

**SUPPRESSION OF RHIZOCTONIA SOLANI BY
KODIAK®, A BACILLUS SUBTILIS
BIOCONTROL SEED TREATMENT**

**P. M. Brannen
Gustafson, Inc.
McKinney, TX**

Abstract

Cotton (*Gossypium* spp.) is generally attacked in the seedling stage by *Rhizoctonia solani*, a causal agent of damping-off and soreshin of cotton. This pathogen also causes chronic infections of the cotton plant, and infections can occur through the flowering stage. Cotton has been the first large-scale, agronomic crop treated with a biological-control agent for suppression of seedling diseases and long-term chronic diseases of the rhizosphere. The biocontrol product Kodiak® contains *Bacillus subtilis* strain GB03, and Kodiak is applied in combination with chemical-fungicide seed treatments - an integrated approach. Strain GB03 produces iturin antibiotics, and these antibiotics have strong *in vitro* activity against *R. solani*. When compared to the chemical-fungicide standard alone, moderate stand increases were initially observed in cotton fields treated with Kodiak; more substantive yield increases were observed. Root ratings indicated a possible link between a reduction in *R. solani* lesions and increased yield. Greenhouse pot tests, using sterile soil inoculated with *R. solani*, indicated that the incidence of severe lesions and plant death was reduced when Kodiak was applied. Two years of field tests at Pilot Point, TX confirmed that stand is improved by the addition of Kodiak as a seed treatment. In both years of testing, *R. solani* inoculum was applied in-furrow to increase disease pressure from this specific pathogen. Stand was increased with Kodiak application in year one ($P < 0.10$) and year two ($P < 0.05$). Subsequent yield was increased in both years, with the second year being statistically significant ($P < 0.05$). Based on this research and additional independent research, it can now be concluded that Kodiak, combined with standard chemical fungicides, does increase the stand of cotton when *R. solani* is a predominant pathogen. There is also good evidence that *R. solani* suppression partially explains yield enhancement observed when using Kodiak.