Priming to enhance resistance to leaf rust in barley

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Leaf rust (*Puccinia hordei*) is one of the major diseases of barley (*Hordeum vulgare* L.) leading to yield losses up to 60% besides a reduction of malting quality. Resistance genes *Rph1-Rph24* are known in barley but most of these have been overcome meanwhile and the primary gene pool of barley is to some extent depleted for new resistance genes. Priming of barley may offer a new opportunity to enhance resistance to *P. hordei*.

Bacterial communities such as the soil bacteria *Ensifer meliloti* are known to prime resistance in plants. By quorum sensing N-acyl homoserine lacton (AHL) is produced, which leads to systemic signalling in plants. Up to now knowledge on this phenomenon, which has been observed in *Arabidopsis thaliana*, in barley is limited. The present study therefore aims at the detection of genotypic differences concerning priming capacity.

For this purpose a diverse set of 200 spring barley accessions is analysed in greenhouse pot experiments for priming efficiency regarding leaf rust resistance. The plants are treated with bacteria, i.e. repaired *E. meliloti* natural mutant *expR+ch* overexpressing AHL and transformed *E. meliloti* carrying the lactonase gene *attM* from *Agrobacterium tumefaciens* which inhibits AHL production and acts as a control. Plants are treated three times with a bacteria suspension and are infected with *P. hordei* strain I80, 16 days after sowing. 12 days after infection, scoring of fungal growth and infection type, as well as biomass production is conducted.

First results showed significant effects ($p<0.001$) of the bacterial treatment indicating a positive effect of priming on *P. hordei* resistance. Besides this genotypic differences concerning the effect of priming were observed. In a next step genome wide association studies will be conducted in order to identify genomic regions involved in priming efficiency and develop molecular markers suited to be used in future barley breeding.

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