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GROWTH, DEVELOPMENT AND FORMATION OF SUNFLOWER HYBRIDS DEPENDING ON THE METHODS OF PRIMARY TILLAGE UNDER THE CONDITIONS OF THE RIGHT-BANK FOREST-STEPPE OF UKRAINE

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Increasing sunflower yield in modern agricultural production is possible only under the condition of comprehensive adherence to technological processes, carried out within optimal timeframes and in full compliance with agrotechnical requirements. The introduction of high-yielding regionally adapted varieties and hybrids, the scientifically based use of mineral fertilizers and the reduction of technological operations through the use of wide-cut and combined machinery are of great importance [1].

The objective of our research was to determine the influence of primary tillage methods on the growth, development, and formation of sunflower hybrids under the conditions of the Right-Bank Forest-Steppe of Ukraine.

The research was conducted during 2022–2024 on the experimental plots of Uman National University, particularly at the Department of General Agriculture. Sowing of sunflower hybrids Zahrava, Ukrainskyi F1 and Sumiko was carried out using a wide-row method with 70 cm row spacing and a seeding rate of 50 thousand viable seeds per hectare, at a sowing depth of 6–7 cm. The primary tillage methods included plowing (depth 25–27 cm), chiseling (depth 25–27 cm), and disking (depth 10–12 cm).

Considering that primary tillage is an effective factor in moisture accumulation and retention, as well as in weed control in sunflower crops, it attracts significant scientific interest. Studies conducted under Forest-Steppe conditions have shown that the reserves of available soil moisture are formed under the influence of the primary tillage system and the level of weed infestation in the crops [2].

Literature data indicate that, for the conditions of the Eastern Forest-Steppe of Ukraine, the most appropriate method of primary tillage for sunflower is plowing. It has advantages over chiseling, as it reduces weed infestation and provides better yield indicators [3].

According to the results of our research conducted during 2022–2024, the influence of primary tillage methods on field germination, plant density, and biometric parameters of sunflower hybrids Zahrava, Ukrainskyi F1 and Sumiko was established.

The level of field germination and sunflower plant density depended on the primary tillage method. For the Zahrava hybrid, these values ranged from 88.1–91.6 % and 44.1–45.8 thousand plants/ha; for Ukrainskyi F1 – 88.2–91.3 % and 44.1–45.7 thousand plants/ha; for Sumiko – 88.0–91.3 % and 44.0–45.7 thousand plants/ha. The highest values were recorded under plowing, while the lowest were observed under shallow tillage.

Observations showed that the greatest sunflower height was achieved under plowing: Zahrava – 176.0 cm, Ukrainskyi F1 – 181.4 cm, Sumiko – 171.1 cm. Under shallow tillage, these values were the lowest – 169.6, 173.8 and 164.0 cm, respectively. Chisel tillage reduced the plant height compared to plowing by 1.9, 1.3 and 3.6 cm for the respective hybrids.

Depending on the primary tillage method, leaf area per plant varied as follows: Zahrava – 55.1–57.7 dm², Ukrainskyi F1 – 56.7–59.5 dm², Sumiko – 54.0–56.1 dm². The largest leaf area for Zahrava and Ukrainskyi F1 was observed under chisel tillage at a depth of 25–27 cm, while for Sumiko it was under shallow tillage at 10–12 cm.

Leaf area per hectare also depended on the tillage method: Zahrava – 24.3–25.8 thousand m², Ukrainskyi F1 – 25.0–26.7 thousand m², Sumiko – 24.3–25.1 thousand m². The maximum values were recorded under plowing and chisel tillage at a depth of 25–27 cm and were approximately the same for all hybrids.

For the Zahrava and Ukrainskyi F1 hybrids, the minimum leaf area per hectare was recorded under shallow tillage. The average values were highest under plowing – 25.9 thousand m², and chisel tillage – 25.8 thousand m², and lowest – 24.7 thousand m² under shallow tillage.

The diameter of sunflower heads varied depending on the primary tillage method: plowing – 18.4–18.7 cm, shallow tillage – 17.6–17.9 cm, and chisel tillage – 18.2–18.7 cm. The difference between plowing and chisel tillage was minimal, as evidenced by the average values of 18.5 and 18.4 cm, respectively. The smallest diameter, 17.7 cm, was observed under shallow tillage.

Based on the results of the three-year study evaluating the influence of primary tillage methods on sunflower development and productivity, it was established that the maximum plant height was achieved under plowing: Zahrava – 176.0 cm, Ukrainskyi F1 – 181.4 cm, Sumiko – 171.1 cm. When other tillage methods were applied, plant height decreased by 1.9–6.4 cm for Zahrava, 1.3–7.6 cm for Ukrainskyi F1, and 3.6–7.1 cm for Sumiko. At the same time, leaf area per unit of land was greatest under plowing and chisel tillage at a depth of 25–27 cm for all hybrids.

The smallest leaf area for Zahrava and Ukrainskyi F1 was observed under shallow tillage. Depending on the sunflower hybrid, head diameter varied as follows: under plowing – 18.4–18.7 cm; under shallow tillage – 17.6–17.9 cm; and under chisel tillage – 18.2–18.7 cm.

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