2003 Sugarbeet Research and Extension Reports. Volume 34, Page 254-255

CONTROL OF EARLY-SEASON RHIZOCTONIA DISEASES BY SEED TREATMENT FUNGICIDES

Carol E. Windels and Jason R. Brantner

Professor of Plant Pathology and Research Fellow, respectively
University of Minnesota, Northwest Research & Outreach Center, Crookston, MN 56716

Rhizoctonia solani AG-2-2 (= *R. solani*) is a soilborne fungus that causes diseases on sugarbeet throughout the season. Warm, wet weather is especially favorable for infection and disease development. Depending upon when these conditions occur, *R. solani* causes seed rot, damping-off, and root rot of seedlings or root and crown rot of older plants. Rhizoctonia diseases have been increasing in sugarbeet fields in Minnesota and North Dakota in recent years, especially mid- to late-season root and crown rot. This trend is attributed to unusually wet weather and build up of inoculum by close rotations of sugarbeet with bean crops (*R. solani* AG-2-2 also causes stem rot and root rot of soybean and edible beans). *R. solani*-infested fields are potentially vulnerable to seed rot, damping-off, and root rot when soil conditions are warm and wet within 3 weeks after planting. Standard seed treatment fungicides on sugarbeet are Allegiance (= Apron, for excellent control of *Pythium* species) plus Thiram (provides modest control of *Pythium* species and *R. solani*). Thus, there is a need for more effective seed treatment fungicides to control *R. solani*.

OBJECTIVE

Our objective was to evaluate efficacy of new seed treatment fungicides for control of Rhizoctonia seed rot and damping-off caused by *Rhizoctonia solani* AG-2-2.

MATERIALS AND METHODS

The trial was established at the University of Minnesota, Northwest Research and Outreach Center, Crookston. On May 16, 2003 plots were fertilized for maximum sugar beet yield and then sown with seed of ACH 817 in two-row plots (250 seeds per 30 ft row, 22 inches between rows) with four replicates per treatment in a randomized block design. Counter (1.8 lb/A) was applied at planting to control root maggot. Microrates of herbicides were applied on May 29 and June 2 and 9. Herbicides included Betamix, UpBeet, Stinger, Select, and MSO (0.5 pint, 0.125 oz, 40 ml, 60 ml, and at least 1.5 pint/A, respectively) per application.

Before planting, soil was inoculated with the equivalent of 44.6 lb of *R. solani* inoculum/A. This inoculum was grown on sterile barley grains for 3 weeks and then air-dried. The trial included four seed treatments sown into soil infested with . *solani*: Allegiance + Thiram (A + T, commercial seed treatments), A + T + Protégé (5g), A + T + Trifloxystrobin (10g), and A + T + an in-furrow application of Quadris (0.15 oz a.i./1000 ft) over the seed at planting. A control plot was not infested with *R. solani* and was sown with seed treated with A + T. Plots were irrigated on May 28 with 24 gallons/30 ft row. All of the Rhizoctonia seed treatment products in this trial (Protégé, Quadris, Trifloxystrobin) are in the strobilurin class of fungicides (Protégé and Quadris are azoxystrobin).

Stand data were collected on May 28 and June 2, 9, and 16. Data were subjected to Analysis of Variance and if significant ($P \leq 0.05$), means were separated by Least Significant Difference.

RESULTS

Seedling stands are illustrated for 1 month (4.5 weeks) after planting in Figure 1. At 12 days after planting (May 28), there were no statistical differences among treatments but stands tended to be highest from seed treated with A + T or with A + T + Trifloxystrobin. Lowest stands occurred when Quadris was applied in-furrow over seed treated with A + T. Intermediate and equal stands were attained when seed was treated with A+ T + Protégé in *R. solani*-inoculated soil or with A + T in non-inoculated soil. On June 2 (17 days after planting) there were no statistical differences among treatments although seed treated with A+ T + Protégé reached maximum stand; seed treated with A + T and an in-furrow application of Quadris had the lowest, but steadily increasing, stand; and the other treatments were equal. On June 9 (24 days after planting) there were no statistical differences among treatments but trends in plant populations were shifting. Stands from seed treated with A + T + Protégé, A + T + Trifloxystrobin, and A + T were decreasing. These results indicate the fungicides were decomposing and residual amounts were

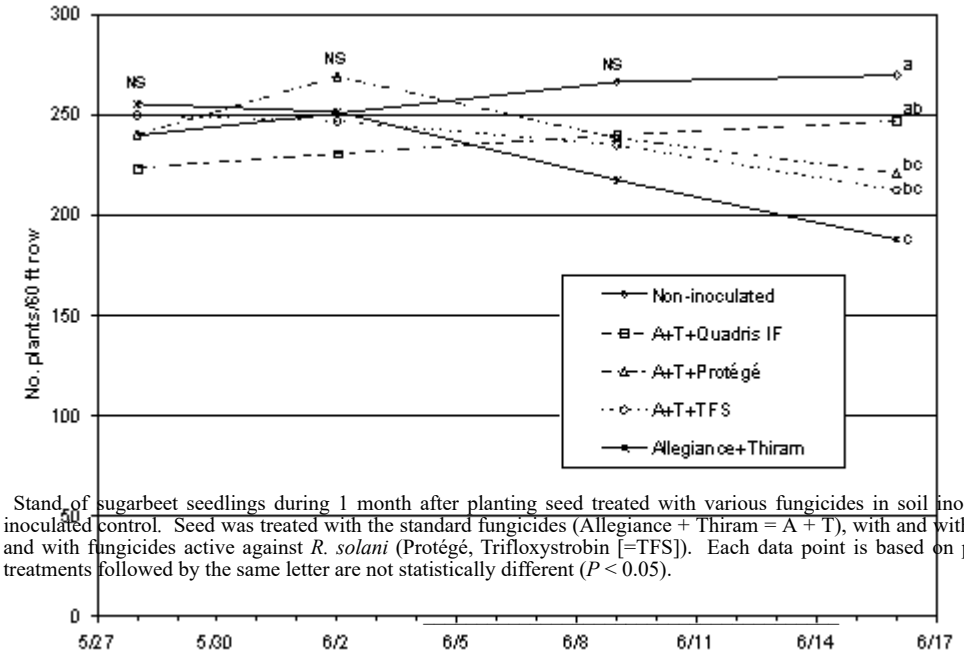

Fig. 1. Stand of sugarbeet seedlings during 1 month after planting seed treated with various fungicides in soil inoculated with *Rhizoctonia solani* and a non-inoculated control. Seed was treated with the standard fungicides (Allegiance + Thiram = A + T), with and without an in-furrow (IF) application of Quadris; and with fungicides active against *R. solani* (Protégé, Trifloxystrobin [=TFS]). Each data point is based on planting 2,000 seed. For each stand count, treatments followed by the same letter are not statistically different ($P < 0.05$).

inadequate to prevent damping-off and root rot. Stands increased for the non-inoculated control and for seed treated with A + T + in-furrow Quadris. By 31 days after planting, there were statistical differences among treatments. Stands continued to increase and were statistically similar in the non-inoculated control and from seed treated with A + T + in-furrow Quadris; were lowest from seed treated with A+ T; and were intermediate when seed was treated with A + T + Protégé or A + T + Trifloxystrobin.

DISCUSSION

Stand was lowest for seed treated with Allegiance + Thiram alone, so addition of Protégé or Trifloxystrobin provided additional benefit for a short period of time. Disease pressure from *R. solani* was higher than expected, despite moderate amounts of inoculum added to soil, and disease continued to develop. Quadris was effective in controlling *R. solani* after seed treatment products decomposed.

CONCLUSIONS

Early season stands improved slightly when Protégé- or Trifloxystrobin-treated seed were sown in soil infested with *R. solani*, but both products lost effectiveness about 2 to 3 weeks after planting.

An in-furrow application of Quadris supplemented seed treatment with Allegiance + Thiram and provided more durable control of *R. solani* than seed treatment with a strobilurin fungicide + Allegiance + Thiram.

ACKOWLEDGEMENTS

We thank Gustafson, Inc. for a grant-in-aid; the Sugarbeet Research and Education Board of Minnesota and North Dakota for partial funding; American Crystal for providing seed; Jeff Nielsen and Todd Cymbaluk, University of Minnesota, Northwest Research and Outreach Center, Crookston for planting and maintaining field plots; and Jeff Nielsen for statistical analysis.