УДК 631.42:006.3(477.41)

EVALUATION OF SPATIAL VARIABILITY OF PHYSICO-CHEMICAL INDICATORS OF CHERNOZEM PODZOLIC WITH THE USING OF PRECISE AGRICULTURE TECHNOLOGIES

S. O. SYCHEVS′KYY

O. L. TONKHA

E-mail: oksana16095@gmail.com

ORCID: https://orcid.org/0000-0002-0677-5494

O. V. PIKOVSKA

E-mail: pikovska_olena@ukr.net

ORCID https://orcid.org/0000-0002-5052-9223

National University of Life and Environmental Sciences of Ukraine

Precise agriculture is considered as a set of technological techniques that provide differentiated processing of individual areas of the field, taking into account its heterogeneity in terms of fertility.

The aim of the work was to study the spatial heterogeneity of physicochemical parameters of the arable layer of chernozem podzolic using geostatistical methods.

Materials and methods of research. On the experimental fields of “Lotivka Elite” LLC of Shepetivka district of Khmelnytsky region the estimation of spatial heterogeneity of indicators of physical and chemical properties of chernozem podzolic was carried out. Soil samples were taken from 0-30 cm of soil layer from control points according to ISO 10381-2. Preparation for chemical analysis was carried out in accordance with DSTU ISO 11464-2001. The content of total humus - according to the method of Tyurin in the modification of Simakov (DSTU 4289: 2004), content of calcium and active acidity were analyzed according to DSTU 4362: 2004, the content of physical clay was determined by the method of pipette in the modification of NA Kaczynski (DSTU 4730: 2007). Harvesting was carried out by industrial harvesters equipped with yield mapping systems. Statistical analysis of the data was performed on the following indicators: number of observations (n); average

value (X_{av}); standard deviation (S); coefficient of variation (C_v); absolute error of the mean (SX_{av}).

Research results and their discussion. Soil organic matter is considered to be an integral indicator of potential fertility of chernozem soils, which is one of the riches of Ukraine.

Humus affects other physicochemical and agrochemical properties of podzolic chernozems, including the amount of exchangeable cations and cation exchange capacity, soil buffering, as well as the content of nutrients. There are correlations between these indicators.

The content of mobile calcium varied from 160 to 480 mg / 100 g of soil, the largest number of cases (7) was in samples containing 240 and 290 mg / 100 g of soil.

The humus content in the studied field ranged from 1.5 to 5.7%, however, the largest number of cases (9) was observed at a humus content of 3.0%. Thus, this fact indicates a pronounced spatial heterogeneity of the soil cover.

The pH varied widely and ranged from 5.9 (weakly acidic) to 8.3 (medium alkaline). In terms of pH, most of the field had a close to neutral reaction of the soil - 6.4.

The content of physical clay varied from 35 to 53%, ie according to the classification of Kaczynski varied from medium loam to heavy loam. The largest number of cases (16) is attributed to the average loamy particle size distribution with a physical clay content of 41%.

The chernozem podzolic of the study area was characterized by an average heterogeneity in the content of total humus (23%) and mobile calcium (19%). The coefficient of variation of the other indicators was less than 10%, which indicates questionable variation.

The variability of the humus content was average, CV = 23% (10 <CV <25). The statistical parameter of humus content in the soil layer 0-30 cm averaged 3,440 ± 0,80, the maximum - 5,213 ± 0,061%. In general, the field is dominated by soils with a humus content of 3.0-3.9%.The variability of the content of mobile calcium is average, CV = 19% (10 <CV <25). Statistical parameter of calcium content in the soil layer 0-30 cm on average - 252.4 ± 10.0, maximum - 350.0 ± 9.11 mg / 100 g of soil.

Soils with a content of mobile calcium 240.0-290.0 mg / 100 g of soil predominate. Active acidity was characterized by low variability, the average was 6.5 ± 0.3, the maximum - 7.3 ± 0.2 pH units. Soils with a reaction of soil environment of 6.3–6.4 pH units prevailed.

The yield of winter wheat had a low degree of variability with an average of 87.4 ± 4.3 c / ha.

Statistical parameter of calcium content in the soil layer 0-30 cm on average - 252.4 ± 10.0, maximum - 350.0 ± 9.11 mg / 100 g of soil. In general, the field is dominated by soils with a content of mobile calcium 240.0-290.0 mg / 100 g of soil. Active acidity was characterized by low variability, the average was 6.5 ± 0.3, the maximum - 7.3 ± 0.2 pH units. The yield of winter wheat had a low degree of variability with an average of 87.4 ± 4.3 c / ha.