культур та кукурудзи, а також диференціальним доходом від їх вирощування отримано в тих районах, де зосереджені орні землі середньої якості. Ціна бала за урожайністю та диференціальним доходом є об'єктивним критерієм оцінки продуктивного потенціалу орних земель щодо зернових колосових культур.

Список використаних джерел

1. Бруханський Руслан, Бінчаровська Тетяна. Комплексний економічний аналіз земельних ресурсів сільськогосподарських підприємств: організація та методика. Інститут бухгалтерського обліку, контроль та аналіз в умовахглобалізації. 2019. Вип. 1-2. С. 97-104.

2. Бутенко Є.В., Харитоненко Р.А. Продуктивний потенціал земель та принципи його оцінки в Україні. Землеустрій, кадастр і моніторинг земель. 2017. №1. С. 58-65.

3. Кримська Л.О., Коваль М.О. Земельно-ресурсний потенціал як основа ефективного використання земель сільськогосподарського призначення. Держава та регіони. Серія: Економіка та підприємництво. 2013. № 6 (75). С.148-151.

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SOME IMPERATIVES OF SOIL MONITORING (ON THE EXAMPLE OF THE KHMELNYTSK REGION)

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To ensure environmental monitoring in Ukraine, a good regulatory and legal framework has been created, which continues to be improved. Resolution No. 391 of the Cabinet of Ministers of Ukraine dated March 30, 1998 "On the approval of the Regulation on the state environmental monitoring system" defines the subjects of environmental monitoring, including the Ministry of Agrarian Policy. It is entrusted with the functions of monitoring agricultural soils. This type of monitoring is established by the laws of Ukraine "On land protection" and "On state control over the use and protection of land".

For sixty years in a row, soil monitoring and agrochemical certification of agricultural lands has been carried out by the Ministry of Agrarian Policy, which exercises these powers through the state institution "Institute of Soil Protection of Ukraine" (State Soil Protection Agency) with its regional branches. During this time, a complete system of soil observations with appropriate normative and methodical support was created, a unique database was formed in space and time on the qualitative characteristics of soils. Currently, soil monitoring is carried out by State Soil Protection Agency in two main directions, namely:

1) agrochemical certification of agricultural lands. The landowner/land user is provided with an agrochemical passport, which is part of the state's information system on the state of natural resources (in this case, soils). This is a standardized form of agrochemical soil survey results [1];

2) conducting long-term observations at stationary monitoring sites, where, in addition to soils, the quality of plant products and their contamination by heavy metals, radionuclides, pesticide residues and other pollutants are monitored, which makes it possible to comprehensively assess the soil-plant relationship system.

The results of the activity of "State Soil Protection Agency", which are reflected in numerous reports, publications, reports, testify to the general trend of loss of fertility of arable soils, the development of soil degradation processes in all

regions. This is evidenced by both the results of scientific research and systematic agrochemical (ecological-agrochemical) monitoring of agricultural lands [2, 3].

In addition to economic activity, one of the reasons for this is climate change. Of particular concern is the intensification of erosion processes, dehumification, which causes deterioration of the structural state and physical properties of soils, and secondary acidification.

However, against this background, the yield of agricultural crops and the gross harvest of grain and oil crops in Ukraine are growing primarily due to the introduction of modern varieties and hybrids with high potential yield, technical re-equipment of the crop industry and the use of the most modern technologies. But it contributes to soil depletion. Undoubtedly, there are fundamental and applied studies in networks of long-term stationary field experiments and soil profiles of the National Academy of Sciences with relevant recommendations. In production, there are enough examples of the organization of soil-protecting agriculture, reproduction of soil fertility. However, on the majority of arable land, measures to preserve soil fertility are not used by both small landowners and large enterprises.

Therefore, it is important for the state to control the quality of soils for timely and well-founded management decisions regarding the protection of their fertility. In this context, we have adopted enough resolutions and laws, by-laws, regional and national soil protection programs have been developed and are being developed, which, unfortunately, are not fully implemented.

Using the example of the Khmelnytskyi branch of "State Soil Protection Agency", it is possible to analyze the problems and prospects for their solution in terms of soil monitoring and protection. There are 1,561 thousand hectares of agricultural land in the region, of which 1,326 thousand hectares (84.9%) are arable land; perennial plantings — 38,000 ha (2.4%); meadows and pastures — 105 thousand ha (9.7%); hay fields — 91,000 ha (5.8%); fallow land — 0.7 thousand ha (0.04%) [3].

Agrochemical certification of agricultural land is carried out in rounds with a cycle of five years. That is, every field, plot of land is subject to inspection for quality indicators every five years.

Agrochemical certification in Khmelnytskyi region in 2016-2020 (XI cycle of soil survey) was carried out on an area of 466.6 thousand hectares, or 29.9% of the area of agricultural land in the region. More than 32,000 soil samples were taken, more than 166,000 analytical tests were performed, agrochemical cartograms were made for an area of more than 386,000 hectares, and more than 5,000 agrochemical field passports were made.

Compared to 2011-2015 (the 10th cycle of surveys), surveyed areas decreased significantly (60% of agricultural land areas). During this period, 2.8 times more soil samples were taken, 2.5 times more analyzes were performed, 984,000 ha more maps were produced (2.5 times more) and 4 times more agrochemical passports were produced.

In recent years, there have been drastic changes in land ownership, the transformation of agricultural enterprises, the creation of small-scale farms (private peasant and farm farms). Therefore, weighted average indicators on the scale of the district and individual farms lose the possibility of their use for comparison with the results of previous rounds.

Now there are 1,326 thousand hectares of arable land in the Khmelnytskyi region [4], of which currently only about 30% are surveyed under the program of ecological and agrochemical land certification in a five-year cycle, and this figure is gradually decreasing. More than half of the area is not surveyed, because land users use the option of "optional" (as reflected in the legislation) survey. This leads to the impossibility of taking soil samples and obtaining up-to-date information about the condition, improvement or deterioration of fertility indicators, since in conditions of private ownership of land, access to land plots may be limited by the owner. The lack of such information in public access increases the risks of irrational use of soils, their depletion and degradation. This situation will make it

impossible to ensure the implementation of Article 13 of the Constitution of Ukraine [5].

The network of stationary monitoring plots, which was implemented for the purpose of ecological monitoring of soils (there are 16 plots within the Khmelnytskyi region) also has its own issues — it suffers from conservation of plots.

In order to better understand trends in soil fertility dynamics, additional information about economic activities (for example, tillage systems, crop fertilization systems, crop rotation, etc.) and weather conditions between observations is needed. Therefore, it is necessary to create appropriate geospatial information systems (GIS) with appropriate support, which allow for operational analysis of a large amount of data in a short time. For monitoring, it is advisable to optimize the network of stationary observation sites and expand it by choosing long-term stable agricultural enterprises, individual fields or soil removals that are part of an elementary plot. In this case, all technological information is especially needed.

Inadequate funding of scientific institutions, including "State Soil Protection Agency"and its affiliates, and the government's loss of influence over land users and land owners led to the commercialization of activities for which most workers were not ready. A large part of agricultural enterprises and almost all small producers were not ready for such activities. The largest agricultural holdings have created their own laboratories with modern equipment for determining soil properties and agrochemical informative support of their activities. However, they mostly analyze soils for the crop fertilization system (nutrient content, acidity, less often - organic matter). The study of ecological indicators, which is a component of the field passport (pollution with heavy metals and radioactive elements, pesticides, etc.), and the calculation of the ecological and agrochemical score of the land plot or field are not carried out.

It should be noted that specialized scientific institutes and "State Soil Protection Agency" are losing their competitiveness, which reduces the ability of

the existing environmental monitoring system to timely detect environmental threats and develop appropriate recommendations for making management decisions to prevent the occurrence of emergency situations.

To carry out work at the level of European standards, laboratory equipment is primarily required for changes. The search for grants for international aid to update devices in the analytical laboratories of the regional branches of the State Soil Protection Agency has already begun, which will contribute to the significant progress of its activities.

For now, an important question is being raised that a serious drawback of environmental monitoring in Ukraine is departmental fragmentation and duplication of research. Soil monitoring is carried out by various departments, but unsystematically, often locally. Observations are conducted according to different methodological approaches and a large difference in the scope of research. This makes it impossible to really assess the state of the objects of research.

Another problem is personnel. Laboratories were experiencing "personnel hunger" as a result of the outflow of qualified workers to other institutions and abroad due to low wages. This is especially noticeable now as a result of the war in Ukraine. Partly, in certain periods, teachers of educational institutions and students-interns are involved for work. The lack of scientists is felt to a large extent also due to the reduction of specialized departments. In the future, in Ukraine, it will be necessary to carry out a soil survey in the de-occupied territories, to assess the soil disturbed by the war, and eventually to conduct a large-scale soil survey. Therefore, a more tangible problem of personnel is expected, since it takes time to prepare them.

Similar problems have been faced in Bulgaria for decades. In the state, soil science and management relatively quickly coped with the need to create a system for monitoring soil fertility and soil cover. Currently, state monitoring of the soil cover is generally organized in the country, taking into account the natural features and requirements of the legislation of the European Union.

There are also separate laboratories for servicing agricultural production. For example, the agrochemical laboratory of the Agrarian University in Plovdiv. It serves certain scientific topics in the field of soil science and agrochemistry for the university and carries out commercial activities with production, but it has certain "residual" problems of the relevant reorganizations in the past. Laboratory equipment is relatively new, sufficiently productive and adapted to world standards, but does not correspond to modern analogues of Western European laboratories (complete re-equipment to the level of highly developed European countries has not yet been completed). The laboratory is certified for a wide range of field and laboratory research and works according to the principles of consulting with the involvement of the scientific potential of the department of agrochemistry and soil science. Due to the relatively low solvency of Bulgarian agricultural enterprises and small commodity producers, it is difficult to establish cooperation with them for agrochemical soil research and development of a fertilization system and measures to preserve their fertility.

Conclusions. 1. In Ukraine, the monitoring of soil fertility and soil cover needs improvement, but thanks to the extensive network, laboratory equipment and standard research methodology, the state institution "Institute of Soil Protection of Ukraine" is most suitable for performing the functions of the state soil monitoring service.

2. The research results of the Khmelnytskyi branch of the "Institute of Soil Protection of Ukraine" confirm the trend of decreasing soil fertility, their depletion and the loss of ecological functions. However, due to the non-obligation of the agrochemical passport of the field/land plot, the volumes of survey of agricultural land for the last few cycles and the possibility of establishing the objective dynamics of changes in soil fertility, respectively, are lost.

3. Possible prospects for strengthening the "Institute of Soil Protection of Ukraine", based on the reequipment of laboratories with modern devices and methods, optimization of regional branches and the experience of other countries, have been identified.

References

1. Metodyka provedennia ahrokhimichnoi pasportyzatsii zemel silskohospodarskoho pryznachennia: kerivnyi normatyvnyi dokument [Methodology for agrochemical certification of agricultural land: a regulatory document] / Za red. Yatsuka I. P., Baliuka S. A. 2-he vyd., dopov. Kyiv, 2019. 112 s., (https://www.iogu.gov.ua/literature/instructions/1.pdf) [in Ukrainian].

2. Periodychna dopovid pro stan gruntiv na zemliakh silskohospodarskoho pryznachennia Ukrainy za rezultatamy X turu (2011-2015 rr.) ahrokhimichnoho obstezhennia zemel [Periodic report on the condition of soils on agricultural lands of Ukraine according to the results of the X cycle (2011-2015) of agrochemical land survey]. Kyiv, 2020, 208 s., (https://www.iogu.gov.ua/literature/periodically/3_2020.pdf) [in Ukrainian].

3. Naukovi doslidzhennia z monitorynhu ta obstezhennia silskohospodarskykh uhid Ukrainy za rezultatamy XI turu (2016-2020 rr.) [Scientific studies on the monitoring and survey of agricultural lands of Ukraine according to the results of the XI cycle (2016-2020)], Kyiv, 2023, 74 s. (https://www.iogu.gov.ua/link/directions/edition.html) [in Ukrainian]/

4. Sait DU «Derzhhruntokhorona» (filii) [state institution "Institute of Soil Protection of Ukraine"]. Elektronnyi resurs. URL: https://iogu.gov.ua.

5.Konstytutsiia Ukrainy [Constitution of Ukraine] (https://ips.ligazakon.net/document/Z960254K) [in Ukrainian].

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ЗНАЧЕННЯ БАГАТОРІЧНИХ БОБОВИХ КОРМОВИХ ФІТОЦЕНОЗІВ У ПІДВИЩЕННІ РОДЮЧОСТІ ҐРУНТУ

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