

Impact of different tillage practices and green manure on physical properties of Chernozem soil

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The results of a study of the physical properties of Chernozem typical (black soil) in the short field crop rotation of the northeast of the Forest-Steppe of Ukraine (fields of Sumy National Agrarian University): buckwheat, winter wheat, potatoes, barley are presented in the article. The purpose of the research was to compare the effectiveness of different types of tillage for digging green manure in: plowing to a depth of 28–30 cm, tillage by sub-surface cultivator to the depth of plowing, surface tillage by disk tiller to a depth of 13–15 cm and 6–8 cm. Oil radish (*Raphanus sativus* var. *oleifera*) was used as green manure which planted after harvest of the primary crops. As the area of degraded soils in Ukraine increases due to a decrease in the amount of organic matter, the actual task of modern agriculture is a reducing of an anthropogenic load intensity on cultivated agricultural land. Therefore, at this time, it is especially important to choose a variant of tillage for digging the green manure in, which would contribute to sustainable production growth of fertility by stabilizing the soil agrophysical indices. Ten years of data across all crops shows an advantage of tillage by subsurface cultivator compared with over turning at 28–30 cm for incorporating the green manure. There was a strong trend towards increasing in the state of aggregation (by 4.3 %), water stability (by 1.1 %), bulk density (by 1.7 %), hardness (by 5.7 %), total porosity (by 0.5 %), capillary porosity (by 0.9 %) and aeration (by 0.2 %) in the root 0–30 cm layer of Chernozem typical compared with deep tillage. The surface tillage by disk tiller leads to an improvement of these parameters only in the top layer 0–10 cm, in the lower layers the agrophysical parameters of fertility deteriorated. There was a definite trend towards lower the parameters of the entire 0–30 cm layer when disk tiller on 13–15 cm was used (compared with plowing). Thus, research has shown the expediency of tillage by subsurface cultivator for incorporating the green manure into the Chernozem soil to optimize the structural stability, water stable aggregation and hardness.

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