Chapter 6
Influence of Soil Tillage Methods on the Protective Role of Vegetation Cover

Valerii Petrovich Koliada
https://orcid.org/0000-0003-2682-5687
NSC ISSAR, Ukraine

Oleksandr Viktororovich Kruglov
NSC ISSAR, Ukraine

Mykola Viktororovich Shevchenko
SBTU, Ukraine

Oleksandr Mykolaiovych Zhuravel
SBTU, Ukraine

Sergii Mykolaiovych Dolia
SBTU, Ukraine

ABSTRACT

This chapter presents opportunities to use vegetative plants or their residues on the soil surface as a primary main indicator that restrains the development of erosion processes. Technological measures of soil cultivation that create different levels of erosion control efficiency presented, directly affecting the presence of post-harvest residues on the surface and indirectly the conditions of growth and development of crops in the conditions of unstable and insufficient moistening of Left Bank Forest

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Steppe, which is especially pronounced in the spring period. The methods and types of soil cultivation to strengthen this indicator by preserving the post-harvest residues of the previous crop for a certain period of time are considered. The compensating ways for an inevitable weakening of plant development and a decrease in their yield against the background of minimal tillage are presented to solve a problem of the same values of erosion resistance in agrocenosis with different tillage options during the growing season of crops in the rotation.

BACKGROUND

The main task facing modern land users is to preserve soil cover properties used or affected by agricultural production (Kopittke P. M. et al., 2019; Kuzmych et al., 2022, 2023; Yakymchuk et al., 2022). In general, such a direction is called sustained or sustainable agriculture (CTIC, 1998; Smart Farming…, 2019). The preservation of soil cover is the main security challenge for civilization. It is estimated that agricultural activities on land provide 99.7% of the human food supply on a global scale (Pimentel D., 2006).

The concept of sustainable agriculture is aimed at preserving soil fertility. Among the factors that negatively affect fertility in a number of regions of the world, the leading role belongs to water erosion. So, in particular, in Ukraine, up to 40% of arable land (13 million ha) needs additional protection from it (Kutsenko M. V., Timchenko D. O., 2016). To mitigate the impact of this factor, a number of measures are being taken, including both amelioration and agrotechnical components. Of course, a complete list of such measures is used in basic models of erosion processes, such as USLE (Wischmeier W. H., Smith D. D., 1978). Their values at the local territorial level (field - a group of fields) can be regulated by the land users themselves - the length of the slopes, agrotechnical factors that determine the roughness of the soil surface and its vegetation cover (Castrignano A. et al., 2020).

Adequate assessment of the values of such factors is the correctness basis of the mathematical modeling results, which in turn is the basis for making management decisions in modern agriculture. Such solutions include both the management of the configuration of the working plots and, most importantly, in the management of the structure of the sown areas and agrotechnical measures. This changes both the nutrient regime of soils (Haruna S. I., Nkongolo N. V., 2020) and their ability to resist the effects of water flows and raindrops (Malézieux E. et all., 2009; Wallander S. et al., 2021).

In recent years, the problem of conducting a more accurate and more targeted system of anti-erosion measures has been determined both by the requirements of precision farming technologies and by the action of the global climate change pro-

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