Establishment of broad-spectrum resistance against *Blumeria graminis f.sp.* tritici in *Triticum aestivum* by RNAi-mediated *knock-down* of MLO

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The broad-band resistence (*mlo*$^-$ genotype) of *Hordeum vulgare* (barley) against the obligate biotropic fungal pathogen *Blumeria graminis* (powdery mildew) is a commonly applied mechanism of resistance in the field for over 30 years. A broad-spectrum resistance could also be confirmed in *Arabidopsis thaliana* and *Solanum lycopersicum* (tomato) by transient MLO *knock-down* experiments. The establishment of a stable *mlo*$^-$ genotype in agro-econommically important *Triticum aestivum* is neither naturally nor by artificial breeding likely due to its hexaploid genome. Naturally MLO-defective plants of *H. vulgare* show phenotypically premature leaf senescence and are slightly more sensitive to biotic and abiotic stresses which gives them disadvantages compared to WT plants. The altered phenotype of the MLO defective plants indicates a negative pleiotropic effect of MLO dysfunction. Since the interaction of *B. graminis* with its host is contended to the epidermal cell layer, the project aims at the transformation of *Mlo*-RNAi constructs underlying epidermis-specific expression in order to analyse and diminish this negative effect by spatial gene-silencing of MLO in the epidermis in *T. aestivum* leaves. To provide a high quality of the transgenic plants generated gene transfer will be mediated by *Agrobacterium tumefaciens*. For this aim binary vectors bearing a Mlo-RNAi cassette have been created under control of the epidermis-specific pGSTA1- and the constitutive Ubi- promoter. Functional analysis of the vectors were performed by TIGS (transient induced gene silencing) and transformation into barley cv. Golden Promise. Characterisation of the plants will include an analysis of the number of transgene insertions, spatial and temporal expression analysis of the RNAi construct and an analysis of the general resistance against *B. graminis* challenges. Establishment of a *T. aestivum* line bearing a stable broad-band resistance against *B. graminis* would by itself constitute an advance in plant breeding. Furthermore, such lines would be a valuable basis for more detailed studies on host-pathogen interactions as well as for research towards the general mechanisms of RNAi-mediated *gene silencing*.