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SOIL CONSERVATION TECHNOLOGY OF CROP GROWING AND QUALITATIVE COMPOSITION OF SOIL ORGANIC MATTER OF CHERNOZEMS

O.L. TONKHA, O.V.PIKOVSKA

The results of studies of mobile humic substances content and fractional composition of humus in typical chernozem under different tillage methods and fertilizer are presented in the article. It was established that the use of deep soil conservation tillage compatible with organic-mineral fertilizer system contributed to the increase of content of labile humic substances and improvement of group-fractional composition of humus.

Keywords: *mobile humic compounds, group composition of humus, water-soluble organic matter,humus, plowing, soilconservation tillage.*

The labile organic matter ia important in the formation of effective soil fertility. It is presented as water-soluble, free and bound with sesquioxides humic substances. As a result of enzymatic and oxidative processes they are partly mineralized and are the source of most available for plants nutrients and, partially, conserve to stable humus. Movable organic substances serve as biochemically active pool of soil organic matter, which significantly influences the processes of structure formation and energy accumulation.

Researches were carried out in conditions of the long-term fiels research of the Department of Soil Science and Soil Conservation of NULES of Ukraine at the "Velykosnitynska education-research farm named after O.V.Muzychenko" in Fastovsky district of Kievan region during 2006-2012. Soil of the research area - chernozem typical loamy low-humified in loess, humus content in the plowed layer was 3.57±0.13 and in the subsoil – 3.52±0.14. In the experiment three variants of the basic tillage: conventional - plowing to a depth of 22-27 cm; - different-depth non-plowing cultivation to the depth of 22-27 cm; shallow cultivation to the depth of 10-12 cm. Fertilization options in crop rotation: without fertilizers (control), Straw 1.2

t/ha + N_{12} + $N_{78}P_{68}K_{68}$, Straw 1.2 t/ha + N_{12} + green manure + $N_{78}P_{68}K_{68}$. Also, the soil parameters under fallow plot were studied.

Plant and root crop residues that remain to compensate mineralized mobile humic substances was not enough in control option. Organic fertilizers increase their content in the 0-40 cm layer by 26-27%. Thus, under the use of straw the content of soluble humic substances (SHS) was higher on 0,04-0.06%, under organic-mineral fertilizer system with straw and green manure – higher on 0,12-0,14% compared to plowing. The highest values of SHS in the 0-40 cm soil layer were observed in the case of different-depth non-plowing cultivation (0,11-0,26%) compared to plowing. Thus, the distribution of SHS was like under the fallow. Under fallow the highest rates of SHS in the 0-20 cm layer were formed, then down in the profile they decreased.

Under plowing the mineralization process of water-soluble substances went more rapidly than under different-depth non-plowing cultivation, especially in the upper part of the tilled layer. Soil conservation technology based on non-plowing cultivation, increase the content of water-soluble organic substances in the upper 0-20 cm soil layer. In the subsurface layer the plowing tillage had advantage in 5-10% compared with non-plowing.

The effect on the content of soluble organic matter in soil studiedtillage options may be divided into a downward row: straw → non-plowing cultivation → plowing. Soil tillage tools lead to mineralization of organic matter, which is largely manifested in plowing compared to non-plowing tillage. Soil conservation technology based on non-plowing tillage compared with the technology based on plowing, change the nature of the soil organic matter accumulation, confining overwhelming amount of plant residues, organic and mineral fertilizers in the top layer of the tilled soil layer, and create conditions for displacement system of "mineralization↔humifying" towards strengthening humifying.

The significant increase in humus reproduction compared to plowing in chernozem typical low-humified of the Right-Bank Forest-Steppe of Ukraine in intensive grain-beet crop rotation (40% cultivated) and non-plowing tillage

fertilization variant achieved straw 1.2 t / ha + N_{12} + green manure + $N_{78}P_{68}K_{68}$ per 1 ha of crop rotation area.

Our research group-fraction humus composition varied depending on soil fertilization and tillage. Humic and fulvic acids changes in group composition of humus significantly different using various methods of cultivation (Fig.). Thus, in the case of plowing the amount of humic acids on all variants of the experiment ranged 32,6-44,4%, while for different-depth non-plowing tillage - 34,9-44,8% and under shallow cultivation - 35.6-44.1%. The amount of fulvic acids under different-depth non-plowing cultivation was higher compared with the corresponding figure for plowing 30.8%. This shows the approximation process humus-formation for minimum tillage to virgin.

Entering fertilizers helped to reduce non-hydrolized fraction for organsc-mineral fertilizer system with straw and green manure on 10.2-10.4%; Organic-mineral fertilization with straw – on 28.7-30.2% compared with the control. Accordingly the ratio “carbon of humic acids (C_{ha}) to carbon of fulvic acids (C_{fa})” changed. It has expanded that under the use of fertilizers and in control in the topsoil C_{ha}:C_{fa} was 1,92-2,07; in option with straw 1.2 t/ha + N_{12} + $N_{78}P_{68}K_{68}$ - 1,97-2,24; straw 1.2 t / ha + N_{12} + $N_{78}P_{68}K_{68}$ + green manure - 1,98-2,11. So, in all options humic acids predominate, corresponding to humate type of humus formation.

In fulvic part of humus the changes observed in these areas: fertilization decreased the content of almost all factions of fulvic acids, especially the second and third fraction (FA-2, FA-3). At the same time, part of an aggressive faction, soluble in acids, was higher than in variant without fertilizers compared to the application of organic fertilizers.

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