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SELECTION OF CORN HYBRIDS FOR RESISTANCE TO DROUGHT AND SALINITY

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The resistance of the corn male gametophyte to abiotic stress factors, particularly drought and salinity, is an important factor to consider when creating and selecting new hybrid combinations. Studying the variability of pollen traits under stressful conditions allows for an effective assessment of the genotype's resistance and productivity potential. The aim of this study included investigation of the variability of the "pollen grain diameter" trait in hybrid genotypes under drought and salinity stressful conditions, evaluation of the effects size of stress factors, and identification of the most promising hybrids for further breeding.

The initial material was represented by 7 hybrid combinations, in which the maternal component was represented by simple hybrids (Mo17xW23), (Mo17xRf7), (XL12xP346), (XL12xN6), (L276xP165), (A285xRf7), and the paternal component included different types of hybrids: (simple (MK01xL276), trilinear (L459xP502) xP101, double (L459xMK390)x(P165xB73), backcross (A239xMK159)xMK159). The usual simple hybrids F_1 - L1866xA285 and F2xCo125 and a hybrid population of sweet corn were also used. The values of pollen grain diameter were determined by using MOB-1-15^x ocular micrometer in solutions with the calculated values of osmotic pressure (137.6 MPa and 40.67 MPa), as well as in NaCl solutions (3% and 15%). Effect sizes of stress factors and of the interaction «genotype x stress» were determined using ANOVA, and the significance of differences between genotypes were found by the Tukey HSD test.

The effect size of the «stress» factor was the largest (η_p^2=0.45***) and significantly exceeded the similar indicators for the interaction of factors (η_p^2=0.27***) and the "genotype" factor (η_p^2=0.19***). R^2 adjusted for the entire model was 0.54***. The best genotypes in terms of average values of the "pollen grain diameter" trait in all experimental variants were hybrids in which the maternal component included the XL12 line, and the paternal component was the three-line hybrid (L459xP502)xP101. Hybrids obtained using the L276 line in both the maternal and paternal components

were characterized by high values of the studied trait under the influence of drought. The values of the "pollen grain diameter" trait in the control were significantly higher than in the variants of stress treatments of the experiment, while the lowest values of this trait were observed under salt stress conditions. It was noted that with increasing NaCl concentration, the values of the studied trait decreased, especially in complex hybrid combinations. However, under osmotic stress, the performance of simple hybrids was inferior to that of almost all complex hybrids. The difference in "pollen grain diameter" trait values depending on the osmotic solution concentration was significant for genotypes with maternal components (XL12xP346), (XL12xN6), (L276xP165). Hybrid combinations involving paternal components such as double hybrid and backcross hybrid demonstrated significantly lower values for this trait of male gametophyte under drought conditions. Thus, promising hybrid combinations of corn with increased tolerance to drought and chloride salinity were identified at the haploid level of male gametophyte.

Keywords: corn, male gametophyte, drought, salinity.

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