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AGRO-ECOLOGICAL TERRITORIES ZONING FOR THE CULTIVATION OF ORGANIC AGRICULTURAL PRODUCTS

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Обговорюються результати дослідження агроекологічного стану сільськогосподарських угідь Полтавської області в контексті виділення сировинних зон вирощування органічної продукції. З використанням аналізу, синтезу й даних узагальнення статистичних та картографічних матеріалів визначено найсприятливіші ґрунтово-кліматичні зони, де наразі можливе широке впровадження органічного землеробства. Здійснено зонування регіону за критерієм співвідношення ріллі та екологостабілізуючих територій. Наголошується, що 65 % його площі займають чорноземи, найродючіші різновиди ґрунтів. Найвищі показники гумусу (4,01–4,5 %) спостерігаються у ґрунтах Машівського, Чутівського та Карлівського районів; 3,51–4,0 % – у Великобагачанському, Миргородському, Шишацькому та Диканському. Однак підкреслюється, що катастрофічний стан мають майже 40 % земель Полтавщини. Представлено також рекомендації, спрямовані на покращення агроекологічної ситуації у досліджуваному регіоні та усунення недоліків на шляху до стабілізації агроекосистеми в цілому.

Ключові слова: *агроландшафт, агроекосистеми, органічна продукція, районування, органічне землеробство, сировинні зони, розораність території, ерозія ґрунтів.*

Formulation of the problem. The formation of environmentally stable organic crop production zones for organic production seems to be urgent and causes the search of strategies for the rational optimization of the agricultural landscape. The plain relief in Poltava region and a high degree of eroded soils causes the search of optimal and adapted regions for growing of wholesome, high quality and environmentally friendly agricultural products.

Groundwork of scientists [2, 6–8] in this area appear to be significant. However, global climate change need reformating of the existing management models based on environmental monitoring. Also it is necessary to development a new recommendations concerning allocation of organic crop production zones which are the most suitable for growing high quality and environmentally friendly agricultural products.

The ploughing-up soils decreasing level and the restoration of degraded and disturbed fields for agricultural purposes is the basis of structure stabilizing of the agricultural landscape. Excessive lands plowing, including slopes, resulted

in a violation of ecologically balanced ratio of the ploughed field and ecologically stabilizing areas (ECT), which had a negative effect on the sustainability of landscapes. The most threatening phenomena are observed in the soil cover, which is significantly degraded and thus a considerable areas of productive land are taken out from cultivation [4].

Water and wind erosion is the most important factor of decreasing in land resources productivity and agricultural landscape degradation. Erosion has transformed into the extraordinary phenomenon of present time, which directly threatens to the existence of the soil as the main means of agricultural production and essential component of the biosphere.

Rational and environmentally friendly management of agricultural production on the basis of new scientific principles is primarily related to the optimization of the ratio of the natural systems and agroecosystems, the agricultural landscapes reconstruction on an environmental basis, soil-saving organization of the area at the level of individual crop rotation areas and fields.

One of the main directions of implementation of land reform in Ukraine is provision of rational field using, their protection from wind and water erosion, soil fertility improving. Nowadays actuality of these tasks is increasing due to with intensification of anthropogenic and technogenic load on the soils resulting from application of the modern technologies of cultivation [3, 4].

The current stage of land resources using has put the complex target of creating cultural agricultural landscapes, which would be optimally combined ecological aspects of environmental protection, recovery of degraded soils, their protecting from water and wind erosion, and prevention and overcoming of negative impact of dry winds and droughts on plant productivity.

Purpose of work. The main direction of improvement of farming systems and technologies, in the conditions of deficiency of resources and energy, their high cost, global climate changes towards lack of water suply, should be a resource- and energy saving, maximal using of internal agro-ecosystem resources while top soil saving from degradation [9].

The target of our research is to conduct of the geographical demarcation of Poltava region and to determine organic crop production zones for the organic products cultivation on the basis of statistical and cartographic data. In the process of research methods of analysis, comparison, synthesis and generalization were used.

Results and discussion. Analysis of basic statistics and cartographic data [1] shows that ploughed fields (P), which are used for planting and growing of agricultural crops prevail in Poltava region. The percentage of these fields, out of total agricultural fields, is in the range of 61–86 %. This indicates a significant agroresource potential of the region. Minor percentage of fields is presented by ecologically stabilized areas (ESA) – about 39–14 %, what significantly make the environmental stability of the area worse.

Geographical demarcation of Poltava region was carried out according to the criterion of the ratio of ploughed field to ecologocally stabilizing areas using methodical approaches to the selection and justification of criteria and indicators for sustainable development in different landscape regions of Ukraine [3, 4]. It was noted that according to the 5-point scale in percent (optimal – R : ECT = <20 : >80; satisfactory – R : ECT = 20–37 : 63–80; critical – R : ECT = 37 to 54 : 46 to 53; crisis – P : ESA = = 54–70 : 30–46; extreme – P : ESA = = >70 : <30) the majority of the Poltava region according to the level of the soil tilling is in critical state. It is noted that almost 40 % of the territory of Poltava region has the disastrous state (Hrebinkivs'k, Orzhyts'k, Khorol, Mirgorod, Dikan, Reshetylivs'k, Mashevs'k, Karlivs'k and Chutivs'k districts).

It should be noted that a large part of the area (65 %), is a chernozem soil – the most fertile types of soils, which are situated in Piryatins'k, Hrebinkivs'k, Orzhyts'k, Lubens'k, Mirgorod, Gadyach, Zinkivs'k, Shishats'k, Reshetylivs'k, Globins'k, Kobelyats'k, Poltava, Kotelevs'k, Chutivs'k, Karlivs'k are reckoned among them. The highest rates of humus (of 4,01 to 4,5 %) observed in soils Mashivs'k, Chutivs'k and Karlivs'k districts. Indices are in the range of 3,51–4,0 % in Velikobagachans'ky,

Mirgorods'ky, Chiacomo and Decanska areas. The level of humus in the other areas varies in the ranges from 2,5 to 3,5 %.

Class of land quality is defined by using the ecological-agrochemical assessment of land. Analysis of indicators of the soils distribution shows that Poltava, Karlivs'k and Piryatins regions have II, III class of soils quality, which are characterized as the best and ones. Other regions have the IV and V classes, which are characte-rized by having high quality with slightly acidic soil reaction. Soils of poor quality are observed only in some regions. Khorol and Kozelshichns'k regions. There is the lowest indicates of rate of ploughed fields to ecologically stabilizing areas are revealed.

One of the important indicators of zoning in the allocation of organic crop production zones for organic products cultivation is the utilization percentage of erosion and erosion-dangerous acres for agricultural using. The lowest level of eroded soils using (5–15 %) is in Globino, Semenov districts, the highest (45–65 %) is in Mashevs'k, Piryatins'k, Lohvica and Chernuhins'k regions.

Analysis of agro-ecological zoning of the Poltava region area allows us to generalize both Ukrainian research and our research as for highlighting favorable areas of raw materials for the cultivation of organic products [5]. However, it should be noted that each abovementioned district has both positive and negative factors that can have an indirect impact on the distribution of areas.

We took into consideration the following indicators: classes of soil quality, humus content, soil acidity, degree of the soil erosion, the level of the area ecological stability, the level of field tilling.

According to the map data [1], Poltava region is divided into four soil-climatic zones. Areas where it is recommended cultivation of organic agricultural products as the analysis of statistical and cartographic indicators showed their agro-ecological suitability were marked in each of four zones.

I Area – Western forest-Steppe – Chutivs'kyi district:

– benefits: class of soil – 75,1–90,0 points; humus content – 4,01–4,5 %; pH slightly acidic; the usage of agricultural eroded lands – 15–25 %;

– disadvantages: the level of tilled fields – 70,1–80,0 %; level of ecological stability – catastrophic;

– ways of disadvantages overcoming: conversion of eroded, degraded and unproductive soils in ESA.

II area – Eastern forest-Steppe – Shishats'kyi district:

– benefits: class of soil – 75,1–90,0 points; humus content – 3,51–4,0 %; the pH is slightly acidic; the usage of agricultural eroded lands – 15–25 %;

– disadvantages: the level of tilled fields – 60,1–70,0 %; level of ecological stability – catastrophic;

– ways of disadvantages overcoming: conversion of eroded, degraded and unproductive soils in ESA.

III area –Transition South Mashivs'ky district:

– benefits: class of soil – 75,1–90,0 points; humus content –4,01–4,5 %; pH slightly acidic;

– disadvantages: the usage of agricultural eroded lands – 45–65 %; the level of environmental stability – catastrophic; the level of tilled fields – 71–80 %;

– ways of disadvantages overcoming: removal of eroded and degraded soils from agricultural usage; recovery of soil cover and soil fertility in a natural way (conversion in a ESA) and artificial (bioremediation).

IV area – southwest – globinsky district:

– benefits: class of soil – 75,1–90,0 points; pH slightly acidic; the usage of agricultural eroded lands – 5–15 %; the level of tilled fields – 50,1–60,0 %;

– disadvantages: the level of environmental stability – catastrophic; humus content – 3,01–3,5;

– ways of disadvantages overcoming: conversion of eroded, degraded and unproductive soils in ESA; recovery of soil fertility and humus by making organic fertilizers and compost, usage of vermiculture.

Conclusions

Therefore, identification of raw material zones for organic agricultural products growing in Poltava region by generalization of agro-environmental indicators has shown that currently only Mashivs'k, Shishatsk, Chutivs'k and Globins'k areas can be implemented in organic farming. But disadvantages should be considered and they should be eliminated.

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