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PROJECT 2 ABSTRACT
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The most effective strategy for resistance is to eliminate the pathogen during the earliest stages of infection. As a means of developing transgenic resistance, identification of genes in the fungus that direct fungal ingress will be the best targets. These genes will also be very effective targets for development of chemical control. We have identified three genes in *Fusarium graminearum* that arrest infection at the very earliest stages of infection and limit fungal growth on the plant surface. The three mutants are deficient in their ability to infect and cause disease in barley. Experimental evidence suggests that the mutations arrest fungal ingress at a very early stage, perhaps at the entrance of the infection peg into the plant. In light of these current findings, we propose the following objectives:

(1) Perform detailed histological analysis on barley plants infected with each of the mutants to identify the stage at which the ingress is halted. This will allow us to identify the most effective way to develop transgenic plants that silence these genes. That is, if these mutants do not infect past the epidermal layer, then it would be most effective for expression in the plant to be driven by a promoter that drives ample expression in the plant epidermis.
(2) Fully examine and characterize the wheat interactions with the mutants to determine if their pathogenicity on wheat is similarly compromised and to determine where infection is arrested.
(3) Develop RNAi vectors targeting these genes for expression in barley and wheat. These will be sent to the appropriate labs for transformation.

The outcome of this proposal will be to generate information that can be used to generate novel controls of disease in both barley and wheat.