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Project Title: Understanding the Mechanisms Involved in Poor Control of FHB by Fungicides in Barley.

PROJECT 1 ABSTRACT

Successful production of barley with low to no FHB symptoms and DON content will require an integrated approach that includes use of fungicides and FHB resistant cultivars. Although the newest fungicides have increased effectiveness from 20-30% control to 40-60% control of the disease, there is still potential to increase fungicide effectiveness without increasing rates or number of applications. Disease control by fungicides on barley is not as effective as on wheat, and to date much of the design of fungicide application technique has relied on an inefficient empirical approach rather than a mechanistic approach. An understanding of the mechanisms involved in this poorer control would help development of spray application techniques that increase fungicide effectiveness.

In preliminary experiments, fungicide has been shown to be preferentially attracted to awns and it is unclear how much is translocated toward the tissue that is invaded by the pathogen. This and other outcomes of current spray application methods will be thoroughly studied.

Objectives of the research are to,

1. Through awn clipping treatments and the use of awn and awnless near isogenic lines, determine the impact of awns on spatial deposition of fungicides on barley heads and its interaction with disease control and DON accumulation.
2. Determine the impact of awn roughness on fungicide deposition on heads and movement of fungicides down the awn toward the kernel.
3. Determine the impact of a range of adjuvants including available encapsulants, humectants, cationic surfactants, emulsified oils and organo-silicone surfactants on fungicide deposition on awns and heads of barley and their effect on disease and DON accumulation.
4. Determine the impact of spike angle on fungicide deposition on barley heads.
5. Determine the effective distance that a fungicide droplet can inhibit *Fusarium graminearum* growth and disease development on a kernel.