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THE EFFICIENCY OF SUNFLOWER GROWING DEPENDS ON VARIOUS METHODS OF BASIC SOIL CULTIVATION IN THE CONDITIONS OF THE RIGHT-BANK FOREST-STEP OF UKRAINE

Traditional technologies for growing field crops need to be improved in new conditions in order to save resources and increase the profitability of seed production. This can be achieved by minimizing the main tillage of the soil and replacing ridge plowing with ridgeless plowing.

The results of the research showed that the success of the tillage system depends on the soil and climatic conditions of the region, the cultivated crop, the technology used, etc. As a result of global climate changes in the agricultural sector of Ukraine, there has been a redistribution of sown areas towards an increase in the share of oilseed crops, where sunflower plays a leading role. Due to the appearance in production of new early-ripening hybrids and varieties, sowing of this crop is spreading in the northwestern Forest-Steppe and Polissya of Ukraine. However, the agricultural technology of growing the crop in these conditions has not been studied sufficiently. In addition, information on the impact of alternative methods of tillage on sunflower yield in new growing conditions is limited.

Therefore, the task of finding effective technological solutions for soil cultivation is relevant, especially for the conditions of the Right-Bank Forest-Steppe of Ukraine.

During 2021–2022, an experiment was launched at the experimental plots of the Uman National University of Horticulture, in particular the Department of General Agriculture, to determine the impact of the main soil cultivation on the yield and efficiency of growing the early-ripening sunflower hybrid Ukrainian F1 according to the following scheme: plot 1 – plowing to a depth of 25 cm with a Lemken Opal 090 plow; plot 2 – chiseling to a depth of 35 cm with a Bednar Terralend TN3000 deep cultivator; plot 3 – disking to a depth of 10 cm with a BDT-4.2 harrow. The soils of the experimental field have an average supply of nitrogen, phosphorus and potassium.

The obtained research results demonstrate a significant inflorescence of tillage methods on the formation of crop structure elements (stem density, inflorescence diameter, content of full grains in the inflorescence, seed weight) and sunflower seed yield. According to the research results, a decrease in plant height was noted with a decrease in the intensity and depth of soil loosening - from plowing to disking. The tallest plants were 167.8 cm on the plot with traditional tillage, and the smallest 164.1 cm – with mulching soil cultivation based on disking.

The highest plant density of 40.2 thousand pcs./ha was recorded on the plot with traditional tillage, and the lowest 39.7 thousand pcs./ha was recorded on the plot where the sunflower growing technology was based on the mulching tillage system. The difference between the lowest and highest plant density on different plots was 0.5 thousand pcs./ha, or only 1.2%. Therefore, the studied tillage systems did not have a significant effect on the plant stand density.

The diameter of the inflorescence, plant productivity and seed weight increased with increasing depth of cultivation and intensity of soil crumbling and loosening. Thus, in plot 3, where the main tillage of the soil involved disking to a depth of 10 cm, the average diameter of sunflower inflorescence was 16.0 cm, the productivity of one plant (seed weight from the basket) was 43.3 g.

Due to the increase in the depth and intensity of soil loosening, these indicators also increased on plot 1 with plowing and amounted to 16.3 cm and 45 g, respectively. Against the background of traditional tillage, sunflower plants formed the largest number of full-fledged seeds in the inflorescence. According to the results of the research, a slight increase in seed yield by 0.09 t/ha was noted between the best and worst variants of the experiment. The highest seed yield of 1.81 t/ha was obtained against the background of plowing (plot 1). On the plot with deep, non-shovel soil loosening, the yield was 1.75 t/ha, and on the plot with disking – 1.72 t/ha.

Plowing with traditional tillage on site 1 requires significant energy and labor costs, which exceed similar indicators of the implementation of non-timber tillage systems (sites 2 and 3). Direct operating costs for plowing were the highest and amounted to 1661 UAH/ha, which is 618 and 986 UAH/ha more than the costs for deep loosening and disking, respectively.

The introduction of traditional tillage contributes to the formation of the highest yield and an increase in profit by 192–229 UAH/ha, however, the implementation of this technology requires higher costs compared to other studied options. Despite the lowest profit on plot 3 with mulch tillage, due to the lowest costs, the highest profitability of 52.2% was obtained, which is 1.0–1.8% more than on plots with conservation and traditional tillage systems.

According to the results of the research, a positive effect of the intensity and depth of the main tillage on the height of plants and elements of the sunflower crop structure was noted. The use of traditional tillage provided favorable conditions for the formation of the largest yield of sunflower seeds, the yield under this option was 1.81 t/ha. On the site with deep, non-slab loosening of the soil, the yield was at the level of 1.75 t/ha, and on the site with disking – 1.72 t/ha. Plowing with traditional tillage on the site requires significant energy and labor costs,

which exceed similar indicators for the implementation of non-dumping tillage systems.

According to the results of the economic assessment, it can be stated that in the conditions that developed during the research, the effectiveness of the implementation of the studied tillage systems is at the same level. The prospects for further research lie in the scientific substantiation, development and implementation of non-timber resource-saving technologies for tillage under sunflower.

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TRANSGRESSION AND INHERITANCE OF MAIN SPIKELET PRODUCTIVITY ELEMENTS IN SECOND AND THIRD GENERATION HYBRIDS OF *TRITICUM AESTIVUM* L.

The development of winter wheat varieties with high productivity and adaptability to unfavorable environmental factors is the main task of breeding. One of the ways to increase the efficiency of material and technical resources is to use plant varietal potential. Varieties have different traits and properties, genetic potential for productivity, reactions to growing conditions, and adaptive properties, so they differ in terms of yield and product quality. The main indicators that determine the grain yield of winter wheat are plant density and productive stem, length and graininess of the ear, grain weight per ear, and weight per 1000 grains.

The experiments were conducted during 2020–2023 in the fields of breeding crop rotation of the winter wheat breeding laboratory of the V. M. Remeslo Myronivka Institute of Wheat. The material for the research was 30 hybrid combinations created as a result of a full diallel crossing scheme (6/6) of soft winter wheat varieties, carriers of wheat-rye translocations 'Ekspromt', 'Zolotokolosa', 'Kolumbiia' (1AL.1RS), 'Kalynova', 'Svitanok Myronivs'kyi', 'Lehenda Myronivs'ka' (1BL.1RS). The hybrid combinations were divided into four groups according to the use of WRT carrier varieties in crosses: 1AL.1RS/1AL.1RS; 1BL.1RS/1BL.1RS; 1AL.1RS/1BL.1RS; 1BL.1RS/1AL.1RS.

According to the results of the analysis of F_2 and F_3 plants in 2020, the degree of positive transgression for the trait «length of the main spike» was observed in 53.3% and 36.7% of hybrids. In F_2, the maximum degree of transgression was observed in the combinations 'Zolotokolosa' / 'Svitanok Mironivskyi' (72.7%) and 'Kalynova' / 'Ekspromt' (18.2%) in the crossing groups 1AL.1RS / 1BL.1RS and 1BL.1RS / 1AL.1RS; in F_3 – 'Kalynova' / 'Zolotokolosa' (14.8%) and 'Zolotokolosa' / 'Kalynova' (11.1%) hybrid combination with the participation of varieties in which both (1AL.1RS, 1BL.1RS) introgressed components are also present.

The degree of positive transgression for the trait «number of grains per main spike» in F_2 populations was found in 93.3% of individuals, F_3 – 80%. Its highest value was found: in hybrid populations F_2 'Zolotokolosa' / 'Columbia', 'Svitanok Myronivskyi' / 'Ekspromt' (32.1%), 'Kalynova' / 'Zolotokolosa' (31.7%); F3 – 'Kolumbiia' / 'Zolotokolosa' (41.5%), 'Zolotokolosa' / 'Ekspromt' (35.9%), in which most of them have parental components of the carrier variety 1AL.1RS translocations.

Positive transgression for the trait «weight of grains from the main spike» in F_2 was determined in 60.0% of the studied populations, in the third generation – 73.3%. The hybrid populations 'Kolumbiia' / 'Zolotokolosa' (F_2 – 31.1%, F_3 – 39.3%), 'Svitanok Myronivskyi' / 'Zolotokolosa' (26.9% and 31.3%, respectively) were characterized by a high degree of transgression. It was found that 20.0% of hybrid populations of different crossing groups had a positive degree of transgression for the elements of ear productivity in F_2 and F_3.

Studies have shown that the frequency of isolation of transgressive forms by elements of ear productivity depended on the genotype, generation, and environmental conditions. In this regard, the degree of transgression in subsequent generations is somewhat hidden by their influence. According to the data analysis, in F_2 (2020) a low level of inheritance character manifestation was observed compared to 2021 in combinations, a decrease in the frequency of transgressions in F_2 and its increase in F_3 was noted. Thus, a new valuable breeding material of winter wheat with higher manifestation of both individual and group of productivity traits compared to parental forms was created with the participation of varieties carrying WRT. However, this is not enough, as valuable economic traits are limited in time, so it is necessary to continue research on the use of varieties with WRT in crosses.