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EFFECT OF SALT STRESS ON THE CHLOROPHYLL AND RELATIVE WATER CONTENT IN MAIZE

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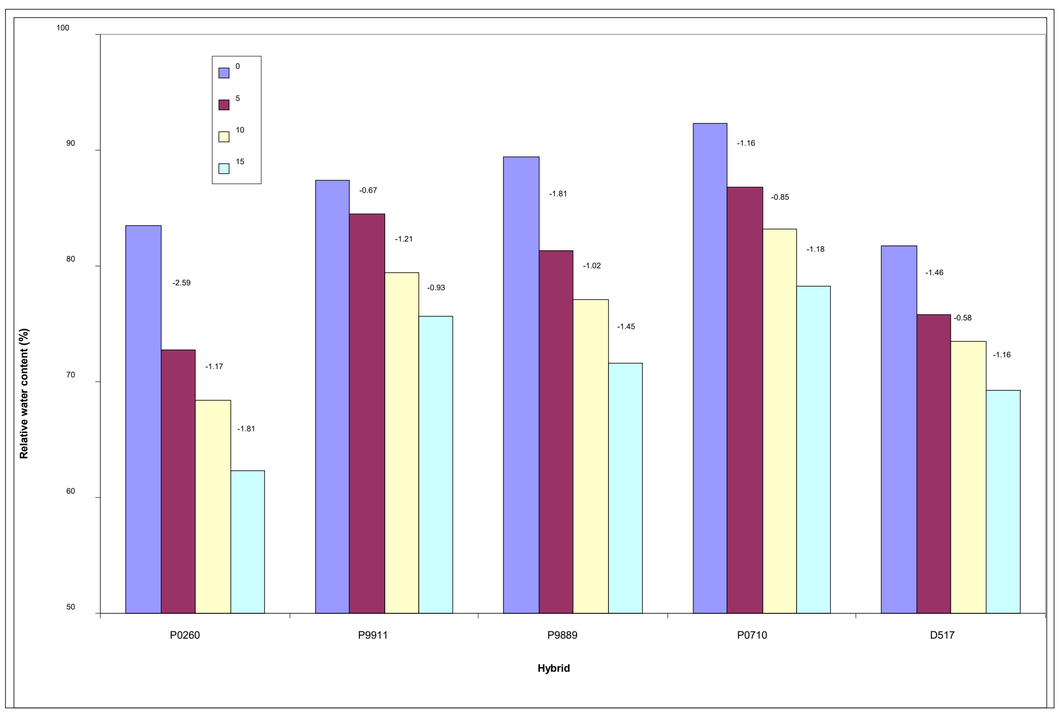
Abstract: Maize plants exhibit notable sensitivity to soil salinity. The presence of salinity inflicts detrimental consequences via physiological, biochemical, and morphological pathways, ultimately leading to inadequate stand establishment and restricted plant growth. The study included four salinity (NaCl) levels (0, 5, 10, and 15 dS m-1, respectively) and five maize genotypes, using a completely randomized design with three replicates. Currently research was undertaken to establish the effect of different salinity levels on the chlorophyll and relative water content of leaves in five maize hybrids. The findings of this research will be used as a basis for future studies on maize responses to salt stress.

Introduction

Poor maize plant performance under a saline environment results are due to plant hormone and nutrient imbalance, ion toxicity, osmotic stress, electrolyte leakage, disruption in cellular functions, and membrane damage. Higher concentrations of salt in the soil decrease the water potential, thereby restricting water and nutrient uptake by roots. This study investigate the effects of different salt stress levels on the chlorophyll and relative water content of leaves in early stages of five maize hybrids.

Material and Method

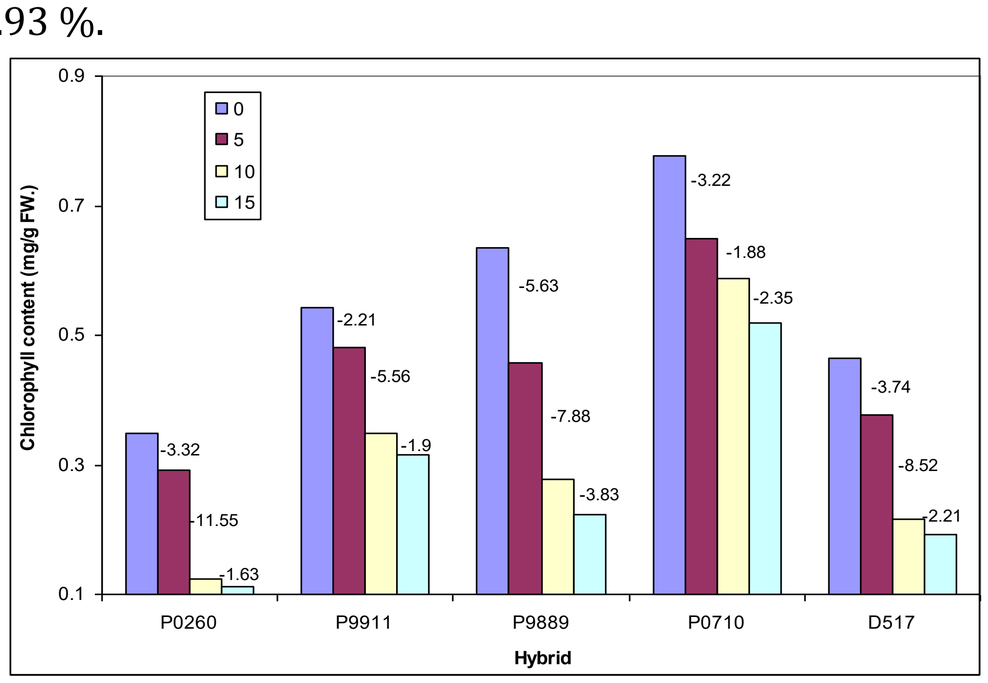
The germinated seeds were placed on pots (10 x 10 cm) with perlite, in three replicates, using a completely randomized design. For each maize hybrids (P0260, P9911, P9889, P0710, D517), four salinity levels were used: 0 (distilled water); 5, 10, 15 dS/m. The maize plants were irrigated with the four treatments during 14 days at a two-day interval. Relative water content (RWC) was determined using the procedure presented by Lugojan and Ciulca (2011). The chlorophyll content (mg/g) was determined with the method of Shabala *et al*., (1998), and measured using a UV spectrophotometer.



Variation of relative water content in maize leaves under salt stress

Results and Discussions

In the case of treatment with 15 dS/m, there are more obvious differences between hybrids in terms of their effect on the water retention capacity of the leaves, associated with a variability of 8.67 %, while against the background of the application of the saline stress of 5 dS/m, the genotype had the least influence on this characteristic against the background of a variability of 4.93 %.



Variation of chlorophyll content in maize leaves under salt stress

Considering the cumulative influence of saline treatment and hybrids on chlorophyll content, it is observed that the highest significant differences between hybrids were highlighted against the background of the treatment with 15 dS/m, at the opposite pole being the unstressed saline variant where the variability of the amount of chlorophyll between hybrids was considerably lower. The 'P0710' hybrid showed a higher increase in this parameter compared to the rest of the hybrids regardless of the level of salt stress.

Conclusions

Under the effect of salt stress, the values of relative water content were significantly reduced by 7.65% for the 5 dS m-1 treatment and by 17.77% for the 15 dS m-1 treatment. The application of the 5 dS m-1 treatment caused a significant reduction with 18.6% in the amount of chlorophyll, while under the effect of the treatments with 10-15 dS m-1 this parameter was significantly reduced by 43.8-50.7%.