

Title Biological control of Fusarium dry rot and other potato tuber diseases using *Pseudomonas fluorescens* and *Enterobacter cloacae*

Author Khalil I. Al-Mughrabi

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Abstract

Dry rot caused by various species of *Fusarium* is a disease of significant importance in potatoes. Field trials were conducted in 2005 and 2006 in New Brunswick, Canada to assess the efficacy of *Pseudomonas fluorescens* and *Enterobacter cloacae* applied as a seed treatment in suppressing Fusarium dry rot of potato (*Solanum tuberosum* L.) 'Russet Burbank' under field conditions. In 2005, the trial consisted of five treatments namely (1) non-treated, non-inoculated control; (2) non-treated control inoculated with *Fusarium sambucinum*; (3) seed inoculated with *F. sambucinum* and treated with *P. fluorescens*; (4) seed inoculated with *F. sambucinum* and treated with *E. cloacae*; and (5) seed inoculated with *F. sambucinum* and treated with the fungicide fludioxonil. In 2006, a mustard meal treatment was added. After harvest, tubers were assessed for disease severity of dry rot in addition to other tuber diseases, including silver scurf (*Helminthosporium solani*), and common scab (*Streptomyces scabiei*). In addition, tubers were graded and assessed for total yield, tuber size, tuber number, and tuber weight. Significant reduction in dry rot severity was obtained with all treatments compared to the non-treated control inoculated with *Fusarium sambucinum*. The highest dry rot reduction averaged over the two years of the study was for the fludioxonil treatment (55.7%) followed by the treatment with mustard meal (47.5%; 2006 only), *Pseudomonas fluorescens* (35%) and *Enterobacter cloacae* (26.5%). All treatments significantly reduced the severity of common scab and silver scurf compared to the non-treated, non-inoculated control. In both years, on an average, seed treated with *P. fluorescens* and *E. cloacae* produced higher total number of tubers. Both total and marketable tuber yields were significantly higher for the *E. cloacae* treatment compared to the non-treated, inoculated control. The results of this study suggest that *P. fluorescens*, *E. cloacae* and mustard meal are viable options for controlling potato tuber diseases along with fludioxonil. This is the first study to investigate the effect of these bacteria on potato diseases under field settings.