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MODELING THE INFLUENCE OF MINERAL POWER PLANTS ON THE AGROCENOSSES KHERSON REGION

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The estimation of trace elements in soils of the Kherson region and their impact on agrocenoses using mathematical modeling. When using mathematical models have been taken into account environmental factors and biological characteristics of crops.

Key words: microelements agrocenosis, nitrogen, phosphorus, potassium, mathematical model.

Introduction. Kherson region is one of the most loaded of growing crops that require application of mineral and organic fertilizers. The composition of fertilizers is a large number of polluting elements that further harm the plants and agrocenoses in general.

Problem. At the present stage of development of environmental science more attention paid to the use of mathematical models for the purposes of assessment of agrocenoses.

Analysis of recent research and publications. The assessment of the impact of fertilizers on condition agrocenoses and their classification involved many authors [1]. This was taken into account qualitative and quantitative characteristics fertilizers [2].

The purpose of research. Run assessment of the impact of trace elements that are introduced into the soil conditions in the Kherson region, the state agrocenoses using a mathematical model that will optimize treatment of mineral and organic fertilizers for the purpose of reducing the load on the soil.

Results. When modeling the impact of trace elements on condition agrocenoses used a mathematical model of performance agrocenoses that is presented in [3]. It is assumed that the formation of the Free nitrogen by absorbing nitrogen from the soil, products of tissue destruction and restoration costs livelihoods tissue

structures:
$$\frac{dN_{lab}}{dt} = N_{abs} + N_{hyd} - N_{sen}, \quad (1)$$

where N_{lab} - free nitrogen Fund; N_{abs} - the amount absorbed from the soil nitrogen; N_{hydr} - the amount of nitrogen that is formed by the decay of protein; N_{sen} - the cost of restoring the protein. The process plant uptake of nitrogen from soil is through active and passive - the removal of nitrogen from transpiration flow.

$$\frac{dN_{abs}}{dt} = \frac{N_{abs}^{max} \bar{N}_{s.r.} m_r^n}{K_{abs}^N + \bar{N}_{s.r.}} K_{abs}^N (T_s) + T \bar{N}_{s.w.}, \quad (2)$$

where N_{abs}^{max} - the maximum rate of absorption of nitrogen roots; $\bar{N}_{s.r.}, \bar{N}_{s.w.}$ - the concentration of nitrogen under the surface of roots in the soil solution; K_{abs}^N -

Michaelis-Menten constant; $K_{abs}^N(T_s)$ - Function of temperature influence on the absorption rate of soil nitrogen roots. To analyze the main content of trace elements in soils of the Kherson region used data on the content of the last of 2013. For the model calculations take into account soil and climatic conditions, and the types of crops, while used area's characteristics. Fig. 1 shows the area of soil Kherson region with an average nitrogen content.

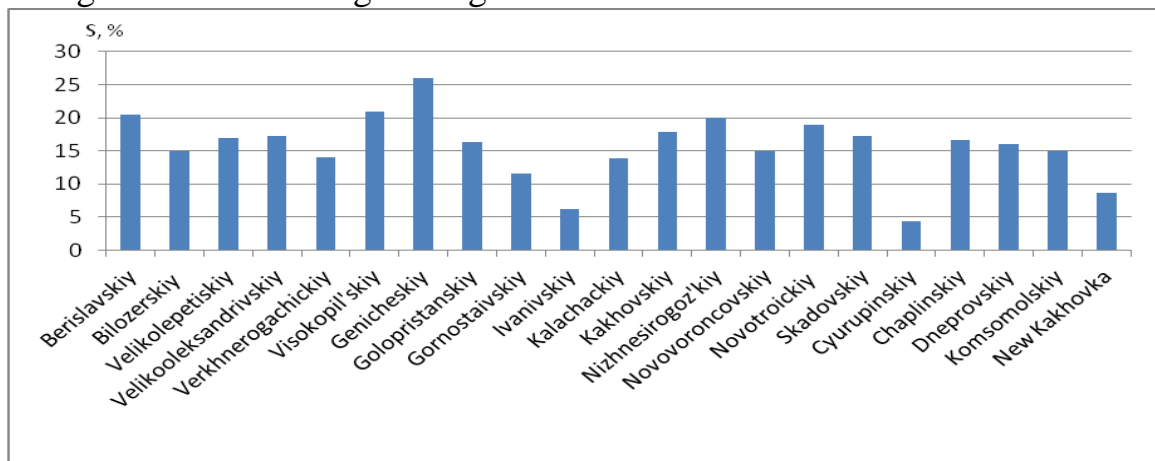


Fig. 1. Area of soil Kherson region with an average content nitrogen

Analyzing the chart shows that the value of the average indicator for the nitrogen content in the soils of the Kherson region, the largest nitrogen occurs in Genichesk area - the area of soil 26%, the lowest - in Tsyuryupynsk area - 4.4%. Average in all areas is 15.6%. Fig. 2 shows the content of phosphorus in the soils of the Kherson region. Analyzing the chart shows that the maximum content of phosphorus in soils of the Kherson region is 55.2% (Verkhniy district), the minimum value of - 8.3% (m. New Kakhovka). Average for all areas is 25.3%. Fig. 3 shows the amount of potassium in soils of the Kherson region. Analyzing the chart shows that the maximum content of potassium in the soils of the Kherson region is 37.8% (Komsomol district), the minimum value of - 0.2% (Genichesk district). Average for all areas is 20.7%. Fig. 4 represented area soil Kherson region with an average content of potassium. Fig. 3 shows the amount of potassium in soils of the Kherson region. Analyzing the chart shows that the maximum content of potassium in the soils of the Kherson region is 37.8% (Komsomol district), the minimum value of - 0.2% (Genichesk district). Average for all areas is 20.7%. Fig. 4 represented area soil Kherson region with an average content of potassium. Analyzing the chart shows that meaningfully weighted average potassium content in the soils of the Kherson region, the largest nitrogen occurs in Ivanovo area - the area of 601 km² of soils, the smallest - in. New Kakhovka - 149 km². Average in all areas is 382.3 km². With the above mathematical model Modelling efficiency of mineral fertilizers for the main agricultural crops that are grown in conditions of Kherson region, which include winter wheat, corn and sunflower. Thus the model urahovuvavsyia moisturizing regime, because this territory belongs to the territory of insufficient and unstable conditions of moisture, so the impact of this factor is very important when growing crops. Table 1 shows the effectiveness of fertilizer, due to the moisture conditions

during the period of plant development, which falls on May - August months. Overall, for the period in the Kherson region falls insignificant rainfall. During

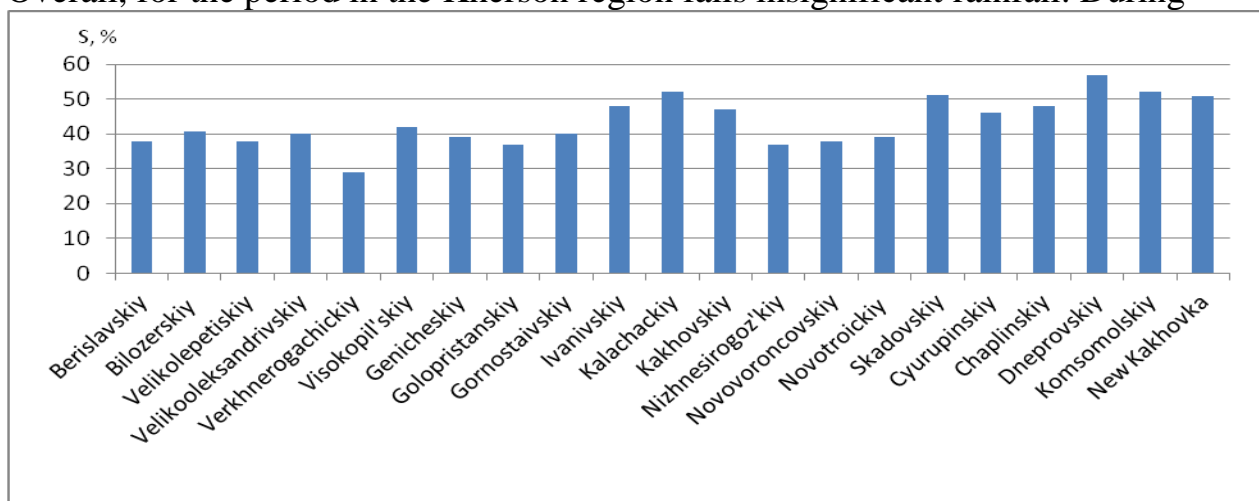


Fig. 2. The content of phosphorus in the soils of the Kherson region

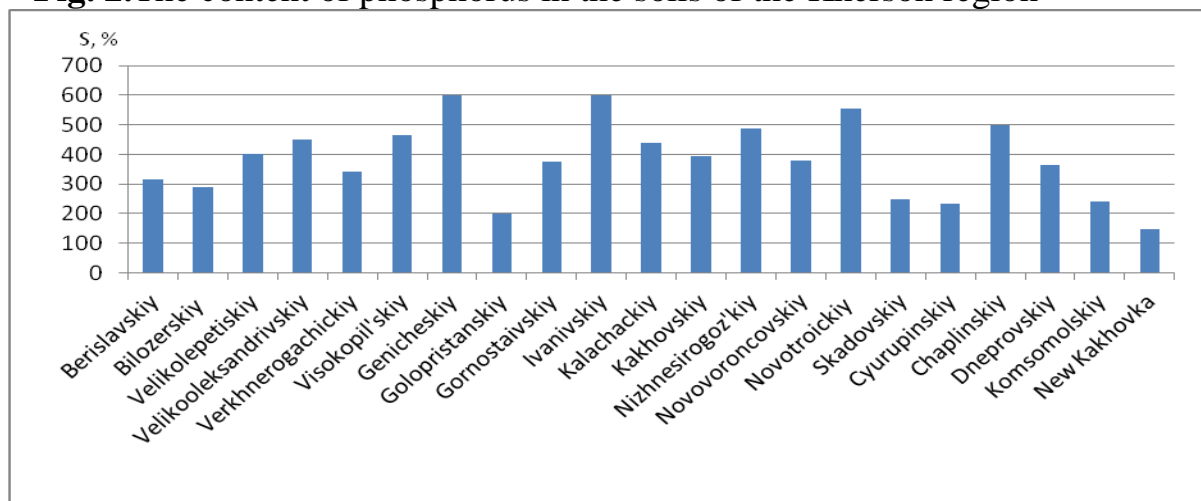


Fig. 3. Potassium content in the soils of the Kherson region

the period observed in 40% of cases, dry conditions. Therefore, as part of the calculations of the efficiency of mineral fertilizers in terms of years of insufficient moisture. Proper use of fertilizers weakens the impact of unfavorable weather conditions on the quantitative and qualitative characteristics of the crop. The use of fertilizers also reduces the negative impact on the yield of high temperatures and other adverse weather conditions. Defined application rate helps to ensure high yields with minimal amounts of pollutants. A significant number of heavy metal gets into the soil and vegetation with chemical fertilizers, influenced by the intensification of agricultural production. Given all this, we evaluated the maintenance of heavy metals in some soils of the Kherson region, with various norms of mineral and organic fertilizers. Calculations were carried out for one of the major crops that are grown in the area - corn. This culture is very responds well to change the rules of organic and mineral fertilizers. High and stable yields are obtained by making nitrogen fertilizer 60-80 kg/ha of phosphorus 100-120 kg / ha).

Table 1. Average efficiency for soil NPK Kherson region due to growing conditions

Damping	Σr , mm		D, MB		The average increase in yield of NPK, kg / ha					
	Wet conditions	Dry conditions	Wet conditions	Dry conditions	winter wheat		corn		Sunflower	
					Chest nut	Chern ozems	Ches tnut	Cherno zems	Chest nut	Cher noze ms
Norm	90	50	4,2	5,3	7,2	7,9	6,9	6,6	6,9	6,8
Insufficient	70	30	5,8	8,2	4,0	4,2	4,2	4,8	4,5	4,6
Finished	100	60	4,6	5,8	5,2	7,7	5,0	5,2	6,3	7,1

Conclusions. The resulting data of say that under the influence of Kherson oblast mineral nutrition of plants is significant quantitative and qualitative characteristics of agricultural crop plants. This assessment is made using a mathematical model that allows further provide practical advice that the regime of mineral and organic fertilizers for various agricultural crops, taking into account environmental factors.

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МОДЕЛИРОВАНИЕ ВЛИЯНИЯ МИНЕРАЛЬНОГО ПИТАНИЯ РАСТЕНИЙ НА СОСТОЯНИЕ АГРОЦЕНОЗОВ ХЕРСОНСКОЙ ОБЛАСТИ

Ильина В.Г.

Ключевые слова: микроэлементы, агроценозы, азот, фосфор, калий, математическая модель.

Резюме

Выполнена оценка содержания микроэлементов в грунтах Херсонской области и их влияние на состояние агроценозов при помощи математического моделирования. При использовании математической модели были учтены факторы окружающей среды и биологические особенности сельскохозяйственных растений.

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Summary

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