

Influence of arbuscular mycorrhizal fungi on abiotic stress tolerance of wheat

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Wheat (*Triticum aestivum*) is beside rice and maize one of the most important crops worldwide and used mainly for human nutrition as well as for feeding animals. Due to early summer drought and nutrient deficiencies especially in organic farming, yield and quality losses are expected. One of the most promising approaches to reduce the negative impact of abiotic stress is the identification of stress tolerant wheat genotypes.

Due to the increased water and nutrient transport to the plant, arbuscular mycorrhizal fungi (AM) are beneficial for many plant species especially under water or nutrient deficiency. Therefore, the aim of this project was to identify wheat genotypes which show a high AM colonization leading to enhanced abiotic stress tolerance. To achieve this, a set of 103 and a subset of 30 genotypes respectively were investigated under abiotic stress conditions in order to detect genetic differences of their ability to generate mycorrhiza symbiosis and to get more information on the impact of the symbiosis on agronomic traits like grain yield and shoot dry weight.

In a pot trial, the 103 genotypes were grown under glasshouse conditions in a drought stressed and a well watered variant with and without mycorrhization. Each variant was replicated 3 times. A second pot trial was conducted with a subset of 30 geno-

types grown in an optimal phosphorous fertilized variant and under phosphorous deficient conditions with and without mycorrhization in 3 replications and yield parameters were assessed. Furthermore, PCR analyses and an ink vinegar stain of root segments were performed to evaluate the root colonization by the AM *Glomus intraradices*, *Glomus etunicatum* and *Glomus claroideum*.

Quantification of root colonization using light microscopical techniques showed differences in mycorrhization between genotypes in both trials. Significant differences in root colonization were observed between optimal phosphorous fertilized and plants grown under phosphorous deficient conditions. Under both abiotic stress conditions – drought stress and phosphorous deficiency – significant differences of yield parameters were determined between AM inoculated and non-inoculated plants.

Pot trials will be repeated in order to get more information on the benefit of mycorrhizal symbiosis under limited conditions. Furthermore, genotyping using the 90k iSelect SNP-chip will be conducted to identify QTLs which are involved in root colonization and tolerance to abiotic stress via genome wide association studies (GWAS).