PI: Lynn Dahleen **PI's E-mail: Lynn.Dahleen@ARS.USDA.GOV**

Project ID: FY10-BA-003 **FY09 ARS Agreement #: NA**

Research Category: **BAR-CP** **Duration of Award: 1 Year**

Project Title: High Efficiency Method for Generating FHB-Resistant Barley: Removing Bottlenecks in the Pipeline for Deploying FHB Resistance Genes.

PROJECT 2 ABSTRACT

(1 Page Limit)

There is a pressing need for germplasm and genes that confer resistance to FHB, in wheat but even more so in barley, where there are relatively few natural sources of FHB resistance. Molecular genetic approaches allow FHB-resistance genes to be identified in other plant species, including research model plants. We have used this approach to identify a number of plant genes that contribute to effective resistance against *Fusarium graminearum.* These studies have been performed using either the model plant *Physcomitrella patens* (where genes can be stably overexpressed or knocked out by physical disruption) or wheat (where genes can be transiently suppressed through Virus Induced Gene Silencing or overexpressed in stable transgenic plants).

Our ability to exploit these effective genes in barley, as well as identify new ones has been hampered by the lack of efficient barley transformation. Here, we propose to use the super-virulent AGL1 strain of *Agrobacterium tumefaciens* to transform the barley cultivar Conlon. This strain has been shown to be highly effective by researchers to the John Innes Center (JIC) in the UK and a distinct improvement on existing biolistic methods. Based on the JIC results, we expect to introduce up to a dozen genes into barley each year. We will use this approach to introduce genes whose overexpression or suppression or deletion has been effective in boosting immunity in Physcomitrella (Lawton lab) and in wheat (Scofield lab). For these studies, we will use the most highly related barley version of genes already shown to be effective in other plants. Barley plants will be characterized for the presence and expression of the selectable marker gene and the transgene. Barley plants will be propagated, allowed to set seed and the progeny assayed for resistance to FHB in controlled and contained conditions.