УДК 332.33:332.72
DOI: https://doi.org/10.31651/2076-5843-2022-3-4-158-164

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ADAPTIVE LAND MANAGEMENT IN CONDITIONS OF SECURITY RISKS

Theoretical approaches to the development and economic substantiation of the effectiveness of the use of biological methods of rational agriculture have been improved. One of the ways to increase the effectiveness of protection of agricultural crops from harmful organisms and reduce environmental pollution by pesticides is the use of means created on the basis of biologically active substances. These substances are regulators of the growth, development, reproduction and behavior of living organisms. Organic and biological farming significantly reduces the use of extraneous chemical factors involved in agricultural production, based on limiting the use of chemically synthesized fertilizers, pesticides and pharmaceuticals.

Key words: *adaptive land management, security risks, rational land use, plowing of agricultural land, chemicalization of agricultural production, biological methods of rational agriculture, biologically active substances.*

Introduction. Rational land use means the maximum involvement in the economic circulation of all lands and their effective use for the main purpose, creating the most favorable conditions for high productivity of agricultural land and obtaining the maximum amount of products per unit area with the least labor and money costs. Land protection is a set of scientifically based measures aimed at eliminating excessive withdrawal of land funds from agricultural circulation as a result of industrial, transport, urban and rural construction and mineral extraction, prevention of flooding, waterlogging by means of hydrotechnical and reclamation construction, improvement of physical and chemical properties, destruction of poisonous chemical substances in them when using mineral fertilizers and means of plant protection against pests and diseases, prevention of soil pollution with industrial production waste, fuel and lubricants during agricultural work, protection against water and wind erosion, rational regulation of the soil-forming process in conditions of intensification of agricultural production and its industrialization.

Ukraine is characterized by an extremely high level of development of the land fund and plowed agricultural land. The structural imbalance of the land fund worsens the efficiency of land use and protection. The agricultural development of the land exceeds the ecologically justified norms.

Literature review. The management of land resources of agricultural producers is a rather comprehensive category and includes, in particular, the transformation of the land fund, which began with the reform of land relations. The main goal of land reform in Ukraine is to create conditions for the rational use and protection of land through the development of various forms of land ownership and management, the establishment of new land relations that would meet the requirements of a market

economy and rational nature management. Rational use and protection of land resources include two groups of issues:

1) protection of land from depletion and increase of its fertility - economic group;

2) protection against pollution and its prevention - ecological group.

Rational use and protection of land are two interrelated processes aimed at increasing the productive forces of the land. They provide for:

- optimization of the distribution of the land fund between branches of the national economy and its use in each of them as efficiently as possible;
- optimization of the structure of certain types of land according to natural and economic zones and districts;
- development and implementation of a rational system of agriculture, which includes soil protection cultivation, fertilizers; liming of acidic and plastering of saline and saline soils, crop cultivation technology, crop rotation system, etc.;
- drainage of swampy and waterlogged lands and irrigation and watering of arid lands; prevention of flooding, waterlogging, waterlogging of lands, deterioration of their physical and chemical properties;
- wide use of soil microorganisms to create highly fertile and erosion-resistant soils;
- development and implementation of a scientifically based onion growing system;
- development and implementation of a rational system of resettlement, development of rural and urban settlements, placement of channels for transferring water from high-water to low-water areas, large reservoirs, communication routes, power lines, oil and gas pipelines;
- development and implementation of ecological and economic land assessment and its use for planning the location and specialization of agricultural production, determining the volume of state purchases of crop and livestock products, production costs and profitability of agricultural enterprises, establishing correct, scientifically based prices [1-10].

Setting **the purpose** – to investigate the system of adaptive land management in conditions of security risks.

Results and discussion. For agriculture, the part of the earth called soil is of the greatest importance - a special natural formation, which is characterized by the features of living and non-living nature, formed as a result of the long-term transformation of the surface layers of the lithosphere under the joint and mutually determined influence of the hydrosphere, atmosphere, living and dead organisms. The use of land is accompanied by the transformation and change of its main natural original properties, the emergence of new ones. In agriculture, the transformation of land into arable land is effective. Plowing of areas previously covered with grass vegetation, irrigation in arid regions and draining of marshes in humid regions, the resulting increase in arable land contributes to the effective growth of agricultural production and is accompanied by a deep transformation of the environment. Often these transformations become undesirable, going beyond the initial consequences [11-19].

Therefore, the economic benefit from the use of products of the chemical industry does not exhaust all the arguments in favor of increasing the rate of supply of modern chemical products to agriculture. There are a number of important factors that determine the limits of distribution and use of chemicals. The use of large doses of fertilizers can worsen the quality of products and groundwater, which leads to the pollution of nearby rivers and reservoirs. The use of mineral fertilizers made it possible to increase the yield of crops to a certain extent, but the further increase in their doses did not contribute to its growth, which is associated with a decrease in humus reserves in the soil. An increase in yield is impossible without improving the fertilizer application technology. Their uncontrolled use leads to environmental pollution, which threatens human health. Improper or excessive use of pesticides is especially dangerous. Moreover, some of them are transformed, that is, new toxic substances appear (secondary poisoning). It is impossible to assess all the consequences of exposure to pesticides due to the imperfection of research methods [3].

As conditions worsen due to air pollution and precipitation, soil erosion processes become more active. It is well known that 90% of soil erosion is caused by a change in such parameters as aggregateness, dispersion coefficient, volume mass, total content of dust and clay fractions, i.e. a complex of physical and mechanical properties of soils, individual components of which undergo

changes under the influence of man-made air pollution and sediments This affects the state of the soil structure and the anti-erosion resistance of the soils. Enhanced erosion processes are especially characteristic of areas where the air is smoky by industrial enterprises. In large cities, there are some anomalies in the manifestation of local climatic factors, there are also differences in the wind regime: the average annual wind speed in large cities is 0.2-0.9 m/s lower than the norm.

Urbanized areas have their own microclimate, the formation of which is greatly influenced by large cities. This effect is manifested in an increase in the frequency and duration of heavy rains and heavy downpours. In pollution zones, due to a decrease in solar radiation, the soil receives 13-23% less heat, depending on the vegetation cover. Soil pollution by vehicle emissions, which contain a large amount of heavy metals, is significant. It was established that the average concentrations of all metals increase with the increase in the intensity of traffic and are ten times higher than the background level.

A decrease in the content of metals in the deeper layers of the soil indicates their arrival from the air with automobile exhaust. Near freeways, 5-20, 50-100, and 100-200 times more lead accumulates on the leaves of crops, grasses, and trees, respectively, than in enterprises located far from freeways. Deposition of solid particles occurs as a result of atmospheric precipitation, the action of gravity. The content of chemical elements in the soil affects their concentration in plants. It was established, in particular, that the concentration of lead in 1 kg of soil along a highway with a throughput of 1,650 cars per hour per lane is up to 50 mg with a norm of 12-14 mg [6].

Transport pollution of the soil leads to a decrease in its fertility. In the conditions of a moderate climate near the sources of pollution, the grain yield decreases by 20-30%, beets - by 35%, beans - by 40%, 63 potatoes - by 47%. The issue of disposal of sewage sludge is very important, the total amount of which in Ukraine is 25 million m3 per hour, and in agriculture, about 150 thousand tons are used per year. More than 1,200 hectares of fertile land are occupied for the storage of sewage sludge, and this area is increasing every year. In Kyiv alone, the area covered by sewage sludge has almost doubled over the past 5 years and amounts to 196 hectares [3]. When using wastewater to irrigate fields, it is necessary to constantly monitor the content, the dynamics of the accumulation of salts in the soil, in order to take timely measures for land reclamation. According to the salt content, soils are divided into: non-saline (salt content 0.3%); slightly saline (0.3-1%); highly saline (2-3%); salt marshes (more than 3%). Saline soils include soils containing at least 20% of absorbed sodium from the absorption capacity, saline soils - 15-20%), moderately saline soils - 10-15, slightly saline soils - 5-10, non-saline soils - less than 5%. Significant differences in salt resistance indicators according to various authors are explained by different soil and climatic conditions in which plants grow, as well as by the fact that different varieties, zoned in certain areas, were studied. Yes, light sandy soils are more resistant to the negative impact of sewage on them. Long-term irrigation of sod-podzolic soils with industrial and domestic wastewater does not impair such properties as volume, transparency, water permeability, strength of the plow layer, acidity, and improves the biological activity of soil microflora. The agro-ameliorative condition of soils does not deteriorate from the use of wastewater from sugar mills for irrigation. In Ukraine, about 200 million m3 of such effluents can be used in agricultural production, which can be used to irrigate an area of about 70,000 hectares [6]. The creation of large reservoirs in the conditions of a plain river causes a sharp change in the hydrological conditions in the adjacent territories.

The organic and biological system of agricultural production, which has gained active development in the world since the 70s of the XX century, is based on the maximum use of crop rotations, manure, composts, plant residues, leguminous and leguminous crops, siderates, organic waste from agro-industrial production, mineral raw materials. Biological methods of weed and pest control and aimed at increasing the fertility of soils, improving their structure while simultaneously ensuring full nutrition of agricultural crops.

Fertility can be regulated with the help of more advanced soil treatment, which helps to reduce the rate of mineralization of humus. For example, reducing the depth of loosening and the frequency of soil treatment slows down the humus mineralization rate, so the need for organic fertilizers is reduced by 25% [3]. Chemization is not the only means of agricultural intensification. Our country seriously lags behind world science in the development of biological methods. One of the main means of bioprotection is trichogram - a genus of parasitic insects of the Chalcid family, which are successfully used in the fight

against scoops, butterflies, fruit eaters, and leafhoppers. At the same time, the complete set of species of this genus is still unknown in our country. In the fight against weeds, herbivorous insects are used, the perspective of which is high specificity in relation to host plants, which practically guarantees the impossibility of their transition to other species. Already such insects (herbiphages) are used against field thistles, many species of thistles, cornflowers, milk thistles, cruciferous flowers, sedges, birch, buckwheat, horsetail, creeping wheatgrass, gorse, even ragweed [7].

An important element of integrated plant protection is the biological method, which includes the use of insects and entomophages, which are artificially propagated in laboratory conditions and in biofactories, as well as microbiological preparations of industrial and economic production. In the world, 14% of open ground agricultural crops, which were subject to chemical treatment against pests, were protected with the help of a biological method. The use of chemical plant protection agents against leguminous crop pests has significantly decreased. Thanks to the use of a bacteriocide against mouse-like rodents, the use of chemical zoocides was reduced by 15-18%. Accounting for microsporiosis, entomofluores, and entomophages on cabbage moths helps to reasonably cancel chemical treatments on cruciferous crops. Such regulation of the chemical method is carried out on pea and wheat crops, when predicting entomofluorite of pea grain and granulosis of gray grain scoop [5].

Agro-technological measures and various natural factors are used in order to increase productivity and protect agricultural crops in the conditions of application of the organic-biological farming system. The main principle in this case is the use of materials and technologies that improve the ecological balance in natural systems and contribute to the creation of sustainable and balanced agroecosystems. The main goal in this case is to maintain the proper level of human health, to optimize the productivity of soil fauna. Organic and biological farming significantly reduces the use of extraneous factors involved in agricultural production by limiting the use of chemically synthesized fertilizers, pesticides and pharmaceuticals. One of the ways to increase the effectiveness of protection of agricultural crops from harmful organisms and reduce environmental pollution with pesticides is the use of means created on the basis of biologically active substances, which are regulators of the growth, development, reproduction and behavior of living organisms.

Conclusions. The most important point in the introduction of organic farming technologies is the preservation and improvement of soil fertility. The measures that ensure the achievement of this goal include: mandatory regulatory use of black and occupied pairs in crop rotation fields; optimization of placement of agricultural crops within each enterprise; comprehensive reproduction and support of a single system of field protection forest strips as the most important means of stabilizing agricultural landscapes and fixing the boundaries of crop rotation fields; bringing water protection and field protection forests to optimal standards; application of the contour-ameliorative system of land use, which involves the optimization of natural agro-landscapes; comprehensive implementation of methods of minimizing tillage, introduction of wide-grip tillage tools, use of direct seeding technology; stopping the unjustified expansion of areas under sunflower in order to improve the phytosanitary condition of the fields by introducing alternative oil crops, i.e. rapeseed, soybean, mustard, linseed, sorghum, etc.; the use of local raw materials that contribute to increasing soil fertility, in particular, phosphorites, sapropels, zeolites, feces, phosphate slags, glauconites, etc.; restoration of chemical land reclamation using local deposits of limestone, chalk, marl, gypsum, etc.; using the advantages of biologicalization of agriculture thanks to the expansion of crops of perennial grasses, agricultural crops for green manure and the introduction of bacterial preparations; highly efficient use of available resources of organic fertilizers, for example, manure, peat, peat-manure composts, bird droppings, sapropel, organic waste from the processing of agricultural products.

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АДАПТИВНИЙ ЗЕМЛЕУСТРІЙ В УМОВАХ БЕЗПЕКОВИХ РИЗИКІВ

***Проблема**. Раціональне землекористування означає максимальне залучення до господарського обігу всіх земель та ефективне використання їх за основним призначенням, створення найбільш сприятливих умов для високої продуктивності сільськогосподарських угідь та одержання максимальної кількості продукції з одиниці площі з найменшими затратами праці та коштів. Для України характерний надзвичайно високий рівень освоєння земельного фонду та розораності сільськогосподарських угідь. Структурна незбалансованість земельного фонду погіршує ефективність використання та охорони земель. Сільськогосподарська освоєність землі перевищує екологічно обґрунтовані норми.*

***Метою** статті є розкриття специфіки системи адаптивного землеустрою в умовах ризиків безпеки.*

***Результати.** Економічна вигода від використання в сільськогосподарському виробництві продукції хімічної промисловості не вичерпує всіх аргументів на користь зменшення темпів хімізації. Існує низка важливих факторів, які визначають межі розповсюдження та використання хімічних речовин. Застосування великих доз добрив погіршує якість сільськогосподарської продукції та підземних вод, призводить до забруднення прилеглих річок та водойм. Застосування мінеральних добрив дозволило певною мірою підвищити врожайність сільськогосподарських культур, але подальше збільшення їх доз не сприяло її зростанню, що пов'язано зі зменшенням запасів гумусу в ґрунті. Збільшення врожайності неможливо досягнути без удосконалення технології внесення добрив. Особливо небезпечним є неправильне або надмірне використання пестицидів. Причому деякі з них трансформуються, тобто виникають нові токсичні речовини (вторинне отруєння).*

У міру погіршення умов через забруднення повітря та випадання опадів активізуються процеси ерозії ґрунту. Значним є забруднення ґрунтів викидами автотранспорту, які містять велику кількість важких металів. Встановлено, що концентрація свинцю в 1 кг ґрунту вздовж траси з пропускною здатністю 1650 автомобілів на годину на одну смугу становить до 50 мг при нормі 12-14 мг. В умовах помірного клімату поблизу джерел забруднення врожайність зерна знижується на 20-30%, буряків - на 35%, квасолі - на 40%, 63 картоплі - на 47%.

Доведено, що хімізація – не єдиний засіб інтенсифікації сільського господарства. Важливим елементом інтегрованого захисту рослин є біологічний метод, що включає використання комах і ентомофагів, які штучно розмножуються в лабораторних умовах і на біофабриках, а також мікробіологічних препаратів промислового і господарського виробництва. Україна серйозно відстає від світової науки в розвитку біологічних методів.

***Наукова новизна**. Удосконалено теоретичні підходи до розробки й економічного обґрунтування ефективності використання біологічних методів раціонального землеробства. Одним зі шляхів підвищення ефективності захисту сільськогосподарських культур від шкідливих організмів та зменшення забруднення навколишнього середовища пестицидами є використання засобів, створених на основі біологічно активних речовин. Ці речовини є регуляторами росту, розвитку, розмноження та поведінки живих організмів. Органічне та біологічне землеробство значно скорочує використання сторонніх хімічних факторів, залучених до сільськогосподарського виробництва, на основі обмеження використання хімічно синтезованих добрив, пестицидів і фармацевтичних препаратів.*

***Висновки**. Найважливішим аспектом у впровадженні технологій органічного землеробства є збереження та підвищення родючості ґрунту. До заходів, які забезпечують досягнення поставленої мети, належать такі: обов'язкове нормативне використання пару в сівозмінах; оптимізація розміщення*

сільськогосподарських культур у межах кожного підприємства; комплексне відтворення та підтримка єдиної системи полезахисних лісових смуг як найважливішого засобу стабілізації агроландшафтів та закріплення меж полів сівозмін; приведення водоохоронних і полезахисних лісів до оптимальних нормативів; застосування контурно-меліоративної системи землекористування, яка передбачає оптимізацію природних агроландшафтів; комплексне впровадження прийомів мінімізації обробітку ґрунту, впровадження широкозахватних ґрунтообробних знарядь, застосування технології прямого посіву; припинення необґрунтованого розширення площ посівів соняшнику з метою покращення фітосанітарного стану полів шляхом впровадження альтернативних олійних культур – ріпаку, сої, гірчиці, льону, сорго тощо; використання місцевої сировини, що сприяє підвищенню родючості ґрунтів, зокрема фосфоритів, сапропелів, цеолітів, фекалій, фосфатшлаків, глауконітів тощо; відновлення хімічної меліорації з використанням місцевих родовищ вапняку, крейди, мергелю, гіпсу тощо; використання переваг біологізації землеробства за рахунок розширення посівів багаторічних трав, сільськогосподарських культур на зелене добриво та впровадження бактеріальних препаратів; високоефективне використання наявних ресурсів органічних добрив, наприклад, гною, торфу, торфогнойових компостів, пташиного посліду, сапропелю, органічних відходів переробки сільськогосподарської продукції.

Ключові слова: *адаптивний землеустрій, безпекові ризики, раціональне землекористування, розораність сільськогосподарських угідь, хімізація сільськогосподарського виробництва, біологічні методи раціонального землеробства, біологічно активні речовини.*

Одержано редакцією: 20.04.2023
Прийнято до публікації: 19.06.2023