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Project Title: Development of Fusarium head blight resistant transgenic plants in barley.

PROJECT 1 ABSTRACT
(1 Page Limit)

Fusarium head blight (FHB), caused primarily by *Fusarium graminearum*, has been one of the most destructive diseases of barley since the early 1990s, resulting in huge economic losses for the growers. The fungus also produces the mycotoxin, deoxynivalenol (DON), which is harmful to humans and livestock. The goal of this project is to provide additional genes for FHB resistance and low DON for breeding resistant barley cultivars. The objectives of this project are to 1. produce transgenic barley expressing an anti-toxin genes that may reduce FHB infection and DON level; 2. produce transgenic barley expressing anti-fungal genes that may reduce FHB infection; and 3. produce transgenic barley expressing both anti-toxin and anti-fungal genes. Two anti-toxin genes, modified *Tri101* and *Tri12* and one anti-fungal gene, glucanase will be used to generate transgenic barley plants. *Tri101* encodes a 3-OH trichothecene acetyltransferase from *Fusarium sporotrichioides* that converts DON to a less toxic acetylated form while *Tri12* encodes a trichothecene pump from *Fusarium sporotrichioides* that is expected to transport DON into the intracellular space. Glucanase, isolated from *Fusarium venenatum*, is a pathogen response protein, which may prevent fungal infection and spread. Glucanase hydrolyzes ß-glucan in the fungal cell wall and is believed to alter membrane permeability and/or cellular signal transduction cascades. A combination of anti-fungal and anti-toxin genes may provide transgenic plants that exhibit better resistance against fungi, preventing economic loss and reducing DON levels in barley and grain. The malting barley cultivar Conlon will be used for generating transgenic plants. This project fits in the biotechnology research area, specifically the first two priorities, to transform and test adapted barley cultivars with anti-Fusarium genes.