

## Priming for enhanced defense as strategy to optimize crop resistance

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*Priming* is a physiological defense state of a plant, which can be divided into three different phases.

It starts with a naïve plant, which has not been in contact with a priming agent. The following “*priming* phase” is a reaction of the plant to the priming agent, usually very subtle however, changes in plant metabolites or transcriptome are possible. These changes are specific for different *priming* agents. Generally, it can be distinguished between “*priming* fingerprints” of plant growth promoting fungi, bacteria or chemical priming agents. Primed plants usually react faster and stronger to an upcoming challenge. In this “post-challenge phase” metabolomic and transcriptome changes lead to a higher resistance of the plants against the pathogen or/and biotic and abiotic stress.

Quorum-sensing (QS) molecules are produced to monitor the density of bacterial population(s). In plants, these molecules can trigger a primed state. Different QS molecules from different bacterial species are well known and used for plant protection. One of the best-studied group of QS molecules are the *N*-acyl homoserine lactones (AHL). Oxo-C14-HSL is one of the molecules of this group and is produced for example by the beneficial bacteria *Ensifer meliloti*.

Our research is focusing on the three-way interaction between *Hordeum vulgare*, *Blumeria graminis* and a priming agent. In our case, we investigate the different priming-triggering soil borne bacteria for example *E. meliloti* or *Bacillus* spp..

In the current second phase of the project, we apply previous findings from greenhouse experiments to the field. Therefore, we did screen the priming capability of different *Bacillus* spp. and *E. meliloti* in seven different genetically diverse spring barley lines. In upcoming experiments we intend to expand our research and carry out two field trials at different sides in Germany.

Furthermore, we aim at a deeper understanding of AHL-*Priming* in barley and answer some of the open questions like e.g.: How long does the priming effect last?