Impact of a vesicular arbuscular mycorrhiza symbiosis on biotic and abiotic stress tolerance of wheat

Lehnert, H.[1] , Serfling, A.[1], Ordon, F. [1]

[1] Julius Kühn-Intitute, Federal Research Centre for Cultivated Plants, Institute for Resistance Research and Stress Tolerance Erwin-Baur-Starße 27, 06484 Quedlinburg

Email of corresponding author: heike.lehnert@jki.bund.de

The expected increase of drought and heat periods, in particular early summer drought, will result in reduction of yield and quality of the wheat grain (*Triticum aestivum*) harvested. The identification of stress tolerant wheat genotypes is one of the most promising approaches to reduce the negative impact of abiotic stress. Root endophytic mycorrhizal fungi are beneficial to many plant species by increasing water and nutrient uptake leading to increased yield under stress conditions. Therefore, the identification of wheat genotypes showing a better colonization with respective mycorrhiza fungi may be an opportunity to reduce the impact of abiotic stress on yield and quality. To achieve this, a set of 100 wheat genotypes are tested in order to detect genetic differences related to their ability to generate a symbiosis with arbuscular mycorrhizal fungi and to get information on the impact of this symbiosis on agronomic traits under stress conditions.

Genotypes are grown in pot trials in a drought stressed (25% maximal water capacity) and a control variant (75% maximal water capacity) with and without mycorrhization in three replications. Traits of agronomic performance, e.g. flowering time, plant height, yield and yield compounds were assessed. The analyzation of root colonization by mycorrhizal fungi was performed by PCR analysis (Janoušková et al., 2009) and an ink vinegar stain of root segments (Vierheilig et al., 1998).

The successful inoculation with a mixture of *Glomus intraradices, Glomus etunicatum* and *Glomus claroideum* could be confirmed by the root stain and PCR analyses. Mycorrhizal specific primer pairs showed that the majority of wheat genotypes were colonized by one or more mycorrhizal species of which G. *intraradices* was predominant. Typical mycorrhizal structures like intraradical hyphae, spores and vesicles become visible using light microscopical techniques. Furthermore, significant differences in plant height were observed. However other traits showed no difference between inoculated plants and the non-inoculated control. Respective trials will be repeated and additional trials to get information on the benefit of mycorrhizal symbiosis under conditions like phosphorus deficiency and biotic stress will be conducted. In parallel these genotyping using the 90k iSelect chip available for wheat will be conducted in order to identity QTL involved in mycorrhization and tolerance to abiotic stress via genome wide association genetics studies.