

**ARTIFICIAL INOCULATION OF FIELD PLOTS
FOR EVALUATION OF SOIL FUNGICIDES
FOR COTTON SEEDLING DISEASE CONTROL**

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Abstract

In many instances in which soil fungicides are evaluated for control of cotton seedling diseases, experiments are established on naturally-infested plot areas. Frequently, unless conditions are extremely favorable for disease development, little usable information is obtained from the experiments. During 1994-96, artificial inoculation of field plots with the major seedling disease fungi *Rhizoctonia solani* and *Pythium* spp. was used in an attempt to overcome some of the variation and failures encountered with naturally-infested plots.

Inoculum of the disease fungi cultured on autoclaved oat and millet seed was shaken regularly to maintain seed as individual units of fungus mycelium. The oat and millet seed inoculum was mixed with cotton seed in planter hoppers in 1994 to deliver the inoculum at a rate to apply 1 oz of inoculum with cotton seed needed to plant 35 ft of row at a seeding rate of five seed/ft to the seed furrow during the planting operation. Seedling disease injury ranged from moderate to severe in the plots not treated with fungicides. Disease injury was much greater in the first one-third to one-half of the plot area. As planting progressed across the plot area, the inoculum (esp. on the millet seed) quickly settled to the bottom of the planter hoppers and was moved to the seed furrow. Very little inoculum was available for the last plots planted. The unequal distribution of inoculum resulted in wide variations in seedling disease severity among plots of the same treatments. Only Start 60WG (forsetyl-Al/iprodione) at 0.72 lb./acre sprayed in-furrow significantly improved stands over no treatment. Sprays of 0.48- and 0.72- lb. rates of Start 60WG and Ridomil PC 11G (metalaxyl/quintozene) granules at 7.4 lb./acre reduced skips. All treatments increased plant vigor except Start 15G granules at 4.3 lb./acre. Yields were increased significantly by in-furrow sprays of Start 60WG at two rates above and at 0.34-lb. rate. Coefficients of variation were extremely high for the data obtained in the experiment.

In 1995, seedling disease inoculum on oat seed (0.25 lb.) and cotton planting seed (2.25 lb.) were placed in planter hoppers and mixed. A premeasured amount of additional

cotton seed (175 seed to plant 35 ft of row) and oat seed inoculum of *R. solani* and *Pythium* spp. (1 oz) was added to hoppers and mixed before planting each plot. Seedling disease injury was extremely severe in the untreated plots with an average of one plant/3 ft. of row surviving six to seven weeks after planting. All soil fungicide treatments significantly improved stands, skip levels, plant vigor, and yields over no treatment. However, stands were low in treated plots. Skip levels were high, and plant vigor and yields were reduced to some extent. Treatments included Start 13G at two rates, Start 60WG at three rates, and Rovral 4SC (iprodione) + Ridomil 2EC (metalaxyl) at two rates. Uniform distribution of inoculum was obtained with similar disease development in all plots. The amount of inoculum applied was probably excessive to compare effectiveness of treatments.

A premeasured amount of cotton seed (175 seed to plant 35 ft) and seedling disease inoculum on oat seed (0.75 oz) was added to planter hoppers with cone units before planting and treating each plot to deliver inoculum to the seed furrows in 1996. Amount of inoculum used was reduced by 25 percent from 1995. All granular soil fungicide treatments in one experiment significantly improved stands, skip levels, and plant vigor; only Start 15G at 6.4 lb./acre increased yields over no treatment. Other treatments included 3.2- and 4.3-lb. rates of Start 15G, Ridomil PC 11G at 7.4 lb., and Terraclor Super X 18.8G (quintozene/etridiazole) at 7 lb./acre. In a second experiment in 1996, eight in-furrow spray treatments of soil fungicides significantly improved stands, skip levels, plant vigor, and yields over no fungicide treatment. Fungicide treatments included combinations of Rovral 50WG (iprodione) + Ridomil 2EC, Rovral 50WG + Terrazole 4EC (ethidiazole), Terraclor 2EC (quintozene) + Ridomil 2EC, and Terraclor 2EC + Terrazole 4EC at two rates each. The rate of inoculum was probably still slightly high since there was such a great difference in disease injury between fungicide-treated and untreated plots. Also, the full and one-half rates of the spray treatments were equally effective under the high level of disease pressure.

Of the three methods of artificial inoculation used in 1994-96, placement and distribution of inoculum with cone planter units is probably the simplest and least complicated. It is more precise and reproducible than the others. A lower amount of inoculum, possibly 0.5 oz for 35 ft of row instead of 1 oz, would likely give a better comparison of fungicides and rates.