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Interrelations Of The Root Weight Trait With Other Valuable Economic Traits In The Family Of Hybrids F3 Of Sunflowers In The Conditions Of Karakalpakstan

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Abstract: This article presents mathematical analysis data on the correlations between root weight and several characteristics in simple and complex F3 sunflower hybrid families, including single plant productivity, plant height, basket diameter, and total leaf area. In this case, the correlation relationships in highly heterozygous hybrids changed in a positive direction, and the high indicators of two-three traits were concentrated in one genotype.

Keywords: Sunflower, simple and complex hybridization, interdependence, correlation, heterozygote, genotype, root weight, productivity, plant height, basket diameter, leaf area.

Introduction: Today, in the selection of agricultural crops, hybridization creates the possibility of changing heredity and the emergence of plastic genotypes adapted to a new environment based on simple and complex selection hybridization methods. Hybridization and selection are the main factors in creating new varieties and largely depend on the chosen crossbreeding methods and the genotype of the raw materials. In sunflower selection, the need to create varieties with stable hereditary traits using new breeding methods is increasing.

In our republic, one of the urgent tasks is the study of the interrelationship of hybrid families with other traits of economically valuable traits in the creation of drought-resistant agricultural crops, in particular, sunflower varieties, which require less water and eliminate water shortages.

L.J.Genjeeva [1] and others conducted research in the soil and climatic conditions of Karakalpakstan, as a result of studying the relationships between some valuable traits of third-generation hybrids obtained from simple and complex hybridization of sunflowers, they showed that a change in one trait leads to a correlative change in another trait.

The product obtained from sunflower seeds is considered one of the main vegetable oils used for consumption by the world's population. The surface yield of sunflower is 23 million/ha, the average yield is 14-15 c/ha, and the oil content in absolutely dry seeds is 55-56%. In advanced farms of some countries, sunflower yields reach 40-43 centners per hectare [2].

Based on the results of research conducted by several scientists on the study of new sunflower lines in the conditions of Karakalpakstan, they came to the following conclusions: in the conditions of natural salinization of Karakalpakstan, the yield of a new high-yielding seed kernel from station variety trials proves its effectiveness in creating genotypes that meet world standards for sunflowers with relatively high indicators, and the possibility of transferring L-24, L-28, L-43, and

L-63 lines, which showed relatively high indicators compared to the standard variety for the main economically valuable traits from the studied lines in the small variety trial nursery, to the large competitive variety trial next year [3].

In the natural saline conditions of Karakalpakstan, station seed testing yields of new high-yielding kernels proved their effectiveness in creating genotypes that meet world standards for sunflowers with relatively high indicators, and the possibility of transferring the L-24, L-28, L-43, and L-63 lines, which showed relatively high indicators compared to the standard variety in terms of key economically valuable traits, to major competitive variety testing next year was presented [3].

MATERIALS AND METHODS OF RESEARCH

Our research was conducted in field and laboratory conditions according to the applied project of the Karakalpak Research Institute of Agriculture "Creation of new promising early-maturing, high-yielding, high-oil varieties of sunflower by simple and complex hybridization, adapted to the soil and climatic conditions of Karakalpakstan." All field observations were carried out according to the "Methods of Conducting Field Experiments," and genetic and breeding analyses of the obtained data were carried out according to Dospekhov's methods.

ANALYSIS AND RESULTS

In order to reduce the selection process of agricultural crops and obtain new raw materials and varieties with high indicators for most traits, it is advisable to fully study plant generations and gradually separate traits, as well as reduce the number of combinations created as a result of various hybridizations.

In plants, correlative relationships between traits are of varying degrees, and from a genetic point of view, this is explained by the clustering of genes in one locus or the pleiotropic effect of genes. The relationship of characteristics is of two types, i.e., smooth-system and non-smooth-system. In a smooth correlation, an increase or decrease in the indicators of one trait leads to an increase or decrease in the indicators of another trait. In the first case, positive correlations arise, and in the second case, negative ones. When creating lines and varieties of sunflowers with positive main economically valuable traits, it is important to analyze the relationships of traits, that is, how one trait is in a strongly positive state and how it is related to other traits.

In our study, a mathematical analysis was conducted to examine the correlations between root weight and various characteristics such as single plant productivity, plant height, head diameter, and total leaf area in simple and complex F3 hybrid families of the sunflower. Figure 1.

In the studied 6 F3 simple hybrid families, there was a moderate and strong positive correlation between root weight and productivity, i.e., the correlation coefficient ranged from 0.57 for example, F3 (Sor Gollips x KK-1), to 0.69 for F3 (Tel's x KK-1), and in 3 complex hybrid families, a strong positive correlation was found from 0.66 to 0.69. These indicators provide information about the aggregation of genes controlling these traits.

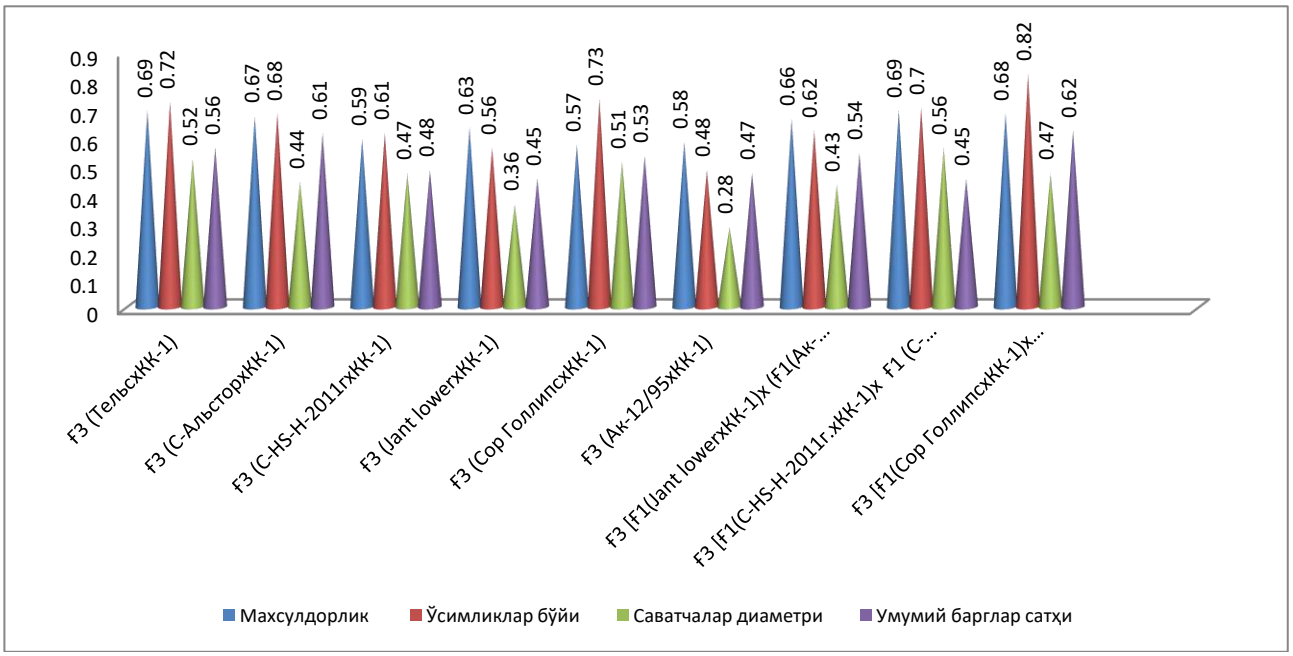

Figure 1. Correlation relationships between root weight and productivity, plant height, basket diameter, and total leaf surface area in sunflower plants.

Among these traits, the highest positive correlation was observed in the families of the simple hybrid F3 (Tels x KK-1), F3 (S-Alstor x KK-1), and F3 (Jant lower x KK-1), and the correlation coefficient was 0.63-0.69. In complex hybrids, the highest positive correlations were observed in the families F3 [F1 (S-NS-N-2011 x KK-1) x F1 (S-Alstor x KK-1)], which showed 0.69, and F3 [F1 (Sor Gollips x KK-1) x F1 (Tels x KK-1)], which showed 0.68. The root weight was also positively correlated with the plant height trait, that is, the correlation coefficient was 0.48-0.73 in simple hybrids and 0.62 to 0.82 in complex hybrids. In sunflowers, root weight significantly influences plant growth and development. The developed root system of sunflower adsorbs a large amount of nutrients and water and directly affects the development of the plant. It was established that in the F3 simple and complex hybrid families, the correlation between root weight and basket diameter was moderately positive. In simple hybrids, it ranged from 0.36 to 0.52, and in complex hybrids - from 0.43 to 0.56. It was established that the root weight is connected to varying degrees with the mark of the total leaf surface area. In simple and complex hybrids, the correlation coefficient was 0.4-0.5. In some hybrids, for example, in simple combinations F3 (S-Alstor x KK-1) and complex combinations F3[F1 (Sor Gollips x KK-1) x (F1 (Tels x KK-1)], the correlation coefficient was higher than 0.6.

CONCLUSION

According to the above analysis, it can be concluded that the correlation relationships in highly heterozygous hybrids changed in a positive direction, and the high indicators of two-three traits were concentrated in one genotype. This leads to a significant acceleration of the breeding process.

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