UDC 631.41:631.445.2:633.11

DYNAMICS OF REDOX POTENTIAL OF LIGHT GREY FOREST SURFACE-GLEYED SOIL UNDER WINTER WHEAT

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Setting objectives. The purpose of the research is to determine the patterns in redox potential changes of light grey forest surface-gleyed soil, depending on the prolonged use of different fertilizer systems and periodic liming during the growing season of winter wheat.

Investigation of the dynamics of redox potential was carried out under long-term stationary experiment in XI rotation of the crop rotation during the winter wheat growth in the following variants: control (without fertilizer), organo-mineral fertilizer system (10 t/ha of crop area of manure + $N_{65}P_{68}K_{68}$) with background of periodic liming by 1,0 n $CaCO_3$ according to Hr (7,0 t/ha of limestone flour) and a similar fertilizer system with background of the liming, calculated according to acid-base buffer capacity (2,5 t/ha); mineral fertilizer system ($N_{105}P_{101}K_{101}$) with liming by 1,5 n $CaCO_3$ according to Hr (9,5 t/ha) and with the introduction of $CaCO_3$ according to acid-base buffer capacity (2,5 t/ha); mineral fertilizer system only ($N_{65}P_{68}K_{68}$).

Presenting main material. The obtained results of redox potential measurements on light grey forest surface-gleyed soil under winter wheat proves its significant variation in experimental variants, depending on temperature and humidity, level and type of fertilizer, as well as on the dosages of introduced limestone fertilizers.

The researches have established that the lowest values of the redox potential in the phase of spring bustle of winter wheat (466 mV) were obtained on absolute control. The growth of redox potential was noted in all studied fertilizer systems in comparison with the control without fertilizers in the spring period. So, for the organo-mineral fertilizer system with the background of liming according to Hr, the ROP increases to 564 mV. In mineral fertilizer systems the value of Eh increases to 558–586 mV both with the background of liming and without it.

In variants of the application of high doses of mineral fertilizers and liming with the dose of $CaCO_3$, calculated according to hydrolytic acidity, the value of Eh in the phase of the outlet in the tube and the flowering of winter wheat was 608 and 644 mV against a similar fertilizer system with a dose of lime, calculated according to acid-base buffer capacity (575 and 595 mV). It proves creation of intensive oxidative conditions and the growth of mineralization

processes while using a mineral fertilizer system with the background of high doses of lime.

In the phase of waxy ripeness of winter wheat, there was a decrease in the value of the redox potential in investigated variants due to the gradual decrease of microbiological processes. The lowest values of ROP were obtained after harvesting of winter wheat for all investigated variants except for non-fertilized control. So, for the organo-mineral fertilizer system, both with the background of the introduction of lime according to hydrolytic acidity and according to the acid-base buffer capacity, the Eh indices were respectively 520 and 473 mV. In mineral fertilizer systems the value of the redox potential was even lower and amounted to 510 mV for liming according to Hr and 462 mV – according to the acid-base buffer capacity.

Conclusions. It was established that the introduction of high doses of mineral fertilizers with the background of liming with a dose of $CaCO_3$, calculated according to Hr, increases the redox potential of the light grey forest surface-gleyed soil against a similar fertilizer system with a dose of lime, calculated according to acid-base buffer capacity, during the period of intensive growth and development of winter wheat plants. It proves creation of intensive oxidative conditions and the growth of mineralization processes during application of high doses of lime.

Bibliographic list

1. Milashchenko N. Z., Sokolov O. A., Braison T., Chernikov V. A. (2000). *Sustainable development of agro-landscapes.* T. 1. Pushchino: ONTI PSP RAS, 316 p.

2. Kaurichev I. S., Orlov D. S. (1982). *Redox processes and their role in the genesis and fertility of soils*. Moscow: Kolos, 247 p.

3. Truskavetskyi R. S., Tsapko Yu. L. (2016). *Fundamentals of fertility management of soils.* Kharkiv : Brovin O.V, 388 p.

4. Dron' Yu. S. (2007). Ecological factors in formation of reducing conditions and their role in genesis of brown-podzol gleic soil of Pre-Carpathian region: dissertation abstract for obtaining PhD degree in biology sciences. Chernivtsi, 20 p.

5. DSTU ISO 11271: 2004. (2006). The quality of the soil. Determination of redox potential – Field method. Kyiv, 18 p.