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SOIL FERTILITY PARAMETERS EVALUATION FOR IMPLEMENTATION OF DIFFERENTIATED FERTILIZATION

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The relevance of research. Agricultural production is a significant part of Ukraine's Gross Domestic Product and should be cost-effective. Studies of soil heterogeneity influence on agricultural crops yield become more clear with appearance of precision farming, therefore the results obtained, as a rule, testify to the effectiveness of the intensive agricultural technologies in conditions of heterogeneity. The solution of this problem might be found in carrying out of complex studies on managing the productive process and developing new agro-technical methods for increasing the productivity of agricultural crops and their highly effective application in soil specific conditions under precision farming. The problem of variable soil nutrient supply can be partially solved by differentiated application of fertilizers. To implement this technology, additional costs are required to purchase equipment.

Aim of the research - to evaluate the expediency of VRA (variety rate application) on the soil fertility indicators of Chernozem podzolized, to determine the share of influence of factors that are limiting technologies effectivity for growing winter wheat, corn and soybeans.

Objects and methods of research. The research was carried out on the fields of LLC Lotevka Elit. Test plots were situated in the northern part of the Shepetivkyi raion, which is part of Right bank forest-steep zone of Ukraine. The soil of the experimental plot was Chernozem podzolized with middle clay content formed on loess. Soil samples were taken from 0-30 cm soil layer at the control points according to ISO 10381-2 [6]. Preparation for chemical analysis was carried out according to DSTU ISO 11464-2001. The content of mobile forms of phosphorus and

exchangeable potassium was determined by the method of Chirikov (DSTU 4115-2002)[7], mineral nitrogen compounds (ISO 11261-2001), exchange magnesium (GOST 26428-85), cation exchange capacity (ISO 11260-2001), water resistance of aggregates and total porosity – GOST 5180 - 84. Harvesting was carried out by industrial combines equipped with yield mapping systems. The data were processed by the method of variance analysis by B.O. Dospekhov and using computer software Microsoft Excel®, Statistica®, FarmWorks®

Results and discussion. The influence of the spatial variation of agrochemical properties on the yield will be largely determined by the level of soil cultivation. On soils with low fertility level additional fertilizers application will be highly efficient and influence of agrochemical parameters heterogeneity on yield will be higher. With a high and very high soil nutrient content, influence of the test plot variation level on yield decreasing. It means, that significance of the coefficient of variation depends on the concentration of the element in the soil. In our studies, only at some plots the mobile phosphorus content was characterized by high values. Rest of the agrochemical and physico-chemical parameters had optimal values for this soil subtype. Statistical analysis of chernozem podzolized agrochemical and physico-chemical parameters provided in Table 1. Test plot soil was characterize by considerable heterogeneity in terms of the following parameters: mobile phosphorus compounds content (58%), ammonium nitrogen (36%), exchange potassium (21%), total humus content (20%) and potassium – magnesium ratio. The variation coefficient of other agrochemical and physicochemical parameters was more than 10%.

The physical parameters variation coefficient value was less than 10%. For the crop yield, the coefficient value was more than 20% only in case with corn. The agrophysical parameters variation level in soil did not have a significant effect on the yield of winter wheat and soybean.

Analysis of the correlation coefficients showed that a close relationship has been obtained between some of physical, physicochemical and agrochemical parameters. Thus, some parameters had a tight relationship, such as exchange

potassium and mobile phosphorus compounds (78%); the content of exchangeable magnesium with the pH (57%), mobile phosphorus (65%), exchange potassium (57%), cation exchange capacity (84%); porosity and the mineral nitrogen content (52%). Other parameters had close opposite correlation. Such as humus and active acidity (-65%), soil density and mineral nitrogen content (-54); the physical clay content and active acidity (-57%), mobile phosphorus (-54%), cation exchange capacity and physical clay content (-53%). The yield of winter wheat on podzolized chernozem had a close direct relationship with the content of mineral nitrogen compounds in the soil (52%), maize for grain with mobile phosphorus compounds (55%), soybean with agrophysical parameters, such as porosity (51%), soil density (51%) and physical clay content (62%). So, the soybeans yield depends more on the physical parameters such as soil porosity and the technological operations associated with it.

Conclusions. On the test plots of the chernozem podzolized by the agrochemical variation coefficient, which was 21-58%, it is expedient to apply a differentiated application of nitrogen, phosphorus and potassium fertilizers. On those soils, the yield of winter wheat and maize for grain depended on agrochemical, and soybean - agrophysical parameters and was due to soil cultivation.

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