ECKHOFF, J L.A.[1] and N.W. CALLAN[2], [1]Montana St. Univ. Eastern Ag Research Center, PO Box 1350, Sidney, MT, 59270, and [2]MSU Western Ag Research Center, Corvallis, MT - Bacteria protect sugarbeet seedlings from fungal disease.

ABSTRACT

Farming practices with reduced chemical input will be necessary as EPA regulations become stricter. Biological seed treatments may be a way to protect beets not only from seedling diseases, but throughout the growing season as a population of the biological protectant develops with the developing beet. The objectives of this study were to evaluate bacterial isolates as sugarbeet seed treatments for control of pre- and post-emergence root rot and to evaluate effects of bacterial seed treatments on sugarbeet root yield and sucrose content.

Seed treatments of bacterial isolates that protected sweet corn seedlings from fungal disease were compared to treatments with metalaxyl (for Pythium control) and PCNB (for Rhizoctonia control). Biological seed treatments included bioprimming, coating seed with bacteria suspended in 1.5% methylcellulose, and vacuum infiltration of the seed with bacteria suspended in water. Controls with methylcellulose only, vacuum infiltration of distilled water, and no seed treatment were also included. Field trials were conducted in 1989 in Corvallis, and in 1990-1992 in Sidney.

Both bio-priming and coating seed with Pseudomonas aureofaciens AB254 resulted in greater seedling emergence than that of nontreated seed, but less than the metalaxyl treatment in Pythium infested soil at Corvallis in 1989, with 85% emergence from the metalaxyl treatment, 66% emergence from the AB254 treatment, and 43% emergence when seed were not treated. Seed treatment with P. aureofaciens strains AB254 and AB282 alone and in combination resulted in about 66% seedling emergence, equivalent to that from metalaxyl treatment with 70% emergence at Sidney in 1990. All had greater seedling populations than the untreated control, with 49% emergence. The metalaxyl treatment (55% emergence) resulted in greater seedling stand than those of untreated seed (36% emergence) or seed coated with the bacterial isolates (37% emergence) in 1991, but vacuum infiltration of the bacteria into the seed resulted in seedling stand (51% emergence) equivalent to that from the metalaxyl treatment. Seed treatments did not affect seedling stands in 1992. Metalaxyl treatment resulted in greater stands than the untreated control in all years but 1992, indicating that Pythium was present in the soil and causing seedling death in those years. The P. aureofaciens strains AB254 and AB282 in combination appeared to protect the emerging seedling from Pythium. Little or no difference among treatments was detected in harvest plant populations, indicating that neither the bacterial treatments nor the chemical treatments effectively protected the beet during development.

Root yields were affected only in 1990, when P. aureofaciens strains AB254 and AB282 applied together resulted in the greatest root yield. Sucrose contents were not affected by seed treatments.