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DROUGHT STRESS INVESTIGATION OF DIFFERENT MAIZE HYBRIDS

Ádám KOMLÓSI, Gábor BENCZE, Zoltán FUTÓ
Hungarian University Agricultural and Life Sciences
Department of Irrigation and Melioration

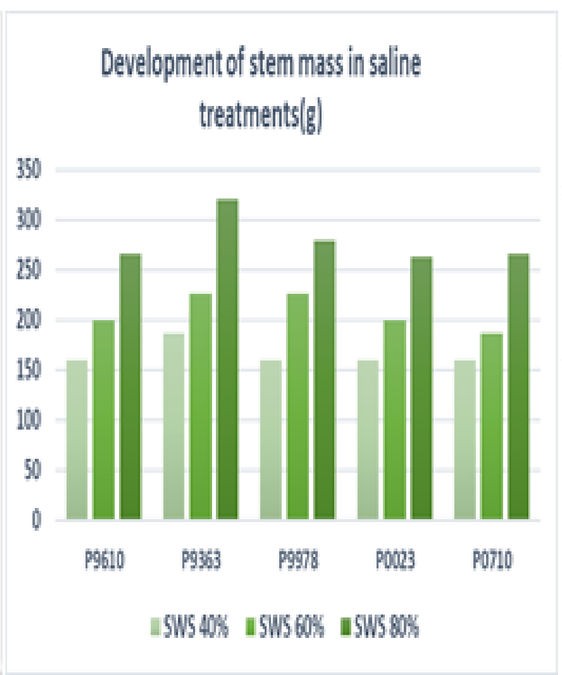
Abstract: In the research, we examined and analyzed the importance of hybrid selection and irrigation. In the course of the research, we measured the photosynthetic activity and different phenological parameters of different maize hybrids in a pot experiment. During the experiment, drought-sensitive and tolerant hybrids were tested under saline and non-saline conditions. . During the experiment, plant height, leaf area (LAI) and relative chlorophyll content (SPAD) were measured every 2 weeks. In today's climate-burdened world, we are increasingly confronted with the negative effects of drought and salt stress, but if we can prepare for and counter them, we can simply have a positive impact on our crop results.

• Introduction

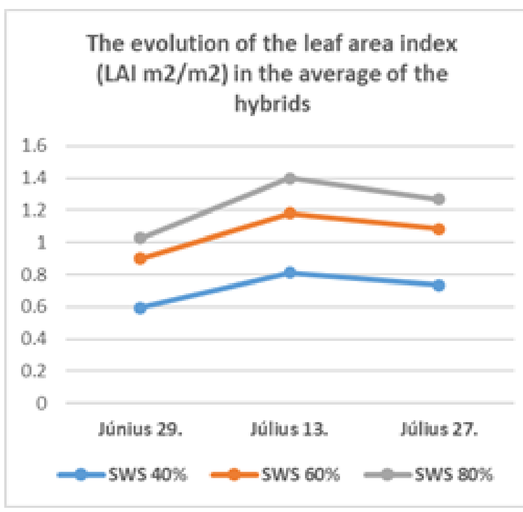
Maize's water consumption is highest from the time of earing to grain saturation, while it is lowest at the beginning of development (Futó és Sárvári 2015, Menyhért 1979).
The generative parts can develop, but as a result of heat stress, even with optimal water supply, the plant may lose its fertility. The concept of water stress includes both salt stress and drought stress (Kaur and Zhawar, 2015), and it has been observed that salt stress combined with drought stress can cause even greater yield loss (Cong et al., 2021).

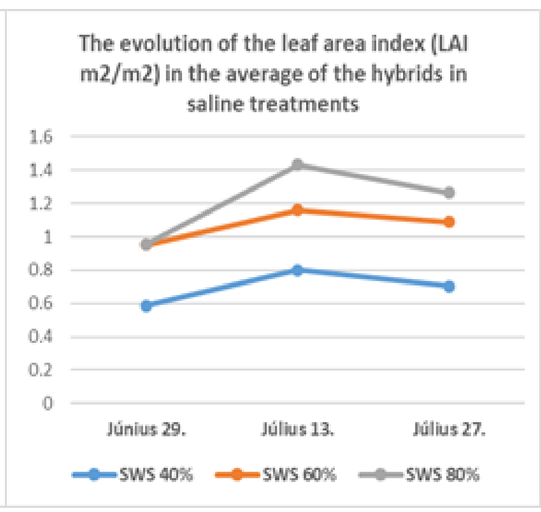
• Material and method

We research the mild salt stress reactions of five different maize hybrids and the drought stress reactions in a pot experiment. The experiment was set up on May 26 and was harvested on July 27 in 2022.
we set 3 water supply levels in the experiment . We first determined the natural water capacity (SWS) of the soil, which was the amount of water that the soil could retain against gravity. The following treatments were set up in the experiment:
- SWS 40% (40% of the water content of the soil saturated to natural water capacity)
- SWS60% of water content (60% of the water content of soils saturated to natural water capacity)
- SWS80% of water content (80% of the water content of soils saturated to natural water capacity) The following phenological parameters were measured in the experiment:
- - Relative chlorophyll content (SPAD) with Konica SPAD 501 instrument
- - Leaf area (based on the Montgomery formula)
- - Leaf area index (LAI m2/m2)
- - Plant height
- - Leaf and stem weight
- - Root mass
- The data were measured several times during the growing season, every two weeks (SPAD, leaf area, plant height), and the final biomass was measured during the harvest (leaf and stem weight, root weight).



• Results and discussions





In the figures below, it is very clear that different amounts of water result in different leaf surfaces. Drought conditions determined the leaf surface of our hybrids not only at the beginning, but throughout the experiment at a water dose of 40% and this is ultimately true for all water doses. If we look at the water dose of SWS60% or SWS80% , it can be established both in saline and non-saline conditions that the negative effects of drought stress will be felt in the leaf surface not only at the beginning, but during the entire growing season. By the third measurement, the plants had already received such heat stress in the film that none of the water doses could help the plants and their water absorption stopped. The difference between the water doses can be clearly seen by looking at the two figures, but not between saline and non-saline conditions. There is a very minimal difference between salty and non-salty treatments, and not always in a negative direction.

Conclusions

During the experiment, we subjected the plants to a small degree of salt stress, which presented a slightly saline soil or, in the evening, a rudimentary secondary salinization. These hybrids handled this stress factor excellently and were able to overcome the disadvantage caused by salty conditions by increasing their root size. The P9978 hybrid performed well on all water doses in the hybrid average and showed one of the best irrigation responses in the experiment. I think it is also important to mention the P0023 hybrid, which was able to achieve good results in terms of leaf area at a water dose of 40%, so its drought tolerance was confirmed, but it also achieved excellent results in terms of root mass at the unfavorable water supply level, and at the elevated he also gave water rations. The experiment made it clear to us that the right choice of hybrids is an essential ingredient for economical and sustainable farming, since with a good choice of hybrids we are able to reduce the negative effects of climate change to a certain extent.

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