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BIOMETRIC INDICATORS OF LINES - PARENTAL COMPONENTS OF MAIZE HYBRIDS OF DIFFERENT FAO GROUPS UNDER IRRIGATION CONDITIONS

It is known that among the morphological features of corn, suitability for mechanized harvesting is influenced by: plant height and height of cob attachment [1]. For the mechanized cultivation and harvesting of corn hybrids, the height of the cob attachment is of the greatest importance. This feature is determined by the biological characteristics of plants and their growing conditions. When using mechanized harvesting of corn, it is important that the cobs are laid evenly at the optimal height, because just as a low height of attachment of the cobs (30–50 cm) leads to significant losses of grain during mechanized harvesting (15–20% or more), so high laying of cobs (higher than 110 cm) is undesirable due to the increase in harvesting costs [2, 3].

The research was conducted during 2018–2020 at the experimental field of the Institute of Irrigated Agriculture of the National Academy of Sciences of Ukraine, located in the southwestern part of the Kherson region, 12 km from the city of Kherson, on the lands of the Ingulets irrigation system. The Kherson region is located in the continental region of the climate zone (belt) of moderate latitudes and is characterized by a moderate-continental climate with mild winters with little snow and hot, dry summers.

The purpose of the research was to establish the biometric indicators and seed yield of parent lines of modern domestic hybrids of corn of different maturity groups, under different plant density and treatment with biological preparations on drip irrigation in the conditions of the Southern Steppe. To determine the relationship between plant height and the height of attachment of the upper (productive) cob with seed yield of parent lines of hybrids.

The formation of plant height of parental forms of corn hybrids depending on the density of plants and the effect of drugs has a significant utilitarian value in combination with seed yield and determination of optimal biometric parameters of corn lines according to individual FAO groups.

Data analysis shows that the height of the plants varied depending on the genotype of the parental forms, the density of the plants and the treatment with biological preparations.

Research has established that the most intensive linear growth processes of corn

plants occurred before the cob flowering phase. During the flowering phase of the cobs, a significant increase in the height of the culture plants was noted, depending on the options. The plant height index of parent forms of corn of different maturity groups ranged from 176.3 to 215.2 cm in the control version.

Studies have shown that the maturity group of the parent forms of corn did not affect the height of the plants at different stages of their growth and development. The mid-early line DK 247 (FAO 290) had the maximum height on average according to the experiment - 213.3 cm, and the mid-late lines DK 411, DK 445 (FAO 420) had a lower plant height - 183.2 and 189.5 cm, respectively. In the line - parental components, plant height depended on the genotype of the plant and not on the FAO group.

The height of the plants varied depending on the density of the plants. The obtained data made it possible to reveal a number of features of the response of corn lines to stem density. The plants with the maximum level of thickening were the tallest during the flowering period. A decrease in stem density led to a decrease in stem height. A similar situation was observed in all lines. Linear growth in thickened variants increased as a result of the aggravation of competitive relations between plants in the agrocenosis with sufficient moisture. The height of the stem in the plants of the parental component - DK 281 increased by 2.3% when the density increased from 70 to 90 thousand plants/ha, in the line DK 247 it increased by 4.9%, in the line DK 411 - by 4.9%, in the line DK 445 - by 3.1%.

Treatment of corn plants with biological preparations had a positive effect on the height of parent forms of corn in separate phases of development. The drug Helafit combi had the greatest impact on growth processes, which increased plant height by 1.9–3.8 cm compared to the control. Bio-gel, on average, had a minimal impact on growth processes (an increase of 0.3–2, 4 cm).

One of the indicators of the manufacturability of parent lines of corn hybrids is the height of attachment of the productive (upper) cob, since its low location leads to significant losses during harvester harvesting. The height of the cob attachment varied within fairly wide limits – from 92.6 to 106.3 cm. It was the highest in the mid-early parental component DK 247, and the lowest in the mid-late parental component – DK 411. Biopreparations increased the height of the cob attachment by 0.6–1.8 cm.

An important aspect of the experiment is the possibility of determining the level of influence of individual biometric indicators on the formation of seed yield of corn lines. It was established that there is no correlation between plant height and seed yield of parental components. Thus, in the phase of milk ripeness, the correlation coefficient between plant height and grain yield of hybrids was +0.021.

This confirms the previous conclusion that the main factor in the formation of seed yield is the genotype of the parent component, and the height of the plants indirectly affects it through the potential productivity of the genotypes.

A low correlation coefficient indicates the impossibility of visually conducting preliminary selections for productivity based on the height of the cob attachment in the parent components.

Analyzing the research data of corn hybrids under conditions of irrigation according to the height of the plants and attachment of the cob of corn hybrids, it is possible to conclude that there is a close direct correlation between the height of the plants and the grain yield of corn hybrids. Thus, the correlation coefficient between plant height and grain yield of these hybrids was +0.873. The high correlation coefficient became possible due, first of all, to the positive influence of the duration of the vegetation period on the height of corn plants. But in the parental components of these hybrids, the growing season did not play a decisive role in the height of the plant. In these hybrids, a strong correlation was observed between the height of the cob attachment and the grain yield of the hybrids ($r = +0.741$). A high correlation coefficient indicates the possibility of visual preliminary selections for productivity based on the height of cob attachment in corn hybrids under irrigation conditions. In corn lines, such a visual assessment of productivity is impossible.

It was established that the area of the leaf surface of one plant was quite variable and depended on the genotype of the line, the density of the plants and treatment with drugs. The maximum values of the leaf surface area in the flowering phase of cobs in all variants of the experiment were observed in the mid-late line DK 445 at a density of 70,000 plants/ha - 0.499 m²/plant.

The largest assimilation surface area of plants of parental components of all maturity groups was noted at a density of 70 thousand plants/ha (from 0.367 to 0.487 m²/plant), the smallest - at a density of 90 thousand plants/ha (0.346–0.448 m²/plant). Therefore, the thickening of crops led to a decrease in the area of the assimilation surface by 0.9–3.9%, depending on the genotype of the parent component.

It was established that the treatment of plants with both drugs had a positive effect on the area of plant leaves, while its increase with FAO 190 and 290 when treated with biological preparations was higher (by 0.026–0.038 m²/plant) than with FAO 420 (by 0.012–0.023 m²/plant). On average, according to the experiment, the use of Bio-gel helped to increase the area of the assimilation apparatus of the plant by 0.022 m²/plant, Helafit combi - by 0.031 m²/plant.

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