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INFLUENCE OF NO-TILLAGE AND CONVENTIONAL TILLAGE SYSTEMS ON BIOLOGICAL ACTIVITY OF SOIL

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The influence of no-tillage and conventional tillage systems on the biological activity of typical black earth with little humus for growing grain corn in the Right-bank forest-steppe of Ukraine is discussed.. It is found out that the biological activity of soil largely depends on its density, whose deviation from an optimum reduces the intensity of microbiological processes. The best microbiological activity of a no-tillage system is found out. The lowest indexes of productivity of dissolution of cellulose with the use of conventional tillage system is found out.

Keywords: *corn, biological activity, conventional tillage system, no-tillage system, dissolution of cellulose, density, flax linen.*

Topicality. Biological activity of soil depends on weather terms, type and fertility of soil, and also type of the grown cultures, content of organic substance, indexes of acidity, physical properties of soil. The important condition of maintenance and recreation of fertility is activity of microorganisms. Among the important functions of the ground microflora we can distinguish their participation in the processes of circulation of carbon, humification, and also in the synthesis of biologically-active substances. Microorganisms react well on tillage.

The aim of our research is to find out the influence of the longstanding use of conventional tillage and no-tillage systems on biological activity of typical black soil for growing grain corn.

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Results of research. The results of our research show that application of conventional tillage on a typical black earth containing little humus with the use of side products on a fertilizer influences the physical properties of the processed layer of soil. In our experience at the beginning of culture vegetation the density of soil in a layer a 0-10 cm at the annual ploughing presented 0,9 gs/cm^3, that is considerably below in comparison with no-tillage system for 0,35 gs/cm^3. In the layers of soil 10-20 and a 20-30 cm the density of soil rose and was 1,10 and 1,21 g/cm^3.

Our research proved that the no-tillage system had shown some higher indexes to the closeness comparatively with traditional till of soil.

During the vegetation period under the change of temperature, humidity there is differentiation of top-soil layer with the index of density. It is necessary to mention that the time passed from the last tillage to the state of soil density equilibrium influences this index.

The obtained data show differentiation of top-soil layer according to the density of both systems of tillage. Confirmation of it is the fact that at mechanical tillage the compression takes place more intensively than at natural processes. During the vegetation period with the use of ploughing, the soil density in a layer of 0-10 cm on the average increased for 0,35g/см^3, at the same time with the use of no-tillage system it decreased for 0,02g/см^3. In layers 10-20 and 20-30 cm at a no-tillage system the density increased for 0,1 and 0,06 g/sм^3, for ploughing accordingly, on 0,15 and 0,07 g/см^3.

The soil density during the cropping period is the indicator of choice of tillage system for the next culture. The density itself influences the growth of root system in case that the index will attain 1,35 g\см^3, that can become a barrier at the germination of chums of plants in the deeper layers of soil.

Subzero porosity is observed in making more compact soil at high indexes. During atmospheric precipitations pores are quickly filled with water, as a result there can be lack of air which is necessary for the growth and development of root system of plants.

The density of soil in an epiphase a 0-10 cm at both systems of till did not exceed optimal values for black earth typical. It is necessary to pay attention to layer a 10-20 cm at a zero till, where the presence of insignificant making more compact layer of soil is clearly visible comparatively with ploughing till on 0,04 g/cm^3. In a layer of 20-30 cm compression with the use of both no-tillage and conventional tillage system is observed, while for ploughings the density of soil kept indoors outside optimal values. By reason of high-density of this layer of soil at a no-tillage system, in our opinion, development of root system that gets to soil on a depth to 3 м. In these layers the root system of plants is formed and bases of future harvest are mortgaged can become, and thus a closeness of him must be optimal.

It is well known that to maintain the density, in optimal parameters, at ploughings mechanical measures which are envisaged by the technological requirements of till of soil are used.

With the use of no-tillage system no mechanical measures are used, everything is done in a natural way.

The study of intensity of decomposition of linen gives an opportunity to claim about the rate of decomposition of vegetable remains, in composition of which a great deal of cellulose is concentrated.

The activity of cellulose-destructive microorganisms was characterized by an increase of the variant of a no-tillage system.

In a layer a 0-10 cm for growing of grain corn at a no-tillage system there was a 48,9% decomposition of flax linen, and with the use ploughings - 25,6%. In layers 10-20 and a 20-30 cm biological processes activated at traditional till. This phenomenon is related to the redistribution of vegetable bits and pieces and fertilizers. With the use of ploughings a considerable part of power material is contained if a layer of 20-30 cm, which slowed the cellulose activity of soil of the given horizon.

On the average in horizon 0-30 cm with the use of no-tillage system the decomposition of flax linen was higher on 15,5% comparatively with the use if

ploughing. A zero till of black earth typical assists the improvement of the biological state, to what the best testify terms for development and functioning of the ground microbiocenosis and intensity of metabolism in agroecosystems.

It should be noted that hydrothermal terms of year influence the process of decomposition of cellulose. For years of researches there was a different activity of cellulose destruction microorganisms which is related to the less favourable weather terms.

The integrated index of economic estimation of the system of conventional tillage is the productivity of culture. At conventional tillage, on the average for years of researches, the productivity was at the level of 9,0 t/ha.

Abandonment from tillage for the 10-year period provided the productivity at the level of 9,5t/ha. A difference between these indexes of the investigated culture in these variants is substantial.

Conclusion. The intensity of decomposition of flax linen in soil for 45 days of display under the action of the annual ploughing in the layer of soil made a 0-10 cm 25,6%, and in a 10-20 cm layer of soil activity of microorganisms grew on 15,1% comparatively with a 0-10 cm, in a layer a 20-30 cm intensity of density went down on 1,9% as compared to a 0-10 cm and went down on 13,2% comparatively with a 10-20 cm by a layer. The use of a zero till results in the increase of cellulose of destroying activity of soil comparatively with ploughing.

The results of research confirm that abandonment from the basic tillage systems needs the complex approach to the management of microbiological processes and technology of growing grain corn.