PHYSIOLOGICAL AND BIOCHEMICAL RESPONSES OF SEEDS OF DIFFERENT *TRITICUM AESTIVUM* L. GENOTYPES TO OSMOTIC STRESS

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Background: Drought is one of the main abiotic factors limiting wheat productivity, especially during the early stages of development, when seed uptake and germination are directly dependent on water availability. Simulating water deficit under controlled conditions allows us to identify genotypic differences in plant tolerance to osmotic stress during the seedling stage.
The aim of this study was to evaluate the physiological response of seeds of different *Triticum aestivum* L. genotypes to osmotic stress induced by varying sucrose concentrations in order to identify genotypes characterized by increased tolerance to water deficit during the early stages of development.
Materials and methods: Seeds of six wheat genotypes were used as experimental material. Drought conditions were simulated using aqueous sucrose solutions with concentrations of 3%, 5%, 10%, and 16%, while distilled water served as a control. Seeds were germinated in a laboratory incubator at a temperature of 20–22°C in a Friocell thermostat. Germination parameters were recorded on days 3, 5, 7, and 10. The percentage of germinated seeds, root length, and shoot length were assessed.
Results: Increasing sucrose concentration generally resulted in a significant reduction in germination and seedling growth in all studied genotypes, although the magnitude of the response varied significantly between them. The greatest differentiation between genotypes in both germination and growth traits was observed with treatment with a 16% sucrose solution. Root length proved to be a more sensitive indicator of osmotic stress than other growth parameters. In sensitive varieties, this trait decreased 3-10 times depending on the sucrose concentration.
An analysis of antioxidant compounds showed that osmotic stress was accompanied by a decrease in catalase activity in all studied wheat genotypes. The content of total phenolic compounds also changed under osmotic stress. Several genotypes showed an accumulation of phenolic compounds, which may indicate a nonspecific defense response. In more sensitive genotypes, biochemical changes were less pronounced or unstable.
These differences reflect genotype-specific physiological and biochemical adaptation mechanisms, including the ability to maintain water balance through osmotic regulation and provide effective antioxidant protection during the early stages of development.
Conclusions: Drought simulation using sucrose solutions is an effective tool for early selection of wheat genotypes for tolerance to water stress, and a comprehensive assessment of germination traits, seedling growth, and antioxidant system status can serve as an informative criterion for selecting drought-tolerant varieties in breeding programs.
Keywords: wheat, osmotic stress, seed germination, sucrose-induced drought simulation, catalase activity, phenolic compounds.

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