was number 4 - supply of high (169 mg / kg soil area of 29 ha). Based on the survey results we can say that the situation on the content of exchangeable potassium in the arable soil layer formed ambiguous because the soil for this indicator are characterized by increased content to very high. Thus, in the fields of number 1, 6 121 ha area of exchangeable potassium content in the arable soil layer is in the range 232-294 mg / kg soil (very high availability for gradation technique Chirikov); field number 2, 4 area of 54 hectares - exchangeable potassium content ranges from 102 to 120 mg / kg soil (soil increased security for gradation technique Chirikov); field number 3, 5 area of 56 hectares - exchangeable potassium

content was 125-166 mg / kg soil (high availability for gradation technique Chirikov).

3. The content of mobile forms of trace elements in the plow layer of soil SFG "Rossosh"

number field	Area, ha	The content of mobile forms of trace elements in the plow layer of soil (Mg / kg soil)				
		Boron	Manganese	Cobalt	Copper	Zinc
1	76	0,72	8,52	0,288	0,094	0,348
2	25	0,6	2,2	0,56	0,134	0,291
3	43	0,7	2,9	0,615	0,133	0,325
4	29	0,6	8,5	0,209	0,068	0,345
5	13	0,65	3,8	0,450	0,072	0,399
6	45	0,95	2,45	0,19	0,094	0,307
Rating (supply ground)		The average availability	Very low supply	Very low supply	Very low supply	Very low supply

2. Environmental assessment of soil for the content of trace elements in soils showed that under the provision of soil gradation mobile forms of trace elements (for work Yahodina BA) farm soils have very low availability of micronutrients Mn (2,2-8,52 mg / kg soil), Co (0,19-0,615 mg / kg), Cu (0,068-0,134 mg / kg), Zn (0,291-0,399 mg / kg) in the arable soil layer and high availability B (0,6-0,95 mg / kg soil).

3. After evaluation of the quality of soil management SFG "Rossosh" can be noted that soils require the use of significant management measures. It would be the farm structure in rotation include legumes that have helped enrich the soil nitrogen reserves, improve water-physical soil properties and level of fertility. Also effective way for improving soil fertility is the use of nitrogen-fixing green manure ("green manure"), including legumes (peas, beans, vetch, clover and lupine).

4. Organization ekokompleksiv be an important revenue in the general fund budget of the village, provided to strengthen the role of the state in the reproduction system tourism. Specifically authorities may carry out an active policy of engagement and attract the attention of potential customers.

Список літератури

1. Балаєв А. Д. Родючість ґрунту, її кількісна та якісна оцінка // Агрохімія і ґрунтознавство. Спеціальний випуск до VII з'їзду ґрунтознавців – Кн. 3. – Харків. – 2006. – С. 4-6.

2. Гловацька В. В. Сільський зелений туризм: сутність, функції, основні організації: [Про розвиток зеленого туризму (СЗТ) в Україні] / В. В. Гловацька // Економіка АПК. – 2006. – №10. – с. 148-155.

3. Рідей Н. М., Строкаль В. П., Рибалко Ю. В. Екологічна оцінка агробіоценозів: теорія, методика, практика. – Херсон: Видавництво Олді - плюс, 2011. – 568 с.

4. Лужанська Т. Ю. Сільський туризм: історія, сьогодення та перспективи / Т. Ю. Лужанська, С. С. Махлинець, Л. І. Тебляшкіна – К.: Кондор, 2008. – 385 с.

5. Якість ґрунту. Показники родючості ґрунтів: ДСТУ 4362:2004 – [Чинний від 01.01.2006 р.]. – Київ: Держстандарт України, 2006. – 23 с. (Національний стандарт України). (Soil quality. Indicators of soil fertility: DSTU 4362:2004 – [Valid from 01.01.2006]. – Kyiv: state standard of Ukraine, 2006. – 23 p. (national standard of Ukraine)).

Оценено качественное состояние почв исследуемого хозяйства по агрохимическому баллу бонитета с целью создания в дальнейшем на его территории экокомплексов.

На основе проведенной экологической оценки почв хозяйства предложены рекомендации повышения урожайности сельскохозяйственных культур путем внесения минеральных и органических удобрений, для оптимального использования почв хозяйства в функционировании экокомплексов.

Екологічна оцінка, сільська територія, екокомплекс, якісна оцінка ґрунту

**PROBLEM ASSESSMENT, CONSERVATION AND REPRODUCTION OF
AGRICULTURAL AREAS AS LIFE
AND ENVIRONMENT**

U. V. RYBALKO, Candidate of Pedagogical Sciences
A. I. BARANNIK, postgraduate *
National Agriculture University of Ukraine

Summery. This article explores the current state, problems of work, and restoration of natural resources, evaluation of socio-economic development, conservation and resource potential of rural areas. The basic methodological approaches to the implementation of a comprehensive assessment of rural areas.

Rural areas, integrated assessment, resource potential, natural resources, social infrastructure

Rural areas are important socio-economic and ecological subsystem of society, where the concentration of considerable human, natural and industrial resources and industries. Therefore, the development of these areas greatly strengthens the economy and improves the standard of living is the main condition for the stability of the state and strengthen its food security.

Natural resource potential of rural areas is the ability of natural resources, forests, land, water, directly or indirectly provide agricultural production. Increasing the rate of use of natural resources, agro-industrial complex cause a problem playing them. Irrational use of natural resources leads to a deepening of negative environmental impacts of pollution that requires problem solving playback resource potential based on a combination of rationalization and balance of nature, and especially in the agricultural sector of the economy.

Problems of natural resource rural areas researched in scientific works of such famous scholars as L.Bohush, O.Bulavka, Butenko, P.Haydutsky, Z.Herasymchuk, V.Horkavy, Danylyshyn, T.Zayats, R. Kosodiy, M.Kropyvko, A.Malynovskyy, V.Mesel-Veselyak, L.Myhaylova, V.Onyschenko, B.Panasyuk, V.Pyla, I.Prokopa, K.Prokopyschak, P.Sabluk, V.Trehobchuk O. tenacious, O.Cherevko, L.Shepotko. A.Yuzefovych, V.Yurchyshyn and others.

The aim is to study the current state, problems of functioning and restoration of natural resources, assessment of socio-economic development and protection of the resource potential of rural areas.

Results and discussion. Key competitive advantages of Ukraine - a natural, demographic, economic, historical and cultural potential of rural areas, rational and efficient use of which can provide stable and diversified development, full employment, high level and quality of life of the rural population.

Enhancing the role of rural areas in implementing strategic socio-economic transformation requires a comprehensive integrated approach to rural development as a socio-territorial subsystem of society that has a number of major national economic functions, including production, demographic, socio-cultural, environmental, recreational [1].

Recently, the concept of "rural areas" is widely used in the scientific literature, but determining their nature, content is still dominated by highly specialized approach, that every scientific discipline on the definition of the term "rural areas" singles out their own research. It consists of a discrepancy between the practice of this concept and the degree of scientific scrutiny applied [3].

Rural areas combine industrial and economic, political, social, natural ingredients, which are subordinated to local governments, public authorities and regulatory impact local communities, businesses and the public. All these components are divided into elements, properties which reveal their nature and define certain functions of rural areas. The nature of these spatial structures is manifested in the fact that production and economic activity within them is in direct connection with the natural environment. The results of these activities depend on natural resources, where the land is the main means of production, and not always for agricultural purposes, depending on the specifics of rural areas, their local circumstances.

Rural areas - is not only a spatial basis of production, but also the environment and the place of human activity. That's because of the man, his cultural and educational background, training, skills, motivation, desire and ability to work and manage efficiency depends territory. But, unfortunately, 0.5% Ukrainian peasants do not know how to read and write, about 10% have only primary education. And are not literate pensioners and young people who were born in the late 80's - mid 90 th century. [5]. Thus, rural areas, firstly, this vegetation, wildlife and people as biosocial being. Second, part of the village, located in the space.

Universal natural resource is land, which under current law is defined as the total land surface natural resource - spatial basis of settlement and economic activity, the main means of production in agriculture and forestry. The use of land as a territorial basis, natural resources and basic means of production is considered the Land Code of Ukraine as one of the principles of land legislation.

The development of the forestry sector will contribute not only to economic recovery timber industry and providing jobs that improve living standards in rural areas, but also improve the ecological situation in the region, performing water protection and water-regulating role, protecting soil from landslides, wind and water erosion.

Social infrastructure - an important component of social and economic development of rural areas [6]. As a set of sectors of the national economy, social infrastructure requires a coordinated systems approach in their development process that is provided by the coherence of regional and state authorities, self-organization of local communities, business initiative in the matter of social development of certain areas.

In the current economic conditions, the formation of an effective social infrastructure needs special attention, as the scope and level of quality of services has a significant impact not only on the harmonious development of demographic processes, but also the level of industrial development areas. For this purpose it is necessary to model the formation of assessing the level of social infrastructure in rural areas on which possible study of differentiation of development, social infrastructure components and their relationship and interaction.

The main methodological approaches to the implementation of a comprehensive evaluation of rural development become systemic, functional, target-oriented, synergistic. Based on the provisions of a systematic approach system of government to develop rural areas is seen as a complex dynamic, holistic, consisting of management and managed subsystems channel flow management information transmission channel state information control system managing and generates and displays its properties in the process of interaction with the environment and here is the active component of this interaction. [7] It is a systematic approach to the study of the object of study requires the formulation of the problem, goals and objectives of the study, the structural analysis of the object, its development concept development, analysis of problems and their solution modeling, synthesis management problems of rural development and decision making his support.

Applied functional approach has led to the need to identify the characteristics of managerial influence on the functioning and efficiency of industrial and agricultural enterprises; Reproduction countryside and its demographic potential; introduction of a system of social services; maintenance of ecological balance favorable to human life and activity of the environment and restore natural resources; providing rehabilitation, rest and recreation in rural areas; preservation and development of traditional culture and some of their elements.

Target-oriented approach to the regulation of rural development Administrative Region provides for the definition of objectives, the main goal and intermediate results (specialization of agricultural production, production in a given volume, delivery times, priorities), and synergistic

approach - taking into account the absence of a clear and mandatory cause-effect dependence, stochastic nature of natural and economic systems, the probability of a random display of varied areas of development and wide involvement, along with quantitative analysis of qualitative methods.

Definition of socio-economic development of rural areas should be based on an assessment of their integrated development. The complexity of rural area development first define its economic, social and environment components. These components provide a specific set of research methods, which complicates the overall system evaluation of rural development.

Assessment involves determining economic development district levels to ensure natural resources, economic development, investment attraction area, entrepreneurship, development of transport communications. The main indicators are: the ratio of the territorial diversity of natural resources [8], the share generated gross output, which accounts for one of the residents, investment in fixed capital per capita, share of small enterprises in the production area, coefficient of Engel, who describes the security area transport communications. [9]

Evaluation of Social Development provides an analysis of share structure and employment area, assess level of unemployment, average wages, provide public goods and services and their availability. Related measures that are taken for analysis, the share of agricultural employment, unemployment rate, average wages, turnover per capita, the amount realized services on one person.

Environmental Assessment involves determining the negative impact of human activities on components of nature, estimate the accumulation of waste. Related measures that are taken for analysis, there are emissions of pollutants and greenhouse gases into the atmosphere, generation of hazardous waste according to danger.

Evaluation demographic status involves analysis of demographic trends, the characteristics of the territory and population of rural population settlements. The corresponding figures are taken for analysis, there is a natural increase of population (including natural growth compared to the total population), population dynamics, net migration of rural population, its density, population size of rural settlements. [7]

The functions of rural areas are diverse and include the following: production function - to meet society's needs for food and raw products for different industries and types of business activities; Socio-demographic function - reproduction of the rural population, provision of agriculture and other sectors of labor resources, significant human capital; cultural and ethnic storage feature original national culture, traditions, customs, rituals, folklore, experience agriculture and natural resources, protection of monuments of nature, history and culture, located in rural areas; ecological function - maintaining the ecological balance in rural areas and throughout

the country, maintenance of parks, game reserves, national parks, etc .; recreational function - to create conditions for health recovery and rest of urban and rural population; space-communications function - to provide a basis for spatial distribution of production and service utilities (roads, power lines, communications, water supply, etc.); function of social control over the territory - promoting rural public authorities to ensure public order and security in the settlements and territories.

Conclusions. For the full functioning of agricultural products in all categories must define areas of land reform, the priority measures which should be aimed at making an inventory of land; develop pilot projects on land of local farms; upgrade planning and cartographic materials; regulatory monetary value of land; revival of life in radiation-contaminated areas.

The main methodological approaches to the implementation of a comprehensive evaluation of rural development is systemic, synergistic, functional, problem-target. They make it possible to analyze the system of government rural development; identify system goals, the main goal and intermediate results; take into account the lack of a clear and mandatory cause-effect relationships, the stochastic nature of natural and economic systems, the probability of a random display of directions of development; identify particular administrative impact on the functioning and effectiveness of rural development.

Considered the definition of "rural area" is generalized, or are focused on agricultural activity of these areas, or covered in terms of economic, environmental, social and energy security in the administrative-territorial entity. The essence of rural areas, their differentiation by levels and types, we conclude that they have many functional, multi, biological, sociological, ecological and economic system that develops in space and time and is under the management of NGOs, businesses, local governments , public authorities. Rural areas can typizuvaty as a natural, industrial, social environment or habitat in the broadest sense.

General algorithm study of rural development Administrative Region provides an assessment of the overall socio-economic development; justification of the main criteria for the diagnosis and identify the factors that determine it; evaluation of major subsystems; forecasting of socio-economic development and the development programs of rural development.

Список літератури

1. Прокопа І. Сільські території України: дослідження і регулювання розвитку / І. Прокопа // Економіка України. – 2007. – №6. – С. 50-59.
2. Топчієв О. Г. Суспільно-географічні дослідження: методологія, методи, методики: [Навч. посіб]. – Одеса.: Астропринт, 2005. – С. 175-176.

3. Павлов О. І. Сільські урбанізовані зони і ареали як специфічний об'єкт функціонування та управління // Вісник державної служби України. – 2005. – №3. – С. 34-38.

4. Малік М. Й. До питання сталого розвитку сільських територій/ М. Й. Малік // Економіка АПК. – 2008. – №5. – С. 51-58.

5. Барановський М. О. Наукові засади суспільно-географічного вивчення сільських депресивних територій України [Моногр.] / М. О. Барановський. – Ніжин: ПП Лисенко М. М. – 2009. – 396 с.

6. Бородіна О. Сільський розвиток в Україні: проблеми становлення / О. Бородіна, І. Прокопа // Економіка України. – 2009. – № 5 (570). – С. 59-67.

7. Гончаренко І. В. Ретроспектива формування сільських територій регіонів України / І. В. Гончаренко // Регіональна економіка. – 2008. – №3. – С.204-209.

8. Павлов О. І. Сільський розвиток та розвиток сільських територій: процесуальний та об'єктний прояви / О. І. Павлов // Економіка, фінанси, право. – 2009. – № 7. – С. 17-20.

9. Прокопа І. В. Соціальні аспекти розвитку сільських територій / І. В. Прокопа // Економіка АПК. – 2005. – № 11 (133). – С. 48-51.

В статтє исследовано современное состояние, проблемы функционирования и воспроизводства природных ресурсов, оценки социально-экономического развития и сохранение ресурсного потенциала сельских территорий. Приведены основные методические подходы к реализации комплексной оценки сельских территорий.

Сельские территории, комплексная оценка, ресурсный потенциал, природные ресурсы, социальная инфраструктура

SANITARY-HYGIENIC EVALUATION SYSTEM GREENERY PROSPECTIVE MEGAPOLIS LANDSCAPE OF MANOR

***I. G. RUBEZHNYAK, Candidate of Biology Sciences
A. O. Palamarchuk, student CMO "specialist"
National University of byoresursov of nature and Ukraine***

The article discusses the necessity of change of the modern metropolitan organization to landscape-estate urbanization as one of the stages in the decision of biosphere-ecological crisis and presents sanitary-hygienic evaluation of the green plantation in the prospective pedestrian and bicycle settlement

Metropolis, landscape-estate urbanization, green spaces, sanitary-hygienic assessment

By the look of the modern city, the yard, the house meets urban science - urban studies. With modern design and construction of cities violated a reasonable measure of the density of the population and this directly affects the urban population, which is manifested in the ever deteriorating health, many kilometers of traffic jams, pollution of the city and surrounding areas of the metropolis, in the ultra-high prices for housing, etc.

Along with the process of urbanization in the world, it is gaining momentum opposite process - the de-urbanization. Every major city accumulates over time green ring of houses and gardens, which are constantly relegated to the periphery of urban development. People feel the unnaturalness of the urban environment and for the most part unconsciously, tend to nature. de-urbanization process occurs spontaneously and become not an alternative, but only modifications Metropolitan Area suburban urbanization since close

Scraps suburban areas are not sufficient for a full life and serve as a resting place during the weekend. [3]

Valuable alternative to both urban and suburban modification Metropolitan Area of urbanization should be in the future landscape manor urbanization principles and which device is addressed in some detail numerous models of low-rise settlements. Landscape and manor urbanization, in contrast to the Metropolitan Area, creates the conditions for the disclosure of intellectual and creative potential of every human being, reproduction biologically healthy population, as well as the biosphere-enter a valid way housing and economic activities of people in nature [1].

Important parameters of low-rise settlements are the settlements area, which provides a comfortable movement of people for work (studies) and home. settlement size should be such that the travel time on foot from the most remote point of the village center was no pain for 25-30 minutes, and the population must be at pains 2500-3000 inhabitants, that every man may be personally acquainted with at least part of the third the total number of inhabitants. Since the average velocity of a pedestrian 3 - 5 km / h, the optimum diameter of the settlement is within 4km. And as a major factor in the city pollution is road transport, it is proposed to make the settlement of pedestrian and bicycle type. To ensure the basic needs of the inhabitants of the settlements of low-rise landscape manor type (products, consumer goods) used road [4].

The purpose of research - to find the optimal parameters of noise, gas and dust strip along the 2-kilometer stretch of two-lane road that connects the village center and its suburbs. This guard band is a thick multilayered planting specially selected trees and shrubs and is an effective obstacle to the spread of noise and car exhaust fumes.

Materials and methods of research. In accordance with the comprehensive protection of roadside territories protective green areas have the following parameters:

- Bandwidth of not less than 10 m;
- The height of the tree must be not less than 7 - 8 m;
- Height of the bushes - at least 1.5 - 2 m [4].

The cross profile of the guard band must have a triangle shape with a flat side facing the source of contamination (i.e., to the roadway).

The layout of trees and shrubs in the band shown in Fig. 1



Fig. 1. Scheme of noise-gas and dustproof plants

1 row on the road - a low shrub, 2 row from the road - a tall shrub, 3 row from the road - related tree species, 4 row from the road - the main tree species, 5 number of road - related tree species, 6 series from the road - a tall shrub .

In the selection of tree species for the guard band is taken into account their resistance to the action of the exhaust gases of vehicles [9].

Results and Analysis of the noise characteristics of traffic flows in the city on two-way roads having from 2 to 6 bands, 73 - 86 dBA.

Of the options we selected noise-reducing plantings chess variant three-row three-lane system of greenery width of 33 m with the distances between strips of 5 m (Figure 2), which can reduce noise levels by 10 - 16 dB [5]. For the desired noise reduction must be two such three-band system. The planned protection zone will reduce the noise level of 30 dBA to 55 dBA, which corresponds to sanitary norms noise around buildings during the day [7].

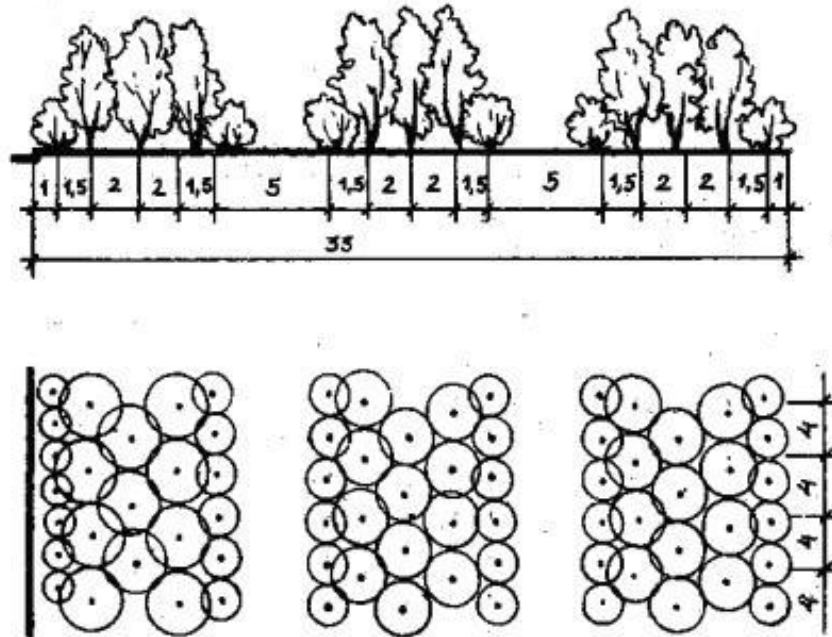


Fig. 2. Option noise protection landscaping strip with an efficiency of 10 - 16 dB.

Each strip consists of three rows of trees. Central row planted with oaks and extreme formed two rows of black alder trees. One hectare of three-lane system is a plot of 33 meters to 303 meters. Then in the same row should be planted $303/4 = 76$ trees. In one three-lane system 9 rows of trees, and their total number to 1 hectare will be $76 \times 9 = 684$. The area of the protective strip along the two-kilometer section of the road has a width of 33 meters and is $2000\text{m} \times 33\text{m} = 66000 \text{ m}^2$, or 6.6 hectares. The total number of trees - $6,6 \times 684 = 4514$ pcs.

To reduce the noise level of the above parameters to use two systems of three-band on each side of the road. The width of such a protective landing will be $2 \times 33 + 5 = 71$ m on either side of the road, and the number of trees $4514 \times 4 = 18056$, of which one third - Oaks (6018) and two-thirds (12 038) - black alder. The total area of landscaping strip located on both sides of the road is $71 \text{ meters} \times 2000 \text{ meters} \times 2 = 284,000 \text{ m}^2$ or 28.4 ha. For sanitary and hygienic assessment of the projected landscaping strips used specific indicators "average rock." Latest obtained by averaging the

Oak (6018 шт.)	8425,20	1685,04	601,80	-	105,48	-	-	-	-
Alder black (12038 шт.)	32502,60	6500,52	1203,80	-	406,94	-	-	-	-
Total	40927,80	8185,56	1805,60	213000	512,42	897440	426	9,94	71000

The growing season of trees 170 days was adopted protective band, the average time of vehicular traffic 12 hours a day. Then the time of the traffic during the growing season - 2040 hours. Next, determine the amount of lead absorbed by the trees of the proposed saw-noise-protection strip, in one hour:

$$MLI = 1805.6 / 2040 = 0.885 \text{ kg / ha * h.}$$

Mli shows how much of the pollutant will allocate a certain type of vehicles on this stretch of road at a certain speed (30 - 45 km / h).

Mass emissions of pollutants by different types of vehicles is calculated according to the formula

, (1)

where: - M_{li} - emission probegovy pollutant k-th car settlement group, kg / km [2]

- l_n - The length of the n-th driving of the input or output direction, km,

- m_{lik}'' - Car traffic k-th settlement group on the n-m stretch of input or output, the authors / h [2].

From the above formula is calculated allowable intensity of the car traffic in the 2-kilometer stretch of road settlements of low-rise landscape and farmstead type:

$$\text{– от РЛА – } N_k = \frac{M_{li}}{m_{lik}'' l_n} = \frac{0,885}{0,00002 * 2} = 22125 \text{ авт./час, или}$$

$$\text{– от РГАБ – } N_k = \frac{M_{li}}{m_{lik}'' l_n} = \frac{0,885}{0,00003 * 2} = 14750 \text{ авт./час, или}$$

$$\text{– от РАБ – } N_k = \frac{M_{li}}{m_{lik}'' l_n} = \frac{0,885}{0,00004 * 2} = 11062 \text{ авт./час.}$$

Similar calculations were made for sulfur dioxide (SO₂):

$$M_{li} = 512,415 / 2040 = 0,251 \text{ kg / ha * h.}$$

Then the allowable traffic cars on this stretch of road where the trees guard band effectively absorb sulfur dioxide:– от РЛА –

$$N_k = \frac{M_{li}}{m_{lik}'' l_n} = \frac{0,251}{0,00007 * 2} = 1793 \text{ авт./час, или}$$

$$- \text{от РГАБ} - N_k = \frac{M_{li}}{m_{lik}^n l_n} = \frac{0,251}{0,00021 * 2} = 598 \text{ авт./час, или}$$

$$- \text{от РАБ} - N_k = \frac{M_{li}}{m_{lik}^n l_n} = \frac{0,251}{0,0003 * 2} = 418 \text{ авт./час.}$$

Conclusions. The results of calculations show that the road pedestrian and cycling settlement serving for the passage of vehicles, service trade and domestic enterprises settlement designed protective strip will almost completely absorb these air pollutants. Also not taken into account in the calculation of the data on the absorption of pollutants shrub and herbaceous vegetation that make up the belts. Observations carried out on roads show that an ordinary two-way street, which has roadway width of 7 - 7.5 m in both directions can skip around 2,000 vehicles / h, ie, almost as much as the one lane multilane highway.. This is explained by interference with the oncoming traffic on the narrow roadway. [10] The projected low-rise settlements landscape and country type is planned that the main mode of transportation is a bicycle transportation as a more environmentally friendly form of transport. Road transport will be present in a small amount and will serve only the specific problems of the population. Based on our calculations, it will be enough for noise and gas pollution absorption motor road a three-lane system of green spaces.

Список литературы

1. Асаул А. Н. Теория и практика малоэтажного жилищного строительства в России. / А. Н. Асаул, Ю. Н. Казаков, Н. И. Пасяда, И. В. Денисова – СПб.: «Гуманистика», 2005. – 563 с.
2. Дьяков А. Б. Методические указания к дипломному проектированию по разделу «Безопасность жизнедеятельности»./ А. Б. Дьяков, Ю. М. Кузнецов, А. В. Рузский – Московский государственный автомобильно-дорожный институт, 2001. – 23 стр.
3. Мера в урбанистике: пояснительная записка к модели поселения МП № 1 (спираль). – Санкт-Петербург – Гатчина, 2012. – 89 с.
4. Методические рекомендации по озеленению автомобильных дорог. – Москва, 1998 г.
5. Методические рекомендации по учету шумового загрязнения в составе территориальных комплексных схем охраны среды городов. – Ленинград, – 1989 г.
6. Лакида П. І. Нормативи оцінки компонентів надземної фіто маси дерев головних лісотвірних порід України / П. І. Лакида [та інші] – К.: Видавничий дім «ЕКО-інформ», 2011. – 192 с.
7. Парамонов Е. Г. Основы лесоводства и лесопаркового хозяйства: [учебное пособие] / Е. Г. Парамонов, А. А. Маленко – Барнаул: Издательство АГАУ, 2007. – 170 с.
8. Рубежняк І. Г. Методичні рекомендації для проведення лабораторних робіт з дисципліни «Екологія міських систем» / І. Г. Рубежняк – НУБіП України. – Київ, 2012.

9. Руководство по разработке раздела «Охрана окружающей среды» к проекту планировки (реконструкции) жилого района. – Москва, 1998 г. – 55с.

10. Пропускная способность дороги [Электронный ресурс] – <http://www.drivingplus.ru/driving/dorojnoe-dvijenie/5.html>

У статті розглядається необхідність переходу від сучасної мегаполісної організації до ландшафтно-садибної урбанізації як одного з етапів у вирішенні біосферно-екологічної кризи, а також представлена санітарно-гігієнічна оцінка системи зелених насаджень у перспективному пішохідно-велосипедному поселенні

Мегаполіс, ландшафтно-садибна урбанізація, зелені насадження, санітарно-гігієнічна оцінка

ANALYSIS OF QUALITY CROP PRODUCTION (FOR EXAMPLE Pasta)

V. P. STROKAL, Candidate of Pedagogical Sciences
A. O. OKTYSYUK, student level "Master"
National Agriculture University of Ukraine

This study analyzed the indicators assessing the quality of plant products, and their safety. We compared regulatory documents of Ukraine with European, which ensure quality and safety of plant products. Methodological provision to ensure an environmental control of the quality for crop production is discussed in the study. We determined organoleptic and physic-chemical parameters of pasta (as an illustrative example of plant products) to check its quality. We developed a five-point scale to rank quality parameters of pasta products taken from different economic brands accurately. As a result, the quality level of pasta products was identified.

Quality, plant products, safety of plant products, environmental control

Today there is a problem of product quality inconsistencies state standards. Market filled with enough variety of products, but everyone is trying to choose what is safest for his health and the health of loved ones. When we talk about quality, we always believe that high quality is accompanied by a high price; so in many cases it is quite a significant figure, but unfortunately often uses commodity marketing approach. Therefore, you should pay attention on the quality of established standards and regulations, including the need to consider the basic regulations governing issues such as: ISO 4661, ISO 22000, ISO 18001, the Law of Ukraine "On the safety and quality of food» of 23 December 1997 r. number 771/97-BP, the Law of Ukraine "on ensuring sanitary and epidemiological welfare of population» of 24 February 1994 r. number 4004-XII, Law of Ukraine "on plant quarantine" on June 30, 1993 r. number 3348-XII, The Law of Ukraine "on the production and turnover of organic agricultural products and raw materials" of 3 September 2013. Number 425-VII, Resolution № 903 "Issues of the National Commission of Ukraine Codex Alimentarius." The study of these issues were in sight of scholars such as GI Podpryatov, VI Voitsekhivska, LM Maciejko, VI Rozhko [5] VM Poznyakovskyy [6] and others.

Consideration of crop production in the ecological aspect implies that the impact on human health, animals and, generally, the environment is one of the stages of production (field preparation, planting, gathering, production of

finished products). The issue of environmental safety and quality of crop production are reflected in the works of scholars such as A. Belyehina [4] T. Dyman [1] T. Mazur [2] L. Donchenko, T. Plotnikov [4], VM Poznyakovskyy [6] IA Rogov [7] and others.

It is worth noting that the competitiveness of crop production, primarily depends on its compliance with the requirements of the labor market, regulations and standards that determine its safety for consumers and the environment in general. The experience of many generations, the presence of unique fertile black soil, favorable geographical location, significant scientific potential form the basis for the formation of the legal framework and technical regulations to encourage the development of agricultural production as crop production will be competitive only when it will meet all environmental standards and requirements.

The aim - to analyze key indicators of quality of plant products (for example, pasta) and theoretically justify the methodological and regulatory support quality and competitiveness of pasta. Object of study - match the quality indicators of pasta to ISO 7043-2009 "Pasta. Specifications". Research objectives: to analyze key indicators of quality, safety and competitiveness of crop production; conduct a comparative assessment of the regulatory framework to ensure the quality and safety of plant products in Ukraine and the EU; justify the methodological quality control crop production; to analyze the organoleptic and physico-chemical parameters of quality of crop production on the example of pasta; set the quality of pasta; make scientifically grounded conclusions and recommendations to improve the competitiveness of the market.

Materials and methods of research. To address the problems of implementation of the objectives of the study were used theoretical methods - theoretical analysis of the legal framework to ensure the quality and safety of plant products, methodological quality control crop production; empirical (laboratory) - organoleptic and physico-chemical methods for determining the quality of pasta (ISO 7043-2009 "Pasta. Specifications").

Research conducted during the 2013-2014 biennium. In educational research and production laboratory environmental assessment and certification areas and businesses NUBiP Ukraine and the Institute of Surface Chemistry. AA Chuiko NAS of Ukraine. In the laboratory determined the organoleptic and physico-chemical quality of pasta on the methods specified in ISO 7043-2009. Designed for precise five-point scale ranging indicators of quality of different brands of pasta, determination of physical and chemical parameters by drying, titration and mathematical calculation of mass fraction crumbs.

Results and discussion. Problems of quality and safety of any consumer product, regardless of the scope of production, will always have the highest relevance, since they are directly related to the life and health of the population. Such products differ only in terms of the impact on the natural values of these people. If industrial output performs quite the impact on local people, the agricultural products which are the basis of food, due to the large prevalence

and frequency of domestic consumption, a serious demographic factor [3]. Leading substantive talk about the quality and safety of plant products should, above all, reveal the essence of these categories. Immediately it should be noted the lack of regulatory consolidation on agricultural products. Quality, as well as its concepts were centuries-old path of development (Table. 1), from Aristotle to the present day.

Quality developed in proportion as evolved uriznomanitnyuvalysya and were increasing public spending and increased production capacity and meet them. Particularly dynamic process of development and change substantially the quality of its parameters occurred in recent decades, when rapidly changing directly quality concept, requirements and approaches to it [5]. Thus, the quality of products - a total description of the main characteristics that define the ability to meet the relevant needs of the most appropriate and economical way directed. A safe food product that does not create harmful effects on human health, directly or indirectly, under the conditions of its production and circulation in compliance with sanitation and consumption (use) by appointment. [3]

1. The historical evolution of the concept of quality

Author the formulation	The wording of the definition of quality
Aristotle (III century BC.)	The difference between objects - differentiation on the basis of "good - bad"
Hegel (XIX c. BC)	Quality is, first of all, being identical with and knowledge
Chinese version	The character, which means quality, consists of two elements - "balance" and "money" (money + money = balance), so the quality is identical to the concept of "high quality", "expensive"
Shuhart (1931)	Quality has two aspects: objective physical characteristics; subjective side thing as "good"
Oykava K. (1950). J. Juran. M. (1979)	Quality - a property that really satisfies consumers Suitability for use (compliance purposes). Quality is the degree of customer satisfaction (to implement quality manufacturer must determine customer requirements and make their products such that it satisfies these requirements)
GOST	15467-79 Product quality - a set of product properties that contribute to its suitability to meet the specific needs according to its purpose
International standard	Quality - a set of properties and characteristics of the products or services that give it the ability to meet the needs caused or alleged

Unlike the European, Ukrainian legal framework focused on the subject of conformity "de facto" mandatory standards (ISO), not on food safety. Below are summarized the characteristics of legal systems of the EU and Ukraine that regulate food safety (tab. 2).

A comparative analysis of quality assurance and food safety, including crop production in Ukraine and the EU. Established a number of key differences, namely the European Parliament provides clear principles and mechanisms for the construction and operation of a national food control system that is unpredictable Ukrainian legislation; European countries there is a legislative framework for regular review of legislation on food safety, including through counseling stakeholders, but in the Ukrainian legislation focuses on the credentials of representatives of state regulatory agencies; Ukrainian legislation in the field of quality and food safety corresponds to a greater extent the principle of "presumption of guilt", and in European legislation is based on the principle of "due diligence"; Ukraine has a limited number of certified testing laboratories to comply with international quality standards (ISO 17025), which causes problems in the study of product quality and safety and so on.

2. Characteristics of the legal systems of the EU and Ukraine

EU model	UKRAINIAN MODEL	COMMENTS
Mostly focused to achieve the objective and to the final product	Requirements for premises and equipment	The quality and safety of final Products mainly provided through the legislative process requirements
Flexibility in development process	Requirements as mandatory regulations	Without the flexibility of the process can not be effectively introduce advanced technology and innovation
Requirements for safety food Depending on the level of risk Control focuses the final product	Food safety products - is expected indirect consequence precision compliance with detailed rules	In fact, the rules are not always guarantee safety and if and ensure that the most effective way
Traceability	Lack of track origin	In fact, the rules are not always guarantee safety and if and ensure that the most effective way

A study was conducted organoleptic characteristics of pasta on their compliance with ISO 7043-2009, the results are presented in Table 3. For the study used different brands, both domestic (TM "Chumak", JSC "Chumak" TM "La'Pasta" LLC "Terlych" - Ukraine) and imported (TM "Di Martino", TM "Santini", TM "Don Valerio" - Italy, TM "Auchan" - France). The results of organoleptic characteristics can be said that the quality of pasta is within the parameters of the standard (ISO 7043-2009), except for minor deviations in terms of "taste" samples №3, 4, 5 have been conducted to establish the level of quality pasta claim ' yatybalnoyu scale (tab. 4), which made it possible to show the quality of pasta on the market of Ukraine.

4. The scale of quality pasta

Point grading (evaluation)	The characteristic organoleptic quality score
Колір	
5	Single color with a cream or yellowish, the appropriate type of flour
4	Single color of cream, brown shade, appropriate type of flour without trace nepromisu
3	Single color with a yellowish tinge, with traces nepromisu
2	A monochromatic grayish hue
1	A monochromatic grayish hue, with traces nepromisu
Surface	
5	The surface is smooth with no slight roughness
4	The surface is smooth, allowed a slight roughness
3	The surface is dull damages (Lohman products 2%)
2	The surface is dull damages (Lohman products 3.5%)
1	Surface dull Lohman products exceed 5%
Form	
5	Compliant product type
4	Meets the type of product, with little mushrooms
3	It has a certain deviation from the shape of the product
2	Uneven, wavy, form does not meet product type
1	Not appropriate for the type of product
Taste and smell	
5	Characteristic for pasta without foreign smell
4	Characteristic for pasta
3	Inherent in this type of products, with a slight odor of flour
2	With foreign smell taste not characteristic of the product
1	Products are uncharacteristic smell of pasta and not a pleasant aftertaste
Condition cooking	
5	Well preserved shape after cooking, not seethe not matted
4	Retained shape, slightly matted, not seethe not formed lumps
3	Almost preserved form, but seethe and matted
2	Not kept its shape, matted, seethe formed lumps
1	Not kept its shape, matted, formed clumps, went to the seams

5. Results of the quality of pasta on a five point scale

Indicator	The sample					
	Pasta TM type figure «Chumak»	Pasta TM type figure «La'Pasta»	Pasta TM type figure «Di Martino»	Pasta TM type figure «Santini»	Pasta TM type figure «Don Valerio»	Pasta TM type figure «Auchan»
Color	Single color with a grayish tinge	Single color with yellow hue corresponding type of flour, with no trace nepromisu	Single color with a cream shade, appropriate type of flour, with no trace nepromisu	Single color with yellow hue corresponding type of flour, with no trace nepromisu	Single color with yellow hue corresponding type of flour, with no trace nepromisu	It has a brown hue corresponding type of flour, with no trace nepromisu
points	2	5	5	5	5	4
Surface	Smooth	Smooth. With low roughness	Smooth. With low roughness	Smooth	Smooth. With low roughness	Smooth. With low roughness
points	5	4	4	5	4	4
Form	Compliant product type	Compliant product type	Compliant product type	Compliant product type	Compliant product type	Compliant product type
points	5	5	5	5	5	5
Taste and smell	Inherent in this type of products, with a slight odor of flour	Inherent in this type of product, without foreign taste and smell	Inherent in this type of products, with a slight odor of flour	Inherent in this type of products, with a slight odor of flour	Inherent in this type of products	Inherent in this type of product sweet taste
points	3	5	3	3	4	4
Condition cooking	Retained shape, slightly matted, not seethe not formed lumps	Well preserved shape after cooking, not seethe not matted	Well preserved shape after cooking, not seethe not matted	Well preserved shape after cooking, not seethe not matted	Retained shape, slightly matted, not seethe not formed lumps	Well preserved shape after cooking, not seethe not matted
points	4	5	5	5	4	5
average rating	3,8	4,8	4,4	4,6	4,4	4,4

Using the specified scale (Table. 4) was set organoleptic assessment of data quality samples pasta, evaluation results listed in Table 5. According to the selected criteria results interpretation organoleptic evaluation scale set of product quality (tab. 6).

Based on the survey results can be noted that the excellent quality with pasta brands: TM «La'Pasta» - 4,8 points and TM «Santini» - 4,6 points; others were rated "good", but nevertheless TM "Chumak" received the lowest score - 3.8, due to not quite appropriate color compared with other samples and the presence of a slight taste of flour. If a comparative description of price indices, the TM «La'Pasta» not only has excellent quality organoleptic characteristics, but also the most affordable price with all the above-mentioned brands, so we see that the domestic manufacturer is very competitive on the market of Ukraine and abroad.

Physical and chemical properties of pasta were identified by drying, titration and mathematical calculation of aggregate content by ISO 7043-2009. Results of the study are listed in the table (tab. 7).

6. Scale assessment of the quality of pasta

Assessment of quality	Points	Quality characteristics
«perfectly»	5,0-4,51	This product meets all the organoleptic characteristics of the standard. Sample the highest organoleptic requirements
«fine»	4,50 - 4,01	This product has good organoleptic characteristics and meets the requirements
«satisfactorily»	4,00-3,51	Pasta with unsatisfactory organoleptic characteristics that meet the requirements of standarts
«below satisfactory»	3,50-3,01	Pasta with poor organoleptic quality
«unsatisfactorily»	3,00-2,50	This pattern does not meet the standard in terms of quality

The results of the researches observe the following situation: all pasta samples were found deviations from the International Standard (ISO 7043-2009) for physico-chemical parameters, except for brand TM "Chumak", where the mass fraction of chips exceeds the norm and is 3 58%, while the permissible limits when the standard is no more than 1.5% for this type of products.

7. Results of the study as pasta for physico-chemical parameters

Quality score	TM "Chumak"	TM «La'Pasta»	TM «Di Martino»	TM «Santini»	TM «Don Valerio»	TM «Auchan»	According to the ISO standard 7043-2009
Humidity, %	12,9	12,5	12,8	12,3	12,9	12,9	13
Acidity, deg.	3,11	2,64	3,21	3,43	3,63	3,32	4,0
Mass fraction crumbs, %	3,58	0,125	0,37	0,19	0,004	0,003	до 1,5

Conclusions

1. The level of competitiveness is primarily dependent on such indicators as quality and safety of plant products. Safety, in turn, ensured the absence of any hazard exposure: no GMOs, radiation contamination of heavy metals and synthetic compounds harmful chemical elements and more. Quality depends on performance under safety, nutritional value of products of high organoleptic characteristics, appearance and packaging of the product.

2. Comparative assessment of the legal framework of Ukraine and EU legislation has revealed a number of differences that need to adapt Ukraine to EU requirements to achieve the national crop production of high quality and competitiveness not only in Ukraine but also abroad.

3. It was chosen the optimal method for determining the quality of crop production on the example of pasta as one of the most common crop in Ukraine and in the world. Defined quality pasta of various brands both domestically produced and imported. For defined organoleptic characteristics: color, surface, shape, taste and smell, condition after cooking, physical and chemical - moisture content (by drying), acidity (titration), the mass fraction crumbs (by mathematical calculation).

4. The results of the research showed that all samples of pasta are within applicable standards of Ukraine, while have the appropriate graduation in terms of quality, organoleptic - excellent quality with pasta brands TM «La'Pasta» (4,8 points) and TM "Santini" (4,6 points), while others were rated "good", but TM "Chumak" received the lowest score (3.8), which is not due corresponding color compared with other samples and the presence of a slight taste of flour. Physico-chemical parameters deviations from standard GOST 14 849 were found in all samples. The exception was the TM "Chumak", where the mass fraction of aggregate exceeded the norm by 2.08%.

5. It was found that TM «La'Pasta» not only has great quality on all indicators, but also the most affordable price on all brands listed above, indicating the competitiveness of domestic producers, both in Ukrainian market and abroad.

Список літератури

1. Димань Т. М. Екотрофологія. Основи екологічно безпечного харчування: [навчальний посібник] / Т. М. Димань, М. М. Барановський, Г. О. Білявський та ін. – К.: Лібра, 2006. – 304 с.
2. Димань Т. М. Безпека продовольчої сировини і харчових продуктів / Т. М. Димань, Т. Г. Мазур. – К.: Академія. – 2011. – 517 с.
3. Єрмоленко В. М. Аграрне право України: підручник / В. М. Єрмоленко, О. В. Гафурова, М. В. Гребенюк [та ін.] / За заг. ред. В. М. Єрмоленка. – К.: Юрінком Інтерю – 2010. – 608 с.
4. Плотникова Т. В. Экспертиза свежих плодов и овощей. Качество и безопасность / Т. В. Плотникова, В. М. Позняковский, Т. В. Ларина и др. – Новосибирск – 2005. – 299 с.
5. Подпратов Г. І. Основи стандартизації, управління якістю та сертифікація продукції рослинництва. Навчальний посібник / Г. І. Подпратов, В. І. Войцехівський, Л. М. Мацейко, В. І. Рожко. – К.: Арістей, 2004. – 552 с.
6. Позняковский В. М. Гигиенические основы питания, качество и безопасность пищевых продуктов / В. М. Позняковский. – Новосибирск: Сиб. унив. изд-во. – 2007. – 227 с.
7. Рогов И. А. Безопасность продовольственного сырья и пищевых продуктов: [Учеб. пособие] / И. А. Рогов и др. – Новосибирск: Сиб. унив. изд-во. – 2007. – 227 с.

Проанализированы основные показатели качества, безопасности и конкурентоспособности продукции растениеводства; проведена сравнительная оценка нормативно-правовой базы обеспечения качества и безопасности продукции растениеводства в Украине и странах ЕС; обоснованно методическое обеспечение контроля качества продукции растениеводства; осуществлен анализ органолептических и физико-химических показателей качества продукции растениеводства на примере макаронных изделий; разработана пятибальная шкала для точного ранжирования показателей качества различных торговых марок макаронных изделий; установлен уровень качества макаронных изделий.

Качество, продукция растениеводства, безопасность, экологический контроль

MICROCLONAL PROPAGATION OF STRAWBERRY (FRAGARIA ANANASSA DUCH.) ALINA SORT IN CULTURE IN VITRO

O. V. SUBIN, postgraduate *
National Agriculture University of Ukraine

The possibility of in vitro micropropagation of strawberry (Fragaria Ananassa Duch.) and the impact of growth regulators on the regenerative capacity of microrossetes was explored. The highest propagation coefficient have been found for the clones C3 and C4 of variety Alina with using nutrient medium MS supplemented with 1.0 mg/l BAP, 1.0 mg/l IBA, 0.1 mg/l gibberellic acid was 4.9 and 7.7 respectively.

Fragaria Ananassa Duch, microclonal propagation, in vitro

Strawberry - traditional fruit crops for consumers, which is cultivated in more than 60 countries with a total area of 254.5 thousand. Ha [6]. Strawberry is the main berries taste due to a significant, early ripening, high skoroplidnosti, its ability to assimilate nutrients lehko and predstavlyaye Mighty value as a product of dietary [3, 10]. A plastic strawberry crop. With the high level of farming can be grown in different climatic conditions, a ground closed in off-season it is possible to obtain marketable yield. [9]

The specifics of the current state of berry in Ukraine is that most of the strawberry acreage is on private land, small farms and in nurseries that are hard to control in terms of phytosanitary security. Mass planting material uncontrolled trade in species composition promotes pathogens and pests. This also leads to the fact that the spread of viral diseases becomes complex and in the future could become rampant. One solution to the problem of rehabilitation planting material of pathogens microclonal is a method of reproduction in conditions in vitro. In addition, this method can significantly accelerate the breeding and get quality, genetically uniform planting material [6].

Method microclonal strawberry breeding used since the early 60s [2, 5]. For growing strawberry isolates were used by different authors liquid and agar medium Murasihe-Skuha with various modifications. However, these various authors are not always consistent. The contradictory nature of wear and research results obtained during the study of the influence of various growth factors on morphogenesis isolates strawberry.

* *Supervisor Doctor of Biological Sciences, prof., Academician of NAAS of Ukraine Dr. M. Melnychuk.*

The aim - to study the features of morphogenesis strawberry isolated mikrorozetok depending on the composition of the culture medium.

Materials and methods. The basic material used plants of strawberry (*Fragaria Ananassa* Duch.) Clones of the variety Alina C3 and C4, a thing of actively growing creeping shoots, including youth outlet. Sterilization explants was performed in 0.1% solution of mercuric chloride (HgCl₂). Aseptic conditions created by methods conventional in biotechnology [5].

Explants were placed on a modified nutrient medium Murasihe-Skuha (MS) [1]. In studies used options with the addition of 6 different combinations and concentrations of auxin, cytokinins and gibberellins: Option №1 - 0,5 mg / l BAP (6-Benzylaminopuryn) variant №2 - 1,0 mg / l BAP, variant №3 - 1.5 mg / l BAP option №4 - 0,5 mg / l BAP and 0.75 mg / l IMC (β -indolilmaslyana acid) version №5 - 1,0 mg / l BAP, 1.0 mg / l IMC, 0.1 mg / l hiberelova acid variant №6 - 1,0 mg / l BAP, 0.1 mg / l IMC.

Cultivation was carried out in a thermal room at a temperature of + 25-26 ° C, relative humidity 70-75%, light 2.0 - 3.0 KLK and 14-hour photoperiod [7, 8].

For induction rhizogeny used three variants of culture media: 1 variant - hormoneless nutrient medium MS, option 2 - ½ MS with the addition of activated carbon, option 3 - ½ MS with the addition of 0.5 mg / l IMC.

To adapt plants regenerants to the conditions in vivo using peaty substrate and substrate using peat, perlite and sand in the ratio 3: 1: 1. In both cases, the effectiveness of adaptation was over 90%.

Statistical analysis of experimental data was performed using analysis package MS Excel.

Results and discussion. The work was carried out in several stages. The first step is the sterilization of explants, which serves as an important prerequisite for a successful microclonal reproduction. As the sterilizing agent used 0.1% solution of mercuric chloride. Sterilization was carried out in stages: first explants were washed 20 minutes. in soapy water, stirring constantly, then sterile explants immersed for 30 seconds in 70% ethanol, followed by transfer to 10 minutes. to 0,1% HgCl₂ and money in three portions of distilled water for 10 minutes. each.

In order to develop proper technique microclonal reproduction strawberry varieties Alina was investigated the influence of different growth regulators on the growth in culture of explants in vitro. We used 6 variants modified MS medium with different concentrations and compositions auxin, cytokinins and gibberellins (Table. 1).

1. Reproduction ratio micro outlets strawberry using different concentrations of phytohormones in terms *in vitro*

№ version	Alina clone C3						Alina clone C4					
	0,5 БАП	1,0 БА П	1,5 БА П	0,5 БА П 0,75 ИМК	1,0 БАП 1,0 ИМК, 0,1 гиБ	1,0 БА П 0,1 ИМК	0,5 БА П	1,0 БА П	1,5 БА П	0,5 БА П 0,75 ИМК	1,0 БАП 1,0 ИМК, 0,1 гиБ	1,0 БАП 0,1 ИМК
1	2	3	4	2	5	5	5	4	5	5	7	8
2	3	3	4	2	5	4	4	7	5	2	8	6
3	2	2	2	2	5	4	5	5	5	2	10	8
4	5	2	3	5	8	5	2	4	7	3	5	5
5	4	4	3	3	5	5	9	2	4	5	4	8
6	4	3	3	4	5	5	8	6	6	4	8	7
7	2	3	2	4	4	3	6	5	3	2	9	9
8	2	2	2	5	5	5	7	6	3	2	7	8
9	5	4	5	2	6	5	6	2	5	4	5	7
10	3	3	2	3	5	6	5	4	5	3	8	9
11	5	3	4	3	4	5	4	5	4	4	10	5
12	4	2	2	3	4	5	5	4	6	6	6	7
13	5	3	2	2	4	5	6	3	6	4	7	5
14	3	3	2	2	4	4	4	4	5	4	10	7
15	2	2	3	2	5	4	6	3	5	5	11	4
Σ	3,4	2,8	2,87	2,9	4,9	4,7	5,5	4,3	4,9	3,7	7,7	6,9

The data of Table 1 it can be concluded that the optimal environment for reproduction microclonal strawberry clones C3 and C4 have the option №5: 1,0 mg / l BAP, 1.0 mg / l IMC, 0.1 mg / l hiberelova acid (Fig. 1).

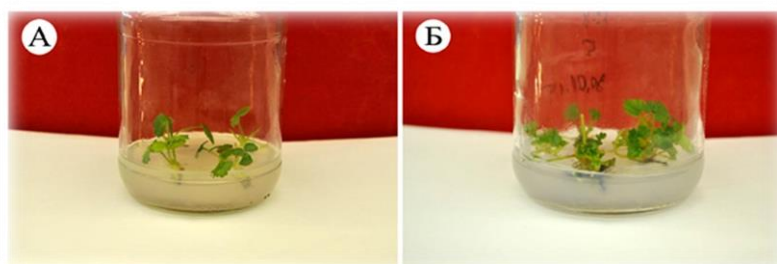


Рис. 1. The initial phase of morphogenesis shoots strawberry on medium MS + 1.0 mg / L BAP, 1.0 mg / l IMC, 0.1 mg / l hiberelova acid:

A - Alina clone C3, B - Alina clone C4.

This significant increase was observed explants and multiplication factor was: C3 - 4.9, C4 - 7.7. (Figure 2).



Рис. 2. This significant increase was observed explants and multiplication factor was: C3 - 4.9, C4 - 7.7. (Figure 2)..

It was found that with increasing concentrations of cytokines (B2: 1.0 mg / l BAP B3: 1.5 mg / l BAP) in explants clone C3 significantly reduced multiplication factor (2.8) in comparison with other variants environments. It should be noted that the plant propagation clone C3 happened more slowly in comparison to clone C4. For explants clone C4 minimum multiplication factor was in the version number 4 (0.5 mg / l BAP and 0.75 mg / l IMC) and made 3.7.

The third stage of our work was rooting process of plant-regenerants. By RG Butenko induction ryzonhenezu can call in several ways: the cultivation of shoots or plants regenerants in an environment with a small amount of auxin, breeding 2 times hormoneless mineral composition of the culture medium MS, wrap the bottom of the foil tubes or adding to the culture medium of activated carbon, given the inhibitory effect on root formation process of high intensity light [4]. In our studies were used to rhizogeny shoots with two or three trifoliolate leaves that are cultivated in different variants of culture media (Table. 2).

2. Effect of components of nutrient medium on induction rhizogeny plants regenerants strawberry.

breeding ground	Alina clone C3		Alina clone C4	
	The formation of roots planted, %	The average length of roots mm	The formation of roots planted, %	The average length of roots, mm
MS	30	28 ±0,2	42	34±0,2
½ MS + activated carbon	90	76±0,5	98	94±0,5
½ MS + 0,5 IMK	70	45±0,2	85	52±0,2

The data (Table. 2) you can see that by using culture medium supplemented with activated charcoal, the highest percentage of root formation of regenerated plants accounted for 90% C3 clone to clone C4 - 98% of the length of roots under 76 ± 0.5 and $94 \text{ mm} \pm 0.5 \text{ mm}$. Somewhat lower results were obtained for the use of the medium $\frac{1}{2}$ MS + 0,5 IMC. The percentage rhizogeny to clone C3 was 70%, for clone C4 - 85%. The lowest figures root environment characterized hormoneless MS: clone C3 - 30%, clone C4 - 42%. For cultivation on medium $\frac{1}{2}$ MS with the addition of activated charcoal for 3-4 weeks formed roots and growing vegetative mass (Fig. 3). The resulting regenerated plant were suitable for further adaptation.

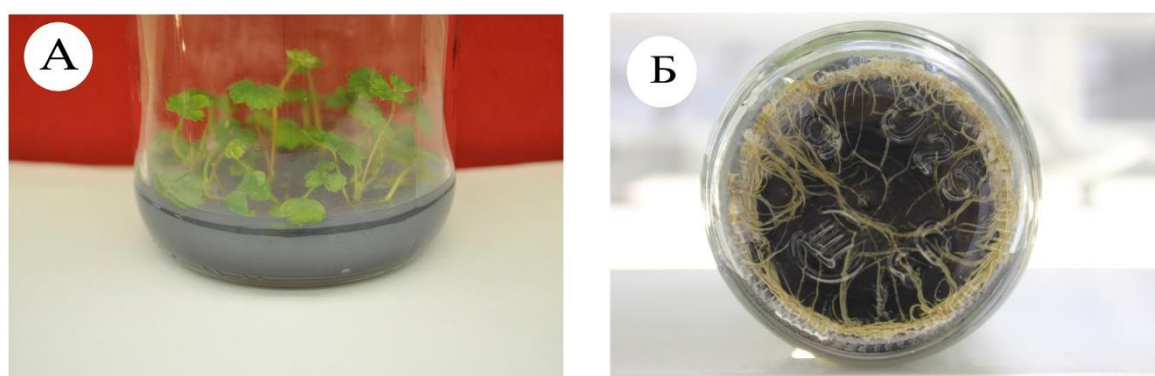


Fig. 3. root plants regenerants Alina class on medium $\frac{1}{2}$ MS + activated carbon: A - Clone C3 B - Clone C4.

An important step in microclonal reproduction is the adaptation of plant-regenerants and planting them in the substrate. The substrate used was a mixture of peat and peat, perlite, sand in the ratio 3: 1: 1 (Table. 3.).

3. Приживлюваність рослин регенерантів суниці садової в субстратах

Substrate	Number of plants planted, pc	Plant survival	
		pc.	%
Peat	30	27	90±0,1
Peat: Perlite: Sand with 1: 1	30	28	93±0,3

For quality homogeneous material conducted sorting plants regenerants. Conducted shortening of the roots to 30-40 mm in order to prevent refraction roots and their subsequent decay. Landed on the substrate plants kept in a humid chamber for 10-14 days at a temperature of 25 ° C to lower humidity. During the period of adaptation carried out preventive treatment with fungicides of biological origin. After 4-5 weeks the plants formed 3-4 leaves and fibrous root system. The effectiveness of adaptation on both substrates was over 90%.

Conclusions. An optimized method and reproduction microclonal strawberry varieties Alina clones C3 and C4. As the sterilizing agent used 0.1% solution of mercuric chloride. Found that the optimal medium is MS + 1.0 mg / L BAP, 1.0 mg / l IMC, 0.1 mg / l gibberellic acid. Reproduction ratio - respectively 4.9 and 7.7 clone clone C3 and C4. The highest percentage was 90% rhizogeny - clone C3 and 94% - clone C4 to medium ½ MS + activated carbon. Adapting to conditions in vivo held in peat substrate and substrate using peat, perlite, sand in the ratio 3: 1: 1, the effectiveness of adaptation was over 90%.

Список літератури

1. Murashige T. A revised medium for rapid growth and bio assays with tobacco tissue cultures / T. Murashige, F. Skoog // *Physiol. Plantarum.*–1962. – Vol. 15. – P. 473-497.
2. Quak F. Plant cell tissue and organ culture 33 / F. Quak // Ed. J. Reinert J. R. S. Bajaj. Berlin etc.:Springer-Verlag. –1977.– P. 598-618.
3. Samir C. Debnath, Strawberry culture *in vitro*. Applications in genetic transformation and biotechnology / Samir C. Debnath, Jaime A. Teixeira da Silva // *Fruit, Vegetable and Cereal Science and Biotechnology.* –2007. – P.1-12.
4. Бутенко Р. Г. Биология клеток высших растений *in vitro* и биотехнологии на их основе. / Р. Г. Бутенко. – М.: ФБк – Пресс, 1999 – 259 с.
5. Калинин Ф. Л. Методы культуры тканей в физиологии и биохимии растений / Ф. Л. Калинин, В. В. Сарнацкая, В. Е. Полищук. – К.: Наукова думка, 1980. – 488 с.
6. Копылов В. И. Земляника: [Пособие] / В. И. Копылов – Симферополь: Поли ПРЕСС, 2007. – 368 с.
7. Мельничук М. Д. Біотехнологія в агросфері. / М. Д. Мельничук, О. Л. Кляченко // Навчальний посібник для студентів вищих навчальних закладів. – Київ, 2014. – 247 с.
8. Мельничук М.Д Біотехнологія отримання високоякісного садивного матеріалу суниці (*FRAGARIA ANANASSA DUCH.*): науково-методичні рекомендації / А. А. Ключаденко, А. Ф. Ліханов, А. М. Силаєва, М. М. Спірочкіна – Київ: 2014. – 56 с.
9. Самойленко Н. А. Пути совершенствования промышленного возделывания земляники садовой в Северном Причерноморье : автореф. ... дис. д-ра с.-х. наук : 06.01.07 / Самойленко Николай Александрович. – М., 2003. – 23 с.
10. Яновський Ю. П. Ягідництво: [Навч. посібник] / Ю. П. Яновський, В. В. Воеводін, О. М. Лапа, Є. В. Чепернатий. – Київ, 2009. – 216 с.

*Изучали возможность микроклонального размножения земляники садовой (*Fragaria Ananassa Duch.*) и влияние регуляторов роста на регенерационные способности микророзеток в условиях *in vitro*. Установлено, что наибольший коэффициент размножения для клонов C3 и C4 сорта Алина составил 4,9 и 7,7 соответственно при*

выращивании на среде MS с добавлением 1,0 мг/л БАП, 1,0 мг/л ИМК, 0,1 мг/л гибберелловой кислоты.

Fragaria Ananassa Duch, микрклональное размножение, *in vitro*

QUALITATIVE CHARACTERISTICS WOOD PICEA ABIES KARST. UNDER UKRAINIAN CARPATHIANS

*I. I. HARTION, getter**

*I. M. SOPUSHYNSKYI, doctor of agricultural sciences, associate
professor*

National Forestry University of Ukraine

Qualitative characteristics of Norway spruce were studied in a mountain Dovshka of SE "Vyhoda forestry." Steam relationship between wood density and wood macroscopic features characterized by a high coefficient of Pearson correlation ($R = 0,71-0,90$). It was found that the value of the annual growth correlates with the radial and longitudinal shrinkage. The relationship between wood density and wood moisture content described by the equation of the first order $\rho_w = 401 + 2,08W_{abs.}$. Coefficient of wood heterogeneity of Norway spruce is in the range from 1.4 to 3.1.

Norway spruce, tree ring, wood density, wood shrinkage, wood quality

Comprehensive knowledge of the properties of wood material gain practical importance for its optimal use. This is best revealed by the example of macroscopic structure of wood in terms of structurally ordered cell membranes. To increase the economic potential of the stands must not only understand how tree growth, but also of macro- and microscopic features of the formation of wood that determine its quality [1, 5, 7].

The term "quality" is subjective and determined depending on the material and the purpose of the product from it. The quality of the wood depends on the characteristics that make the product valuable to end-use. For the production of musical instruments (violin, guitar, pandora, etc) is especially important quality characteristics are uniform macroscopic structure of wood and low density ripe wood [1, 4, 5, 8]. Building wooden beams must have a high density and strength. Decorative wood grain is an important indicator for decorating interiors. Qualitative properties of wood can be characteristic for certain tree species and depend on site conditions. Most experts Forest knowledgeable about technologies of growing tree species and obtaining size-parametric characteristics of wood, but it is difficult to predict the future quality of wood and its targeted use [1, 5, 7, 8]. Knowledge of qualitative differences within the wood tree species necessary for acceptance of applications for effective use

* Supervisor - Doctor of Agricultural Sciences, Associate Professor
I.M. Sopushynskyy

Wood is the impetus for thorough investigations of the properties of wood.

The aim of research was to determine the quality characteristics of wood Spruce (*Picea abies* Karst.), Which grows in the Ukrainian Carpathians.

Material and methods of research. Investigations properties of wood covered in mature spruce stands Lyudvykivskoho Forestry Enterprise "profitable forestry." The selection of trees for modeling physical properties of wood held in the south-western and north-eastern exposure g Dovško relevant altitudes for SW - 1-630, 2-820, 3-975, 4-1190 m asl and to NE - 5-1000, 6-800, 7-650 m asl At each altitude felled three trees model from which it was cut down to three ridges and produced 10 models of juvenile wood and ripe stages accordance with domestic and international standards [1, 2, 6]. To study the physical properties of wood indicators include: basic density (ρ_b), density of wood completely dry (ρ_0), wood density and the number of growth rings in 1 cm (Nrichn.kil.) For absolute humidity Wabs. = 8, 41 68, 72, 94 and 125% ($\rho_8\%$, $\rho_{41\%}$, $\rho_{68\%}$, $\rho_{72\%}$, $\rho_{94\%}$, $\rho_{125\%}$), the average width of annual rings (Srichn.kil.) full linear shrinkage in plain (β_t) radial (β_r), longitudinal (β_l) directions and volume (β_v), rate heterogeneity or anisotropy of wood shrinkage (γ). The latter figure was defined as the ratio of shrinkage to radial plain (β_t / β_r). Number of samples (N) taken for the study was 179 units. Statistical analysis of the results of the study of the physical properties of wood conducted using software packages Excel, SPSS 13.0 and Statistica 10.0.

Results and discussion. By visual diagnostic quality wood signs are the number of growth rings in 1 cm or average width of annual rings. These indicators macrostructure wood is a natural reflection of the annual cambium ontogeny woody plants. Forming stem xylem (the formation of early and late wood spruce), usually lasts from mid-May to mid-June and is due to different climatic factors. Recent significant impact on a wide range of properties of wood. The best "laboratory" to study the quality characteristics of wood is the Ukrainian Carpathians, where broad change altitudes in a small area leads to a sharp change in climatic systems. The physical properties of spruce wood in terms of g Dovško SE "profitable forestry" are shown in Table 1.

1. Physical characteristics of wood Spruce

Indexes	Number of models, pieces.	Minimum kg • m ⁻³	Mean values and his mistake kg • m ⁻³	Mean values and his mistake kg • m ⁻³	The coefficient of variation, %	Indicator accuracy, %
S _{річн.кіл.}	179	0,6	2,3 ^{±0,11}	7,0	63,8	4,8
N _{річн.кіл.}	179	3,0	12,8 ^{±0,56}	34,0	59,0	4,4
ρ ₀	179	304	398 ^{±3,37}	513	11,3	0,8
ρ _{8%}	179	322	418 ^{±3,53}	535	11,3	0,8
ρ _{41%}	20	466	526 ^{±10,62}	608	9,0	2,0
ρ _{68%}	51	508	588 ^{±7,45}	687	9,0	1,3
ρ _{72%}	27	521	609 ^{±11,01}	710	9,4	1,8
ρ _{94%}	84	495	647 ^{±9,25}	796	13,1	1,4
ρ _{125%}	179	565	749 ^{±5,32}	931	9,5	0,7
ρ _б	179	267	347 ^{±2,80}	441	10,8	0,8
β _t	179	6,1	8,5 ^{±0,06}	10,1	9,9	0,7
β _r	179	2,4	4,2 ^{±0,06}	5,8	18,3	1,4
β _l	179	0,1	0,4 ^{±0,02}	1,1	58,8	4,4
β _v	179	9,5	12,7 ^{±0,09}	15,3	9,7	0,7
γ	179	1,4	2,1 ^{±0,03}	3,1	16,3	1,2

The average width of the growth rings in the range of 0.6 to 7.0 mm and corresponds to the maximum possible number of annual 1 cm from 3.0 to 34.0 units. • cm⁻¹. Full plain and radial shrinkage of wood is respectively 8.5% and 4.2%. The latter is characterized doubled coefficient of variation and significant heterogeneity determines the rate of drying wood spruce. In particular, it varies from 1.4 to 3.1. The density of wood in absolutely dry condition varies from 304 - 513 kg • m⁻³ and represents juvenile and ripe wood. Bulk density of wood in the wet state (Wabs. = 125%) Spruce is an average of 749 kg • m⁻³. Effect of moisture content of wood Spruce for its volumetric mass shown in Fig. 1.

As shown in Figure 1 density dependence spruce wood from moisture it is described by the first order ($\rho = 401 + 2.08W_{abs.}$). It should be noted a very high determination ($R^2 = 0,98$) for samples of wood from high-density wood, indicating the adequacy matched model. Juvenile wood with low density characterized by a lower value of the coefficient of determination ($R^2 = 0,87$).

To pair correlation analysis of relationships between indicators of physical properties of spruce wood used appropriate matrix using Pearson's coefficient of linear correlation (R) for significance $p = 0,01$ (Table. 2) [3].

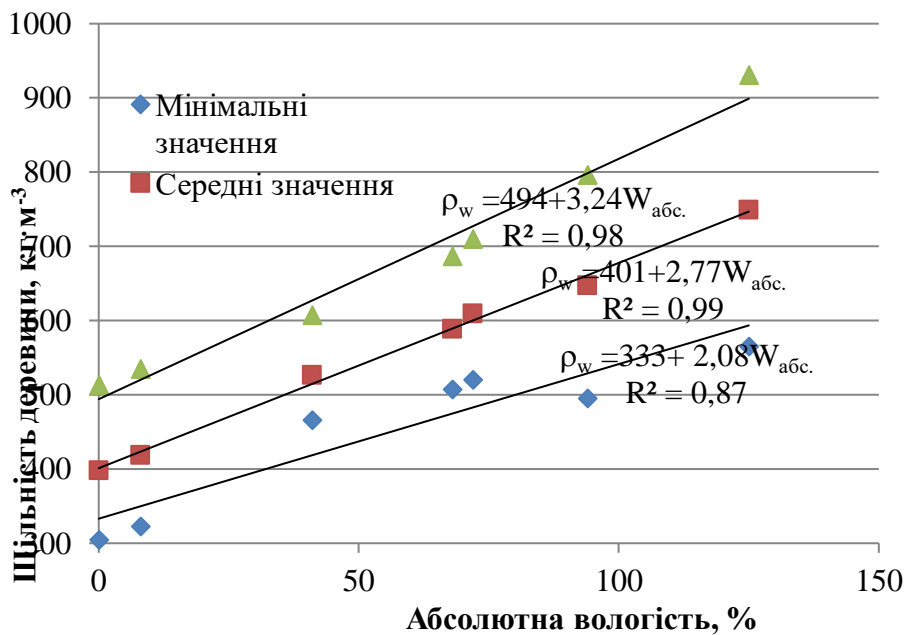


Fig. 1. Effect of humidity wood Spruce its volume mass

2. Correlation matrix between the studied parameters

Показники		$\rho_{0\%}$	$\rho_{8\%}$	$\rho_{125\%}$	ρ_b	$N_{\text{річн.кіл.}}$	$S_{\text{річн.кіл.}}$	β_t	β_r	β_l	β_v	γ
$\rho_{0\%}$	R	1	0,99	0,70	0,99	0,74	-0,78	0,23	0,75	-0,59	0,46	-0,71
	p		0,000	0,000	0,000	0,000	0,000	0,002	0,000	0,000	0,000	0,000
$\rho_{8\%}$	R	0,99	1	0,70	0,99	0,75	-0,79	0,20	0,73	-0,59	0,44	-0,71
	p	0,000		0,000	0,000	0,000	0,000	0,006	0,000	0,000	0,000	0,000
$\rho_{125\%}$	R	0,70	0,70	1	0,69	0,55	-0,62	0,24	0,49	-0,42	0,35	-0,42
	p	0,000	0,000		0,000	0,000	0,000	0,001	0,000	0,000	0,000	0,000
ρ_b	R	0,99	0,99	0,69	1	0,73	-0,77	0,12	0,68	-0,58	0,36	-0,70
	p	0,000	0,000	0,000		0,000	0,000	0,105	0,000	0,000	0,000	0,000
$N_{\text{річн.кіл.}}$	R	0,74	0,75	0,55	0,73	1	-0,83	0,17	0,72	-0,64	0,40	-0,72
	p	0,000	0,000	0,000	0,000		0,000	0,020	0,000	0,000	0,000	0,000
$S_{\text{річн.кіл.}}$	R	-0,78	-0,79	-0,62	-0,77	-0,83	1	-0,19	-0,74	0,65	-0,42	0,76
	p	0,000	0,000	0,000	0,000	0,000		0,010	0,000	0,000	0,000	0,000
β_t	R	0,23	0,20	0,24	0,12	0,17	-0,19	1	0,54	-0,25	0,91	-0,03
	p	0,002	0,006	0,001	0,105	0,020	0,010		0,000	0,001	0,000	0,683
β_r	R	0,75	0,73	0,49	0,68	0,72	-0,73	0,54	1	-0,53	0,81	-0,85
	p	0,000	0,000	0,000	0,000	0,000	0,000	0,000		0,000	0,000	0,000
β_l	R	-0,59	-0,59	-0,42	-0,58	-0,64	0,65	-0,25	-0,53	1	-0,28	0,46
	p	0,000	0,000	0,000	0,000	0,000	0,000	0,001	0,000		0,000	0,000
β_v	R	0,46	0,44	0,35	0,36	0,40	-0,42**	0,91	0,81	-0,28	1	-0,41
	p	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000		0,000
γ	R	-0,71	-0,71	-0,42	-0,70	-0,72	0,76	-0,03	-0,85	0,46	-0,41	1
	p	0,000	0,000	0,000	0,000	0,000	0,000	0,683	0,000	0,000	0,000	

Analysis of data from Table 2 shows that the absolute values of correlation coefficients physical properties of spruce have a close relationship ($R = 0,71-0,90$) between paired dependencies density in absolutely dry, the moisture content of 8%, the number of growth rings in 1 cm, average width of annual rings, performance radial and longitudinal shrinkage coefficient and heterogeneity. The weak nature of the relationship ($R = 0,11-0,30$) characteristic parameters of shrinkage in the plain area. Average bond ($R = 0,51-0,70$) is set between parameters and macrostructure radial and longitudinal shrinkage, indicating a significant effect on the width of the annual ring size shrinkage. Thus, with the number of growth rings in 1 cm increases the value of the radial and longitudinal shrinkage and reduced coefficient of heterogeneity spruce wood, which could theoretically increase the resonance properties of spruce wood.

Conclusions and recommendations for further research. The density of spruce wood in the Ukrainian Carpathians depends on the parameters and macrostructure characterized by a high coefficient of linear Pearson correlation, which varied from 0.71 to 0.90. Increasing the width of annual rings leads to an increase in the value of the radial and longitudinal shrinkage. Reduction in the heterogeneity of wood due to the increasing number of growth rings in 1 cm. The relationship between absolute humidity and a weight of wood adequately described by the first order $\square w = 401 + 2,08W_{abs}$.. shrinkage factor heterogeneity spruce wood varies from 1.4 to 3.1.

Список літератури

1. Вінтонів І. С. Деревинознавство: [навч. посіб. для студ. вищ. навч. закл.] / І. С. Вінтонів, І. М. Сопушинський, А. Тайшінгер – [2-е вид.]. – Львів: Априорі, 2007. – 312 с.
2. ГОСТ-Информ 1.6.0: [Електронний ресурс] / Экспекрт-Софт. – 80 Min / 700 MB. – К.: Экспекрт-Софт, 2007.
3. Горошко М. П. Біометрія: навч. посіб. [для студ. вищ. навч. закл.] / М. П. Горошко, С. І. Миклуш, П. Г. Хомюк. – Львів: Камула, 2004. – 236 с.
4. Сопушинський І. До питання методики визначення щільності деревини у зв'язку із зміною вологості / [І. Сопушинський, І. Вінтонів, А. Тайшінгер та ін.] // Наук. вісн. УкрДЛТУ. – 2003. – Вип. 13.3. – С. 14–22.
5. Сопушинський І. Зв'язок властивостей деревини та якості виробів з деревини / [І. Сопушинський, В. Маєвський, А. Тайшінгер та ін.] // Наук. вісн. НЛТУ України. – 2007. – Вип. 17.4. – С. 101–108.
6. Normen für Holz: DIN-Taschenbuch 31. – [8te Aufl.]. –Berlin: Beuth, 2009. – 604 S.
7. Zimmermann M. H. Trees: structure and function / M. H. Zimmermann, C. Brown // New York: Springer, 1971. - 336 p.
8. Zobel B. J. Wood variation, its causes and control / B. J. Zobel, J. P. van Buijtenen. - New York: Springer, 1989. - 363 p.

Качественные характеристики ели обыкновенной изучены в условиях горы Довшка ГП "Выгодского лесное хозяйство". Парная зависимость между плотностью и показателями макроструктуры древесины характеризуется высоким коэффициентом линейной корреляции Пирсона ($R = 0,71-0,90$). Установлено, что величины годового прироста коррелирует с величиной радиальной и продольной усушки. Зависимость между объемной массой и абсолютной влажностью древесины описано уравнением первого порядка $\rho_w = 401 + 2,08W_{абс.}$. Коэффициент неоднородности усыхания древесины ели обыкновенной находится в пределах от 1,4 до 3,1.

Ель обыкновенная, годовое кольцо, плотность древесины, усушка древесины, качество древесины

GROWTH REGULATORS AS AN EFFECTIVE MEANS OF IMPROVING QUALITY SEEDS OF MEDICINAL PLANTS

**V. I HOMINA, Candidate of Agricultural Sciences
Podolsky State Agricultural and Technical University**

**S.P. Ponomarenko, Doctor of Biological Sciences
State Enterprise "Interdepartmental Scientific and Technological
Center" Agrobiotech "NAS of Ukraine and Ministry of Education and
Science of Ukraine**

**IP HRYHORYUK, corresponding member of NAS of Ukraine
National Agriculture University of Ukraine
A.I. Sergeycandidate of biological sciences
Taras Shevchenko National University of Kyiv**

Stimulating influence of national growth regulators "Ivin," "Biolan" and "Vermystym D" on the seed weight and qualitative indicators of oil plants of milk thistle and safflower before sowing and in phase of rosette of leaves was shown. Determined that the most effective action on the quality was shown by growth regulator "Biolan" in a presowing cultivation of seeds and spraying of crops in the phase of rosette of leaves.

Milk thistle, safflower, growth regulators, weight of 1000 seeds, fat, acid value, iodine value

Domestic growth regulators (RR) contain a complex of biologically active substances (BAS) that cause a wide range of protective reactions, increase metabolism, plant resistance against stressful environmental factors, use of the potential inherent in their productivity and improve product quality [1].

The analysis shows that the level of production of medicinal raw materials in Ukraine now lags behind the advanced countries of the world and does not meet the current needs of the pharmaceutical industry. Therefore, it is necessary to develop optimal conditions for growing medicinal crops and efficient farming practices, taking into account soil and climatic factors in the region. In particular, the priority scientific direction of increasing the yield and improving product quality herbs is widespread introduction of new energy saving technologies by including a new generation of PP with a wide range of biological action. Established that they can enhance physiological and biochemical reactions, growth and development, resistance to adverse environmental factors, yield formation and quality of crops [2].

Stimulatory mechanism of action RR explain their penetration through the membrane into the cell and form stable complexes with proteins and possibly phytohormones receptors [3]. At the same time proved that they adjust the intensity of cell division and stretching processes feed, water exchange, photosynthesis and respiration and cause reduction of nitrates, heavy metals and radionuclides in crop production [1].

The purpose of research - the study of the influence of RR on yield and quality of medicinal raw milk thistle and safflower.

Materials and methods of research. The objects of research served as plants thistle (*Silybum marianum* L. (Gaertn.) (*Carduus marianus* L., *Marian Marian* L. (Hill.) Variety "Boykivchanka" and safflower (American saffron, wild saffron thistle *krasylnyy*) (*Carthamus tinctorius* L.) varieties "Sunny." This one (culture) or perennial herbaceous species of medicinal plants.

Milk thistle - prickly plants of species *roztoropsha* (*Silybum Adans.*). Safflower - oil plant and *krasylna* kind saflor (*Saflor Adans.*). They belong to the department of angiosperms (Magnoliophyta) (Angiospermae), class bipartite (Magnoliopsida) (Dictotyledonea), order asterales (Asterales) and the family Asteraceae (Asteraceae) (Compositae) [4], which grow mainly in Poltava, Kharkiv and Kherson regions and Crimea.

Thistle plants found in the wild as an aggressive weed whose stem simple or branched naked. The leaves are alternate, elliptic, perystolopatevi or pinnate, large, up to 80 cm with yellowish spines on krayamh and leaf veins below. Leaf green plate with white spots, brilliant. The flowers are purple, pink or white, are collected in large, single baskets and spherical cherepynchastoyu wrapper, consisting of thorny green leaves. The bed inflorescence fleshy, covered with fibers. Flowers bisexual, tubular. Fruit - achene with bangs.

Fruits thistle of active substances are flavonoids and flavonolihnany particular isomeric compounds sylibin, sylikristin, silibinin, saponins, fat (30%), fibers, resins, quercetin, tyramine, histamine, vitamins B and C, zinc, selenium, copper.

Milk thistle - the plant is edible and honey plant, which is used in diets and for brewing tea. As a medicinal plant use ripe fruit (*Fructus silybi mariani*), the preparation of which leads to the formation and excretion of bile, treat hepatitis, liver cirrhosis, toxic lesions of the spleen, jaundice, chronic cough [5].

In safflower stem up to 1 m, erect, heavily branched and naked at the top, with a whitish gloss. The leaves are ovate-oblong, leathery, almost sessile, alternate, large, solid-edge, the edge ribbed. Root - rod. The flowers are tubular, p'yatyrozdilni, red or orange. Cones - single basket oval. Fruit - achene white, naked, shiny, ovalnochetiryhrannoyi shape with slightly protruding ribs.

In the flowers of safflower glycosides are halkonovi particular kartamin, izokartamin, kartamin-5-glycoside and luteolin 7-glycoside. In the

seed set from 25 to 60% napivvysyhayuchoyi fatty oil, which is used for the production of margarine, insulin, reducing the amount of cholesterol in the blood, treatment of joints, wounds, burns, pyoderma, pemphigus. Dried safflower petals serve as raw material for kartaminu - red pigments. Reed flowers used to produce harmless dyes yellow, red and caramel.

Safflower oil is rich in oleic, palmitic, and linoleic meristynovoyu (90%), unsaturated fatty acids, which causes an increase elasticity of blood vessels, emollient, firming and nourishing effect on the skin, restoring cell functions and vodozatrymuvalnoyi vodorehulyuyuchi ability. Tea safflower prescribed for the prevention of psoriasis and malignant tumors [6].

Studies conducted in the 2009-2014 biennium. Research in the field branch of the department of breeding, seed production and general biological sciences Podolsky State Agricultural and Technical University of "Obolon Agro" Chemerovets'kyi district of Khmelnytsky region. Accounting yield and seed quality analysis of parameters performed according to conventional methods. The scheme of the experiment included the following variants: PP (control (water), "Biolan" (Ahroemistyn-extra) (25 ml / t and 20 ml / ha), "Ivin" (15 ml / t and 20 ml / ha), "vermistim D" (8 l / t and 10 l / ha), seed treatment and spraying in phase socket leaves. The mass of 1000 seeds was determined by the method of GOST 3484-96 (GOST 170-81-97), the chemical composition of the seed examined with regard to content fat and qualitative characteristics - iodine (the number of grams of iodine per 100 g of oil bound and it describes the content of unsaturated fatty acids) and acidic (number of mg KOH required for neutralizing the free fatty acids contained in 1 g oil) number [7].

For research use: Biolan - PP plant manufacturer Interdepartmental Science and Technology Centre Agrobiotech NAS and MES, which is a multicomponent drug of natural origin with a broad spectrum of activity that includes a balanced composition of amino acids and polyunsaturated fatty acids, oligosaccharides, chitosan, trace elements in the nutrient form and Bioprotective compounds. "Biolan" causes accelerated cell division and the development of a strong root system, increase in leaf surface area and the number of chlorophyll, resistance to diseases and stress environmental factors. Apply water-alcohol solution doposivnoyi preparation for seed treatment and spraying of crops technical, fodder, vegetables, melons, berries, decorative, wood and other plants. The expediency of its use during the growing season together with pesticides, thereby increasing the efficiency of their use and create conditions to reduce the application rate by 20-25%. According to GOST 12.1.007-76 belongs to low-toxic substances [8].

"Ivin" - PP plants with a wide spectrum of action, which is produced according to TU 24.2-03563790-011-2002. It is analogous to natural phytohormones of auxin and tsytokininovoyu activity. To increase the yield of vegetables, oil, pot and other plants used an aqueous solution of the active ingredient N-oxide 2,6-dymetylpyridynu [9].

"Vermistim D" - PP plants. The active ingredient of the drug - plant hormones, fulvo-, humic acid, lactic acid bacterium *Lactobacillus plantarum* (at least $1.0 \cdot 10^5$), *Lactobacillus casei* (at least $1.0 \cdot 10^4$), phototrophic bacteria *Phodopseudomonus polustris* (at least $1.0 \cdot 10^4$), yeast *Sacharomyces cerevisiae* (at least $1.0 \cdot 10^4$). Apply in an aqueous solution for the treatment of seeds and vegetating plants corn, sunflower, sugar beet, rapeseed, hops, buckwheat, potatoes, grains, legumes, vegetables, fruit, ornamentals and other crops.

Results and discussion. Growth regulators are used to initiate and implement genetic potential of plants and increase productivity. Our research found that under the influence of RR crops photosynthetic potential thistle and safflower grown more in the years to less favorable weather conditions.

In average years of research for the optimal effect of the studied crops provided drug "Biolan" in terms of both application; total photosynthetic capacity (CFP) on these options exceeded the benchmarks - to 51,7-80,6 thousand. $m^2 \times d. / ha$ (Table. 1).

Proved that PP affect the basic membrane processes, cell division, enzyme systems, photosynthesis, respiration and supply processes, and as a result - improvement of biological and economic efficiency of crop production.

Productivity - a measure which is the main criterion for evaluation of farming practices and other factors. We evaluated the reliability prybavok to yield milk thistle seed (Table 2).

1. The total photosynthetic potential agrocenoses medicinal plants based on the use of plant growth regulators, ths. $m^2 \times d./ha$

Culture	Seed treatment before sowing	Spraying plants in phase socket layers
---------	------------------------------	--

	Control (Input)	Biolan	Ivin	Vermistim D	Control (Input)	Biolan	Ivin	Vermistim D
Vermistim D	1295,6	1347,3	1306,2	1318,2	1290,7	1371,3	1304,2	1335,3
± to control	-	+51,7	+10,6	+22,6	-	+80,6	+13,5	+44,6
HIP ₀₅		20,83				8,66		
safflower	1114,5	1158,3	1126,5	1131,0	1113,9	1165,7	1134,5	1135,2
± to control	-	+43,8	+12,0	+16,5	-	+51,8	+18,6	+20,3
HIP ₀₅		15,03				13,56		

2. The dependence of the yield of plants thistle ways to use growth regulators for the treatment of various terms (the criterion Duncan)

Term growth regulator application	Yield, t / ha	Homogeneous group		growth regulator, %	Yield, t / ha	Homogeneous group		
		I	II			I	II	III
Seed Treatment	1,52	****		Control	1,4			****
				Ivin	1,5	****		
seed Treatment	1,57		****	vermistim D	1,5	****		
				Biolan	1,6			****
					6			

As for the timing of application of PP, differences between the values of productivity are essential, as are distributed in different homogeneous groups. Preparations "Ivin" and "vermistim D" value provided yield, which were one homogeneous group, ie differences between these variations were not significant, which differed significantly from the control option. Best option - the "Biolan" in terms of productivity related to the third homogenous group that is significantly different from the control and the other two drugs.

We have shown allowances yield of safflower to control depending on the impact of the PP in terms of years (Fig. 1).

Thus, the "Biolan" allowances in the yield of safflower under conditions more favorable 2009, 2010 and 2012 accounted for within 11,9-16,4%, while in the less favorable 2011, 2013 and 2014 - 19,6- 30.6%. A similar trend proslidkovuvalas on all versions.

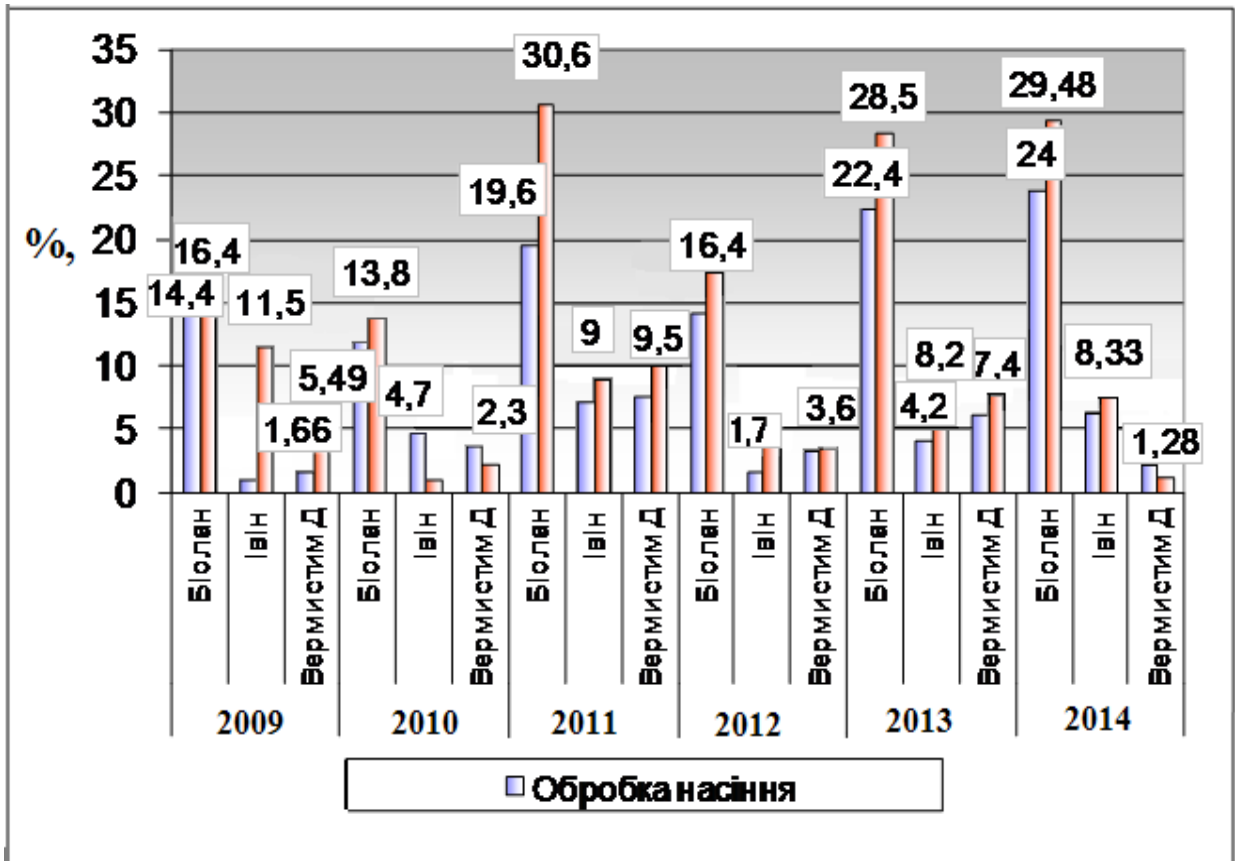


Рис. 1. An increase of productivity safflower seeds depending on the application of plant growth regulators

Pharmaceutical raw materials must meet the quality Pharmacopoeia article, this basic requirement during its cultivation, harvesting and processing to pharmaceuticals. Quality seeds of medicinal plants assessed by the complex technological parameters and chemical composition. The mass of 1000 seeds belong to the technological and qualitative indicators as a big qualitative seeds of its chemical composition.

We found that the mass of 1000 seeds of milk thistle Boykivchanka grade depends on the use of PP. Thus, variants of processing the seeds before sowing and spraying of vegetating plants in the phase of preparation leaves outlet "Biolan" mass of 1000 seeds increased by 0.5-0.6 g (Table. 3).

3. Mass of 1000 seeds of herbs depending on the application of growth regulators, g (average for 2009-2014).

Growth regulator	Seed treatment before sowing		Spraying plants in phase socket layers	
	Milk thistle	safflower tinctorial	Milk thistle	safflower tinctorial
Control	23,7	36,3	23,9	36,4
Biolan	24,0	38,0	24,5	37,8
Ivin	23,9	36,5	24,2	37,1
Vermistim D	24,0	36,3	24,3	36,6
HIP ₀₅	0,52	0,64	0,37	0,45

Sunny safflower variety in terms of Steppe Ukraine is able to form a mass of 1000 seeds 45 g and forest - only 36,3-38,0 g We identified statistically significant weight of 1000 seeds an increase by 1.7, 1.4 and 0.7 g for treatment of conditions PP "Biolan" and spraying solutions of drugs "Biolan" and "Ivin." It is estimated that the maximum rate of seed mass application PP "Biolan" before sowing was 38.0 g, ie 1.7 g higher than the control. It is established that exposure to the drug "Biolan" seeds of plants thistle and safflower vyryvnyanishym and was homogeneous by weight. In these embodiments, the baskets, which were formed on the branches of second order cancellation by weight of seeds were significantly lower than in controls, and slightly exceeded variants using PP "Ivin" and "vermistim D". Milk thistle and safflower belongs to a group of oilseeds, because the level of accumulation of oil in the seed reaches 32%. Studies [10,11] confirm the value of natural milk thistle oil through a unique set of unsaturated fatty acids, which are extremely rare in plants. The seeds of milk thistle oil is the dominant linoleic and oleic fatty acids, whose content ranges from 28-30 to 49-51%. The composition of safflower oil are similar unsaturated fatty acids and sunflower seed (oleic, linoleic), but in other relationships, such as linoleic acid number reaches 90% [12].

We conducted a determination of quantitative and qualitative indicators of oil in the seeds of milk thistle and safflower who were treated RR (tab. 4). Mathematical processing of the data shows that the number of fat and gain iodine number of options for handling preparation plant seeds "Biolan" compared with control were increased by an average of 1.1%. Meanwhile, versions of crops by spraying experiment with PP "Biolan" and "vermistim D" set to increase the number of fat content in the seeds of plants by 2.1 and 0.9%.

4. The content and quality of medicinal oil seed crops depending on the application of growth regulators (average for 2009-2014).

Growth regulator	Fat content, %		Acid number, KOH, mg		Iodine value, J/100 g oils	
	Milk thistle	safflower tinctorial	Milk thistle	safflower tinctorial	Milk thistle	safflower tinctorial
Seed treatment before sowing						
Control	25,0	32,2	0,32	2,0	92,7	117,9
Biolan	26,1	33,3	0,29	1,9	93,8	118,3
Ivin	25,3	32,8	0,30	1,9	91,5	118,2
vermistim D	25,3	32,2	0,31	2,0	91,3	118,1
HIP ₀₅	3,8	4,2	0,04	0,02	2,4	3,7
Spraying crops						
Control	25,2	32,4	0,33	2,0	92,4	118,0
Biolan	27,3	33,6	0,28	1,8	94,0	118,4
Ivin	25,6	32,9	0,27	1,8	90,9	118,3
vermistim D	26,1	32,7	0,29	1,9	91,4	118,1
HIP ₀₅	3,2	3,9	0,03	0,18	3,3	3,9

Conclusions. Research has found increasing CFP plants thistle and safflower through the use of growth regulators. For optimal effect of the studied crops provided the drug "Biolan" in terms of both application CFP these options exceeded the control - by 51,7-80,6 thousand. M2 x d. / Ha. On these versions received maximize productivity - to 30.6%.

Evenness shown increasing extent and mass of 1000 seeds of milk thistle plants at 0.5-0.6 g and safflower - 1.4-1.7 g, which before sowing and in phase outlet leaves were treated PP "Biolan". Its action is defined as an increase in milk thistle seeds fat content at 1.1-1.2% and safflower - 1,1-1,6%. The results open the possibility of natural bioregulators in the cultivation of medicinal plants.

Список літератури

1. Біологічно активні речовини в рослинництві / З. М. Грицаєнко, С. П. Пономаренко, В. П. Карпенко, І. Б. Леонтюк // – К.: ЗАТ „НІЧЛАВА”, 2008. – 352 с.
2. Макрушин М. М. Насінництво / М. М. Макрушин, Є. П. Макрушина // – Сімферополь: ВД «Аріал». – 2011. – 476 с.
3. Пономаренко С. П. Технология применения регуляторов роста растений в земледелии [Справочное пособие] / С. П. Пономаренко, Л. А. Анишин, В. О. Жилкин, З. М. Грицаєнко // – К., 2003. – 54 с.
4. Доброчаева Д. Н. Определитель высших растений Украины / Д. Н. Доброчаева, М. И. Котов, Ю. Н. Проскудин и др. – К.: Наук. думка, 1987. – 548 с.

5. Романюк Б. И. Лікарські рослини в народній та науковій медицині (енциклопедичний словник) / Б. И. Романюк, В. М. Фролов // – Луганськ: ЛДМУ, 2012. – 212 с.
6. Блинова К. Ф. Ботанико-фармакологический словарь. [Справочное пособие] / Под ред. К. Ф. Блиновой // – М.: Высш. шк., 1990. – С. 234-235.
7. Методы биохимического исследования растений / А. И. Ермаков, В. Е. Арасимович, М. И. Смирнова-Иконникова и др. // – Л.: Колос, 1972. – Изд. 2. – 456 с.
8. Анишин Л. А. Регуляторы роста в растениеводстве / Л. А. Анишин, С. П. Пономаренко, З. М. Грицаенко, О. В. Бабаянц – К.: ГП Межведомственный научно-технический центр «Агробиотех» НАН Украины и Министерства образования и науки Украины, 2009. – 31 с.
9. Анішин Л. А. Регулятори росту рослин (рекомендації по застосуванню) / Л. А. Анішин, С. П. Пономаренко, З. М. Грицаенко // – К.: ДП «Міжвідомчий науково-технічний центр «Агробіотех» НАН України і Міністерства освіти і науки України, 2011. – 40 с.
10. Болоховец А. С. Фармакологическое изучение расторопши пятнистой: автореф. дис. на здобуття наук. ступеня канд. фарм. н.: 15.00.02 «Фармацевтична хімія і фармакогнозія» / А. С. Болоховец // – Харьков, 2008. – 22 с.
11. Реєстр № 86/18/03. Олія розторопші / В. С. Кисличенко, Є. В. Гладух, О. О. Стремоухов та інші // – К.: 2003. – Вип. 18-19. – С. 15.
12. Шотт П. Р. Сафлор красильный – ценная масличная и лекарственная культура. Пища. Экология. Качество / П. Р. Шотт // – Новосибирск, 2002. – С. 299-300.

Показано стимулирующее влияние отечественных регуляторов роста «Ивин», «Биолан» и «Вермистим Д» на массу семян, качественные показатели масла растений расторопши пятнистой и сафлора красильного перед севбой и в фазе розетки листьев. Определено, что наиболее эффективное действие на качество проявил регулятор роста «Биолан» в условиях предпосевной обработки семян и опрыскивания посевов в фазе розетки листьев.

Расторопша пятнистая, сафлор красильный, регуляторы роста, масса 1000 семян, качественные показатели масла, кислотное и йодное число

SPECIFIC TRAINING NORMATIVE DISCIPLINE "PROTECTED AREAS" STUDENT DIRECTION "ECOLOGY, ENVIRONMENTAL PROTECTION AND BALANCED NATURE" NUBIP UKRAINE

***E.M. Berezhnyak, Candidate of Agricultural Sciences
National Agriculture University of Ukraine***

In the paper are shown features of teaching methodical discipline "Wildness protection". Posted objectives for the course and the major theoretical issues for modules, the plan of individual student's job and final control.

Nature-reserve fund, natural protection activity, the Red Book, bogs ecosystems, biosphere Reserve, educational-culture activity, environmental monitoring

Recently in Ukraine of particular relevance to the issues of environmental protection, since the turn of the century significantly increased human impact on terrestrial and aquatic ecosystems, growing human impacts on landscapes and areas of natural vegetation, decreasing natural resources. From a legal point of view, the most effective method of preserving representatives of flora and fauna, landscape and biodiversity is the creation and organization of protected areas and territories.

Wildness protection is an important part of environmental science and environmental protection, it plays an important role in the development of theoretical principles, practical problem solving nature conservation and maintaining the equilibrium of ecosystems, forming worldview as the individual and society as a whole. So, reserve the right is of particular environmental, social and economic importance in the world, largely determining the sustainable development of human civilization.

The purpose of discipline "Wildness protection" is knowledge and awareness of student issues of environmental management and conservation of natural objects of the country, its unique landscape areas, the formation of knowledge of the Nature Reserve Fund of Ukraine, Red Book and reserve affairs in general.

Study of regulatory discipline "Wildness protection" for students of 3rd year of faculty of plant protection, biotechnology and the environment is carried out according to the educational and vocational training programs for educational qualification level "Bachelor" training direction 6.040106 "Ecology, Environmental Protection and Balanced Nature" (code AFP - PP3.16), which

is the basic document which defines methodological and scientific content of this discipline.

The course "Sacred case" one of the base when preparing environmental experts craftsmanship and ecology as the theoretical section includes the development of the environmental principles of formation and functioning of territories and water areas that are subject to special protection, practice their implementation at national and local levels.

The subject of the study is to introduce discipline, separation, redundancy, design and operation of territories and objects of natural reserve fund and general ecological network.

Learning students of Protected Areas and the formation of environmental outlook is based on the knowledge they have received from the study of such disciplines as "General ecology (and Neo)", "Biology", "Soil", "Landscape Ecology", "Sustainable Natural Resources (recreational resources of the biosphere). " Future environmental specialists should be aware that protected right is a priority of the modern environmental policy, both in the world and in Ukraine. Wilderness protection is one of the areas of human activity, through which independent Ukraine the most successful part of the international community. So mastery of the world experience for Protected Areas and its implementation in Ukraine is a very important aspect of the comprehensive training of future professionals in ecology. The resulting knowledge they will be used in the future in the study most disciplines of professional and practical training, as well as state certification of specialists.

Presenting main material. Among the list of the key objectives of study of discipline "Sacred right" note the following:

- mastery of theoretical propositions and practical skills development and functioning of a network of territories and water areas that have to be protected to maintain the ecological balance, preservation of the gene pool, communities and natural ecosystems as habitat rights;
- conservation of biodiversity of flora and fauna of natural and cultivated ecosystems limitation of exposure to anthropogenic factors and protection;
- conducting environmental education, scientific research and environmental monitoring facilities;
- restoration and maintenance of historical and cultural heritage and traditional management of protected areas;
- rational use of natural resources geosystems and their sustainable development;
- creation of conditions for eco-tourism and recreation.

As required educational and professional program students must know the place and role of Protected Areas in contemporary environmental policies, the emergence and development of Reserves in the world and in Ukraine, creating a network of environmental principles territories and waters subject to

special protection, clearly remember the list of security subject to state and local significance, their status, tasks, protection mode, hold information on scientific, environmental, ecological and educational activities in Ukraine. [1] Important and useful knowledge and get students on the current network of protected sites higher categories (natural reserves, biosphere reserves, national parks), their landscape and biological diversity, uniqueness and representativeness, but also the concept of the development of the National Ecological Network in Ukraine its relationship with the European ecological network [2].

The purpose and application of discipline trained professionals should be able to:

- Give zoological separate assessment area (area), subject to special protection;
- make expert assessment of Protected Areas in a separate administrative unit;
- spending on protected areas and sites of environmental education, environmental education and public awareness;
- apply the law of Ukraine on protection of nature and to determine the feasibility of protection of a natural object.

It is essential also to use this knowledge to determine the species listed in the Red Book of Ukraine. Thus, during teaching "Wildness protection" students learn the basic theoretical principles and practical methods of conservation, restoration and sustainable use of renewable natural resources to ensure sustainable development of ecosystems and the biosphere as a whole.

As for the structure and scope of learning discipline, for its development given 108 hours or 3 credits ECTS. The first module serves the scientific and regulatory principles Protected Areas. This block addresses such topics as "Reserve business in Ukraine", "Criteria for priorities in the organization of the natural reserve fund", "Ownership and State Cadastre on the territory of Ukraine and the protected areas", "The Red Book of Ukraine", " Organizational and legal Fundamentals of protected Areas "where students can get acquainted with the general provisions of the law" on nature reserve Fund of Ukraine "and acts of current legislation of Ukraine since 1990. In this module, students also gain knowledge about the powers of the state and public control over compliance regime territories and protected areas of ecological foundations of the system of natural areas, conservation of the main stages of development, current status, prospects and problems of Protected Areas in Ukraine in other states, the main provisions of the Convention on biological diversity [3].

The second block is dedicated to meaningful characterization of natural reserve fund of Ukraine, the classification of protected areas, the concept of their category and ranks. In particular, the second module, students are introduced to the habitat of rare, endangered, endemic and

relict species of plants and animals that need special protection and care, study zoning of biosphere reserves, natural reserves and national parks, the regime and the regulation of anthropogenic pressures. Get information on the peculiarities of the European Ecological Network and the National Ecological Network of Ukraine.

"The organization reserves in Ukraine" is the title of the third meaningful unit that is devoted to the specifics of basic research and theoretical and practical research in protected areas. In this module, students carefully consider the socio-economic importance of protected areas in Ukraine, study resource potential of abiotic and biotic components of ecosystems protected, namely coenotic value and degree of coverage of protected forest, meadow, steppe, wetland and other vegetation types, study algorithm inventory of natural systems and their components [5]. In this module, students learn the role of protected areas in environmental education, education and public awareness at the national parks, natural and biosphere reserves. Youth receives information on the main forms of international cooperation in the field of land use and natural protected areas.

Important to reinforce your knowledge of protected areas is the individual job students, which they defend in the form of a presentation of natural reserve fund. According to the plan, students in this study reflect the history of the formation of the object, climatic conditions, the current state of the environment (mineral resources, hydrography and hydrology, ground cover), give a full description of vegetation (list of major vascular plants listed in the Red Book Ukraine, their geobotanic description), considered rare plant communities represented at the site and analyze representatives of the Red species, control the number of their population [4]. At the end of presentations, students bring characterization recreational and humanistic resources (basic ecological paths and routes active tourism and leisure visitors), especially the protection of the territory and natural resources in the present protected areas.

In an independent study students submitted topics that hardly considered in lectures and workshops. In the study they should pay attention to contemporary literature and the Internet to search for keywords as most of the literature of Protected Areas, which is available in libraries, slightly outdated.

For monitoring of student writing module works, which correspond to different test question types and complexity. Final certification is made in the form of set-off end of the semester.

Список літератури

1. Андрієнко Т. Л. Система категорій природно-заповідного фонду України та питання її оптимізації / Т. Л. Андрієнко, В. А. Онищенко, М. Л. Клєстов та ін. – К.: Фітосоціоцентр, 2001. – 57 с.

2. Гродзинський М. Д. Заповідна справа в Україні / За ред. М. Д. Гродзинського, М. П. Стеценко. – К.: Географіка, 2003. – 306 с.

3. Фурдичко О. І. Заповідна справа в Україні: [підручник для студентів ВНЗ] / О. І. Фурдичко, В. К. Сівак, В. Д. Солодкий. – Чернівці: Зелена Буковина, 2005. – 336 с.

4. Каталог раритетного біорізноманіття заповідників і національних природних парків України / За наук. ред. С. Ю. Поповича. – К., 2002. – 275 с.

5. Рідей Н. М. Методичні рекомендації для проведення практичних занять з дисципліни «Заповідна справа» / Н. М. Рідей, В. М. Чайка, Є. М. Бережняк. – К.: Вид. центр НУБіП України. – 46 с.

Дана характеристика методическим особенностям преподавания дисциплины «Заповедное дело». Наводится перечень задач курса и основных теоретических тем по смысловым модулям, освещены план выполнения индивидуального задания студентами и формы текущего и конечного контроля.

Природно-заповедный фонд, природоохранная деятельность, Красная книга, болотные экосистемы, биосферный заповедник, образовательно-воспитательная деятельность, экомониторинг

**CHANGES CONCENTRATION OF SOLUBLE AND MEMBRANE
PROTEINS
IN THE TISSUES OF THE WORM EISENIA FOETIDA INFLUENCE OF
LASER RADIATION**

V.T. Smetanin, K.I. TYMCHYY
Ukrainian State Chemical Technology University
V.S. NEDZVETSKYY, V.V. RUDENKO
Dnipropetrovsk National University. Honchar

The possibilities of obtaining non-specific stability of, to create bio variety in the population Eisenia foetida, under the influence of unfavorable factors. We researched the effect of laser irradiation on the content of protein composition, in tissue of individuals Eisenia foetida at local population. It was done six exposition of irradiation: 5, 10, 15, 20, 25, and 30 minutes, by laser, which has type LGN – 208B. Age of individuals who was exposed to laser action did not reach reproductive maturity. After this, individuals in equal amounts were transferred to the equals in composition 1 - "Sapropel", 2 - "Simple soil". Upon reaching reproductive maturity, signs such as formation of bands (circles) on the body of an individual conducted by the method of Lowry assessed concentrations of soluble and membrane proteins in the tissues of worms. It was established that laser irradiation different doses led to noticeably growing concentrate of the studied proteins.

Soluble proteins, cytoskeleton proteins, substrate, sapropel, irradiation's exposure

Among the global problems of mankind existing at the date the problem of depletion of soils and methods of remediation is becoming increasingly important. Particularly acute today the problem is and for Ukraine, a country with unique black earth. Excessive use of chemical fertilizers and plant protection products, as well as the cultivation of monoculture and climate change are factors accelerating this phenomenon, which is reflected in the reduction gumusosoderzhaniya and loss of soil structure. Suspension of soil degradation can be achieved by the introduction of Bat organovozvratnyh farming systems.

One fairly effective and proven methods such farming is the use of vermicultivation, one example of intensive biotechnology based breeding

worms, which was proposed in the United States and is widely used throughout the world [6].

The objective is vermiculture industrial production using vermicompost worms. In this case it is possible to produce vermicompost in the tens of times faster than it does in nature, using a variety of organic waste, including livestock. The process of biotransformation at vermiculture properly organized, can be carried out for 3-4 months [6].

An important feature of the use of biotechnology, along with an increase in soil quality, and detoxification is of organic substrate in the formation of vermicompost. This effect biotransformation allows for the introduction of agriculture in the silt, and use the products of the biotechnological process in organic farming organizations for cultivation of environmentally friendly crop, going to the production of dietetic and children's food.

A number of researchers [8] describing the vermicompost, note that plants need nutrients are in it, not only in the forms available for their assimilation, but also optimally balanced concentrations of digestible plants. In no other fertilizers that are not shown. There is no doubt that the phenomenon is called the product of centuries of evolution of the symbiotic relationship of soil micro- and zoocenoses with wild and cultivated flora, which requires more in-depth and detailed study.

Eisenia foetida - basic cultivated in captivity kind of worms, which belongs to the family Lumbricidae and differs from other types of biological features and requirements for environmental conditions.

Despite the attractiveness and distribution vermiculture in different countries, in Ukraine, it has not received a proper evaluation and development. In our opinion, this is due to the climatic conditions in which a comfortable temperature for the worm is limited in some areas of our country four or five months, as well as the lack of proper breeding to create tailor-*Eisenia foetida* populations.

Therefore, it is very interesting to study the possibility of creating a specialized population of Worms on the biotransformation of sapropel (capropeli are one of Reserves soil organopopoleniya, unfortunately, hardly used) and more traditional "hard" substrates - agricultural waste, including swine and poultry manure under the Dnipropetrovsk region.

Breeding work with *Eisenia foetida* has notable differences from the traditional farm animals and is aggravated by the biological characteristics of species - the complexity of the identification of phenotypes, hermaphroditism, and at the same time, the need for the presence of the normal process of reproduction sexual partner and others.

Given the fact that the impact of a different nature to stimulate the survival of individuals with predominance of mechanisms of protection against these stressors, the laser light may be a promising tool for the selection.

To assess the potential resistance to stress factors and physiological characteristics associated with genetic modifications, providing formation in the population *Eisenia foetida* new qualities, used in our work laser irradiation of animals with different time exposure mode is a promising direction in the study of their biological and productive features.

The aim of the study was to investigate the expression of cytosolic dynamo and structural proteins *Eisenia foetida* population under the influence of genetic modifying factor - laser (wavelength of 0.63 microns in length).

Materials and methods of research. The studies were conducted at the Department of Biotechnology and Life Safety DVNZ UDHTU. The procedure consisted of exposure of experimental animals *Eisenia foetida* laser LGN-208 Type B with a wavelength of 0.63 microns, and radiation power of 1 mW. For this purpose, 120 individuals were chosen which razdeleli six experimental groups of 20 in each worm, the laser exposure in which exposure time was varied and was 5, 10, 15, 20, 25 and 30 minutes. As a control, we used a similar animal not exposed to the laser. Were irradiated animals are under development in their signs reproductive maturity.

Upon reaching puberty individuals, namely pronounced Education is the body - the girdle of each experimental group were selected based on three medium-individuals, and the control - 12. Of these tissues by conventional methods [9] obtained the native solution that has been identified and the concentration of soluble and membrane proteins in the groups of animals following radiation exposure: control, 5, 15, 25 and 30 minutes. Research of fractions soluble and membrane proteins derived from the worm tissue was performed at the Department of Biochemistry and Biophysics, Dnipropetrovsk National University. Honchar. Processing of the data was carried out by methods of mathematical statistics.

The results of research. The concentration of soluble and membrane proteins in the tissues of the worm according to laser irradiation, and exhibits a relatively substrates - habitat (sapropel, ground) is presented in Table 1.

The action of low-intensity laser radiation on living organisms, causing the interest of researchers almost since the invention of the laser. However, to date there is no single theory explains all effects arising under the influence of laser light on biological objects. This is due to the relative complexity of biological systems and the difficulties in analyzing the laws of energy conversion in living tissues. It is considered an established fact stimulating effect of laser light on many physiological processes in animals and plants.

Our results show evidence of this assumption. Mathematical processing of data for the changes in the concentration of proteins in the tissues of the chart worms contained on substrates (sapropel, gravel) is shown in Figures 1 and 2. The average value of the concentration of

exposures demonstrates that laser action on worms tissue influenced the change in the concentration of soluble and membrane worms body proteins at the cellular level.

As shown in the diagrams optimal change in concentration of soluble and membrane proteins was in the range of 15-25 minutes of laser irradiation.

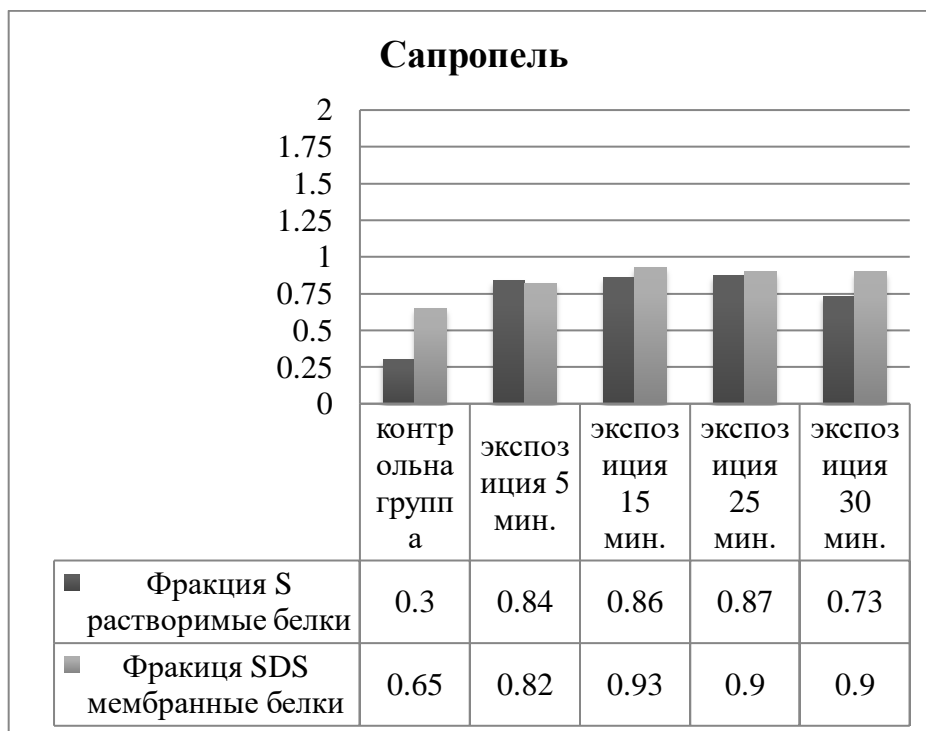


Fig.1 The average amount of change in the concentration of membrane and soluble proteins after exposure to laser radiation on tissue *Eisenia foetida* substrate sapropel

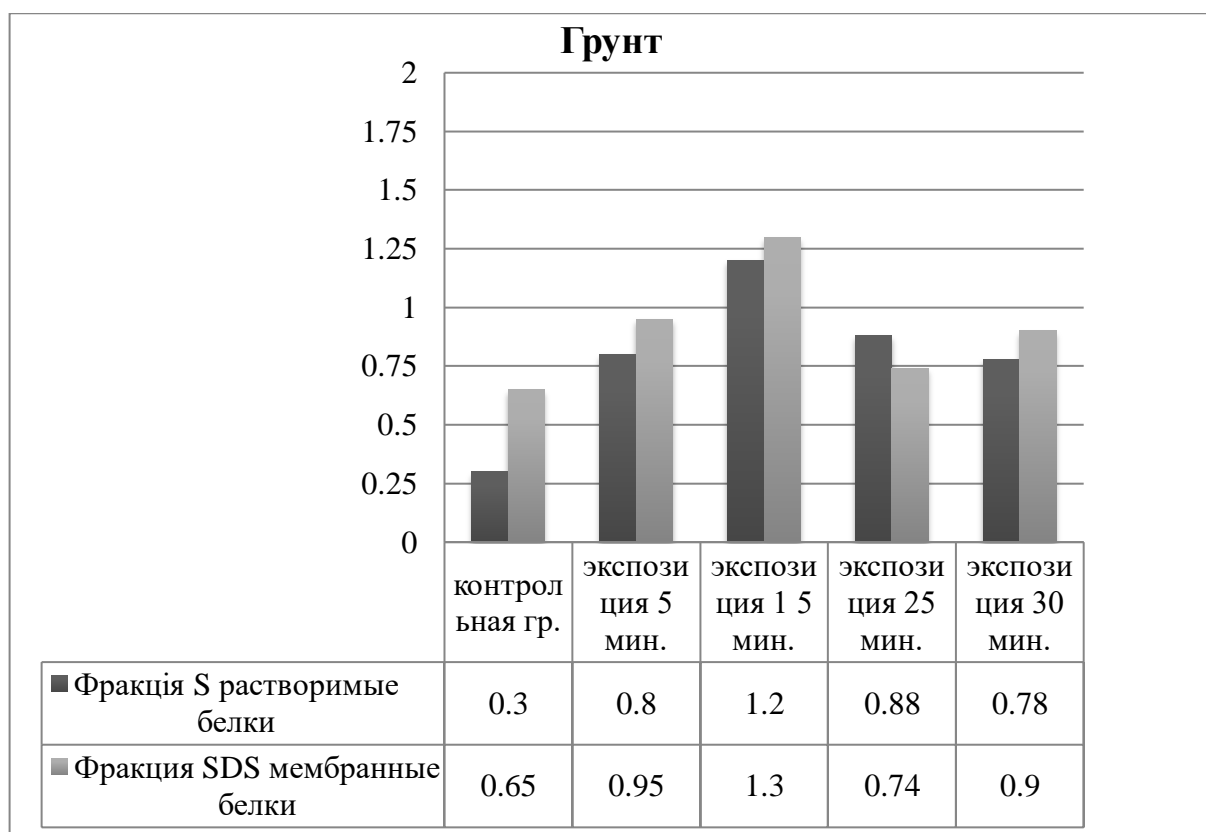


Fig.2. The average amount of change in the concentration of membrane and soluble proteins after exposure to laser radiation on tissue substrate soil *Eisenia foetida* sapropel

We have also carried out the calculation of indicators of reproduction between exposures. The first offspring appeared almost simultaneously in all the exhibitions, but after four months of fertility rate exposure of 25 minutes of laser exposure outperform other exposures 2.5 times. Thus, modulation of expression of the early indicators of the main fractions of proteins in animal cells can be genetic factors predictor modifications body *Eisenia foetida*.

The presented results indicate that the laser radiation may be a promising tool for the stimulation of natural resistance mechanisms that improve the viability and productivity of invertebrates *Eisenia foetida*.

The research may provide the possibility of creating a concept for biological diversity in the population of *Eisenia foetida* in order to obtain the non-specific resistance in the conditions of action is not favorable factors.

Список литературы

1. Девятков Н. Д. Физико-химические механизмы биологического действия лазерного излучения / Н. Д. Девятков, С. М. Зубкова, И. Б. Лапрун, Н. С. Макеева // Успехи современной биологии. 1987. – Т. 103. вып. 1. – С.31-43.
2. Лобко В. В., Кару Т. Й., Летохов В.С. Существенна ли когерентность низкоинтенсивного лазерного света при его

воздействию на биологические объекты / В. В. Лобко, Т. Й. Кару, В. С. Летохов // Биофизика. 1985. — Т. 30. Вып.2. — С. 366-371.

3. Медведев В. В. Физическая деградация черноземов / Медведев В. В. // — Харьков: КП «Городская типография». — 2013. — 323 с.

4. Моргун Ф. Т. Почвозащитное земледелие / Ф. Т. Моргун // — К., «Урожай». 1988. — 46 с.

5. Кокунин В. А. Статистическая обработка данных при малом числе опытов / В. А. Кокунин // Укр. био – хим. журн. — 1975. — 7, №6. — С.776-791.

6. Chaoui, I. H. Effet de déjections de lombricset le compost sur l'activité microbienne et l'absorption des nutriments des plantes / I. H. Chaoui, L. M. Zibilskeet, S. Ohno // Soil Biology and Biochemistry, vol. 35, no 2 – p. 295-302.

7. Сендецький В. М. Технологічні та екологічні аспекти органічного землеробства в Україні / В. М. Сендецький., І. П. Мельник В. С. Гнидюк // Агроєкологічний журнал. — К., 2009. - С.206-208.

8. Сендецький В. М. Виробництво органічних добрив нового покоління «Біогумус» з органічних відходів агропромислового комплексу методом вермикультивування і його вплив на урожайність сільськогосподарських культур / В. М. Сендецький // Збірник наукових праць Білоцерківського національного аграрного університету. Агробіологія. — 2010. — №4 (80). — С.72-78.

9. Miller G. L. Protein determination for large numbers of samples / G. L. Miller // Anal.Chem. — 1959. — 31, No. 5. — P.964-966.

Досліджували ефект впливу лазерного опромінення на вміст фракцій цитозольних та структурних білків в тканинах особин Eisenia foetida місцевої популяції. Досліджено дію різних за часом експозицій опромінення: від 5 до 30 хвилин, лазером типу ЛГН – 208Б (потужністю – 1мВт). Вік особин, які піддавались впливу дії лазера, не досягав репродуктивної зрілості. Після цього особини в рівній кількості були перенесені на субстрати: субстрат 1 –(сапрпель) субстрат 2 – (грунтова суміш). По досягненню репродуктивної зрілості, а саме ознаки утворення на тілі особин пояску, визначали вміст цитозольних та мембранних білків в тканинах черв'яків за допомогою методу Лоурі. Виявлено, що експозиція лазерного опромінення в різних дозах індукувала достовірно зростання концентрації вивчених білків.

Розчинні білки, мембранні білки, субстрат, сапрпель, експозиція опромінення

PROBLEMS GREENING AGRICULTURAL COMPLEX OF UKRAINE

***M.P. FEDYUSHKO, Candidate of Agricultural Sciences
Taurian State Agrotechnical University***

Ecological problems all anymore come into a notice to itself. Therefore an ecologization of agroindustrial complex is one of important problems of society. With every year a necessity grows for the ecologically net products of feed. It seems from it, that agricultural production as well as other industries of APK must be based actually on ecological laws, steady development is impossible without maintenance of quality of environment, guard of soils

Ecologization, contamination, compression, хумизация, pesticides. ecological laws, steady development

In recent years, agricultural production Ukraine have intensified the crisis: reduced volume of gross output, deteriorated natural resources, reduced soil fertility, deepened the imbalance between crop and livestock sectors. Reducing the number of livestock has reached a critical point for a significant reduction in productivity [1]. Almost all sectors of agriculture there is a gradual degradation, affecting not only the general state of the economy, but also reduces the trading position of Ukraine in the world market.

The aim of the study was necessary to examine and describe the main environmental problems in agriculture.

Materials and methods of research. Agro-industrial complex is one of the most notable factors influencing the environment. Some scientists even give him the championship in terms of anthropogenic pressure [3]. This is due primarily to the prevalence of its territorial units, especially agricultural production. In addition, the reproduction of agriculture is closely linked to natural processes. In the 20th century, the impact on the environment AIC increased intensification of agricultural production, namely the mechanization of many processes, over-plowed territory and deep plowing, chemicals and water reclamation, a high concentration of production and so on. Doing farm work has a negative impact not only on farmland but also on the environment [2].

Mechanization of farming. The process of mechanization of agricultural work affects the quality of soil and its fertility. Farming, worked in the fields Ukraine differed cumbersome, more weight and power. Weight of tractors and combines up to 10-15 tons, the following conditions each

centimeter of arable land covered by the running of machines at least twice, and on average 3-5 times a year. This leads to pereuschilnennya plow and subsoil horizons. Because it violated water and air mode, the power of soils, their structure is destroyed, heavier texture. Especially pereuschilnennya detrimental effect on irrigated land. [3] To solve the problem pereuschilnennya soil can only be complex, upgrading technology, reducing pressure on the ground wheeled and crawler tractors, reduction in the number of passes technology field. This problem is successfully solved the introduction of soil ecosystems and appropriate cultivation techniques.

Chemisation agricultural production. One of the areas of intensification of agricultural production is the use of chemicals, which involves making the soil as fertilizer and pesticides. This process is active in all developed countries. Adding chemical fertilizers is because the year with the harvest from soil taken out ten million tonnes of nutrients: nitrogen, potassium, phosphorus, etc., So the application of organic and mineral fertilizers is one of the most important ways to improve soil fertility. The need for pesticides and crop protection chemicals caused outbreaks of mass reproduction of various pests, weeds, fungal diseases. In agriculture pesticides are used in the way of action on pests, herbicides (weeding), insecticides (destruction of harmful coma), nematocides (destroy worms), fungicides (destruction of fungal and viral diseases), bactericides (destruction of pathogens), defoliant (destruction of leaves). Class include pesticides and chemicals that speed up or slow down the growth of some plants. The use of fertilizers and pesticides can increase the yield, but has a negative environmental impact:

- Accumulate in plants, they get into the food chain of the human body;
- Pollute groundwater and surface water;
- Detrimental effect on flora and fauna;
- Reduced productivity due to death of microorganisms in the soil [4].

Contamination of water nutrients, and nitrogen compounds. In the world annually into the environment receives 50 mln. Tons nitrites. They merge into ponds and rivers and lead to a process of "eutryfikatsiyi", ie overgrowth of water bodies blue-green algae.

A number of problems arose in the development of this direction of intensification of agricultural production as reclamation - of measures related to the fundamental improvement of soil properties and aimed at increasing their fertility. There are several kinds of reclamation.

The most common among them is water conservation, ie irrigation and drainage. On irrigated lands the role played by the most active agent artificial moistening the soil from water source to provide plants with moisture. When land drainage excess moisture play outside layer, placed where the roots of plants and thus creating favorable conditions for their growth. However, prolonged irrigation raises a number of environmental problems. Chief among them - is secondary soil salinization, which occurs

due to excessive irrigation and high ground water level [5]. When salinity hit nearly half of irrigated land in the world. Since it is also linked to the problem of rational use of water on the way from the source to the water intake irrigated fields aimlessly lost 60-75% water, so the main task is to improve the quality of irrigation systems.

Drainage for fundamentally new basis contrary irrigation. His hold on the waterlogged lands, forests, swamps to include new areas of agricultural production [6]. But these ecosystems are unique and valuable for biodiversity Ukraine. After the drainage reclamation of dangerous environmental changes occurring water balance of the territory and violations of the groundwater, unwanted changes in surveying mode with frequent disastrous floods, increasing land degradation processes and reduce the productivity of farmland.

Removal of fertile soil with harvest. In Ukraine, the roots of sugar beet for processing incoming contain 15% total weight of the soil. Return the sugar factories gained ground - an important means of rational use of land in agriculture [7].

Not escaped environmental issues and processing industries. A large number of processing enterprises industry lacks basic water treatment facilities, equipment and technologies obsolete. Significant spread them on the territory of Ukraine leads to pollution, small rivers, lakes, which discharged waste.

Conclusions. It was the basic problem of negative impact on agriculture, which has always been the backbone of Ukraine, the welfare of their citizens and forming an important part of the worldview and lifestyle Ukrainian. Modern technologies transform the agricultural sector to fully industrial unit, which aims to maximize profits under conditions minimizing costs. For agricultural land, plants, natural conditions and resources is a means of production, so agricultural production first feels the gradual depletion of natural resources and the danger of changing the natural environment and resources. Furthermore, the world is gradually reduced area of land on which crops are grown and get food, while increasing population. It is therefore necessary to increase yields to meet the needs of people not only in quantity but also in quality, increasing need for environmentally friendly food. It follows that agricultural production, as well as other field of agriculture should be based on the environmental law, sustainable development is impossible without maintaining the quality of the environment, protection of soil, organic technologies that ensure reproduction of natural environment and activation mechanisms of self-regulation.

Список літератури

1. Греков В. О. Охорона і відтворення родючості ґрунтів у зональних агроекосистемах // В. О. Греков, Л. В. Дацько. // Агроекологічний журнал – 2009. – №1. – С. 43–47.

2. Закон України «Про державний контроль за використанням та охороною земель» Відомості Верховної Ради. – 2003. – № 39. – С. 350.

3. Лихочвор В. Перспективи розвитку агротехнологій в Україні / В. Лихочвор // Пропозиція – 2008. – №3– С. 47–52.

4. Основні напрями державної політики України у галузі охорони довкілля, використання природних ресурсів та забезпечення екологічної безпеки // Відомості Верховної Ради України. – 1998. – №38–39. – С. 248–298.

5. Тараріко О.Г. Основні фактори сталого розвитку агроекологічних систем і сільськогосподарських ландшафтів / О. Г. Тараріко. // Проблеми сталого розвитку України – Київ: БМТ, 1998. – С. 254–267.

6. Трегобчук В. Охорона земель - складова національної безпеки / В. Трегобчук . // Вісник НАН України – 1997. – № 3–4. – С. 3–13.

7. Краснолуцький О. Складання проектів землеустрою, що забезпечують еколого-економічно обґрунтовані сівоzmіни та впорядкування угідь / О. Краснолуцький, Р. Тихенко, Т. Євсюков. // Землевпорядний вісник – 2010. – №4. – С. 14–17.

Екологические проблемы все больше привлекают внимание к себе. Поэтому экологизация агропромышленного комплекса является одной из важных проблем общества. С каждым годом растет необходимость в экологически чистых продуктах питания. Из этого выходит, что сельскохозяйственное производство, как и собственно другие отрасли АПК должны базироваться на экологических законах, устойчивое развитие невозможно без поддержания качества среды, охраны почв.

Екологизация, загрязнение, уплотнение, химизация, пестициды. экологические законы, устойчивое развитие