Evaluation of the potential of cleistogamous flowering for a sustainable reduction of loose smut infection (*Ustilago avenae* (Pers.) Rostr.) in oats (*Avena sativa* L.)

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Loose smut caused by the pathogen *Ustilago avenae* (Pers.) Rostr. is one of the most challenging diseases in organic seed production. The seed-borne disease can be controlled by fungicide seed treatments in conventional farming. In organic oat breeding, integrating resistance genes in modern breeding germplasm is an important goal.

The pathogen's teliospores are dispersed by wind and fall into the opened flower of the host plants during flowering time. Newly formed mycel overwinters with the kernels and infects the seedlings shortly after germination. In infected plants, a 'smutted' panicle with hardly any inflorescence tissue left emerges from the culm at flowering time.

The overall goal of the project is to investigate the role of cleistogamous flowering (where the flower remains closed at flowering time) in preventing the contamination of new inflorescences. The closed hulls might function as a mechanical barrier and could reduce the amount of spores ending up in the flower.

In the project, an oat panel is phenotyped according to flowering traits (rating the degree of open flowering and rating the degree of anther retention) in multiple years and locations. The aim is to identify cleistogamous and chasmogamous phenotypes.

The oat panel consists of 540 current and historical breeding lines, with a mostly european origin. The breeding lines are also phenotyped with respect to their degree of susceptibility to loose smut. To ensure a high infection pressure, the seeds are inoculated with the pathogen's spores before sowing.

In addition, the oat panel is genotyped via genotyping-by-sequencing. Performing a genome wide association scan (GWAS) will help to elucidate the molecular basis of the flowering traits. Furthermore, the GWAS approach will be used to detect regions in the genome that possibly encode resistance genes present in the oat panel.