EFFECTS OF REDUCED RISK ALTERNATIVES ON NEMATODE POPULATIONS AND CROP YIELD

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The effects of several reduced risk or biological products on nematode populations and yield of tomato were evaluated separately and in combination in Florida field trials. Plantpro™45B (Ajay North America, LLC, Powder Springs, GA), an iodine based, water-soluble compound, was evaluated in four trials as a soil treatment for control of plant parasitic nematodes. BioYield™ (Gustafson LLC, Plano, TX), a formulation of the plant growth promoting rhizobacteria (PGPR) *Paenobacillus macerans* and *Bacillus amyloliquefaciens,* and DiTera® ES (Valent Biosciences, Long Grove, IL), a concentrated killed fermentation beer of the fungus *Myrothecium verrucaria,* were evaluated as transplant mix amendments. BioYield was developed specifically as a transplant mix amendment while DiTera was developed for soil application. However, results using DiTera in soil have been variable and alternative application methodologies are being investigated. It was thought that these two biological products would interact favorably in the transplant system to improve plant growth. Both BioYield and DiTera were tested alone and in combination with each other and with Plantpro45B as a soil treatment in field trials.

Field Trial Locations: 1) Scott and Long Farm, Lake Jem, FL, 2) University of Florida/IFAS Suwannee Valley Research and Education Center, Live Oak, FL, and 3) Uniroyal Chemical Co., Florida Research Farm, Sanford, FL. The Lake Jem and Live Oak experiments were part of the Spring 2000 IR-4 Methyl Bromide Alternatives Research trials investigating pre-plant alternatives for soil fumigation in tomatoes. Plantpro was evaluated at all three sites while BioYield and DiTera were evaluated at the Sanford site. In general, soil at these sites was infested with moderate-high populations of parasitic nematodes including species of *Meloidogyne, Tylenchus, Xiphinema, Pratylenchus, Criconemella, Belonolaimus, Hoplolaimus, Helicotylenchus, Longidorus,* and moderate to high populations of soilborne pathogens including species of *Fusarium, Rhizoctonia, Phytophthora,*and *Ralstonia solanacearum*.

Treatment Application: Plantpro was applied 7-14 days prior to planting at rates ranging from 60-120 ppm. Treatments were applied through two drip irrigation lines placed 6 inches to either side of a single plant row. Drip tape emitters were spaced at 4 in. Postplant applications of Plantpro at 80 ppm were made from 21-35 days after planting (DAP). BioYield was tested at two concentrations (1:40 and 1:100 v/v) as batch-mixes with Speedling Peat Lite planting mix prior to placing into Speedling flats. DiTera was applied as a drench to tranplants in Speedling flats twelve hours before planting at 1.25 g/L (50 lbs a.i./acre) and allowed to drain for 2-6 hr before transplanting into the field.

Experimental design: Experiments contained four replications arranged in a randomized block design. Three field trials evaluating Plantpro had plots consisting of 75 ft row with 50 plants spaced at 18 in. Plots in experiments evaluating BioYield and DiTera were 20 ft. long with plants spaced at 18 in. Tomato var. Asgrown 47 was grown in Lake Jem and Live Oak, while variety Solar Set was grown in the Sanford trials. Data were subjected to analyses of variance, mean separation and correlation procedures.

Results: Plantpro reduced parasitic nematode populations to levels comparable to that of methyl bromide in Lake Jem at 10 and 45 and 63 DAP while increasing numbers of nonparasitic nematodes at Lake Jem, Live Oak and Sanford test sites. This indicates that Plantpro had a minimal effect on the populations of beneficial soil microorganisms. Plantpro treatments were comparable to methyl bromide in controlling disease caused by root-knot nematodes at 21 DAP at Lake Jem. Both methyl bromide and Plantpro failed to control parasitic nematodes compared to the untreated control at the Live Oak test site. Total yield of tomato from Plantpro treated plots at the Sanford site was equivalent to that of methyl bromide treated plots and both of these treatments were significantly (2200 – 2500 lbs/acre) higher than the untreated controls. Yield data from the two IR-4 field trials in Lake Jem and Live Oak are not yet available.

BioYield + DiTera had significantly healthier roots than the untreated control or DiTera alone although there were no differences in root weight, top weight or gall rate among treatments. Neither of these biological transplant amendments effected nematode populations in the soil. However, the combination treatment of BioYield and DiTera resulted in a 2000 lb/acre yield increase over the untreated transplants and a 500 lb/acre or more increase over either treatment alone. The effects of these treatments appear to be primarily on the host plant. Yield was increased with the biological treatments to the greatest extent when combined with methyl bromide or Plantpro and to the least extent in untreated soil. These data support previous results indicating the ability of biological transplant amendments, BioYield in particular, to increase yield of tomato pepper, and strawberry. Yield increases are greatest in combination with effective soil treatments.

Conclusions: Plantpro has potential as a methyl bromide alternative for root-knot nematode control on tomato in Florida. Application of Plantpro through drip irrigation is effective but may not be practical under all growing conditions, and studies are underway on additional application methodologies. However, application at reduced rates through drip irrigation after planting does provide flexibility in controlling plant parasitic nematodes and other soilborne pathogens as needed during the growing season. Biological products such as BioYield and DiTera can be effectively delivered in the transplant mix and result in significant yield increases. The combination of BioYield amended transplants with alternative reduced-risk chemicals, such as Plantpro and DiTera, has potential to mitigate yield losses encountered by growers due to the loss of methyl bromide. These treatments will also preserve the integrity of beneficial soil microorganisms.

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