Selection of Drought-resistant Genotypes of Common Wheat (Triticum aestivum L.) by Examining the Root System

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Drought is a significant part of plants' life, against which they have developed diverse defense mechanisms to survive and thrive in the ever-changing environmental conditions. One of such mechanisms utilizes antioxidant enzymes. Modulating the activity of these enzymes, plants are capable to regulate formation of reactive oxygen species to keep homeostasis. Scientists and breeding companies are currently trying to develop better and more drought-resistant genotypes. The drought-resistance is often linked to different root system architectures and its qualitative and quantitative characteristics. So far, the root system has not been an object of systematic breeding because of proper approach of the research is still missing. Hence, the main aim of this study is to examine the activity of antioxidant enzymes (ascorbate peroxidase and guaiacol peroxidase) in the roots of common wheat genotypes and to investigate the influence of the differences in root systems of these plants as a response to drought stress. Subsequently, I wish to determine whether the enzymatic activity can be used as the first indicator for the selection of drought-resistant plants. Four genotypes of wheat with different root structure were examined,the activities of antioxidant enzymes in roots, total root length, relative water content and stem and root dry mass were measured. The most drought-resistant genotype was selected, based on measured criteria. I proved that the activity of antioxidant enzymes in roots can be used as the first suitable marker for selecting drought-resistant genotypes. This new and easy-to-perform approach can be used in agriculture and breeding for a fast selection of drought-resistant genotypes.

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