EFFECT OF PREPLANT SOLARIZATION ON RING NEMATODE IN A PEACH TREE SHORT LIFE SITE

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Soil solarization, alone or in combination with other disease management practices, has been shown to be effective in reducing the inoculum density of many soilborne disease causing organisms (Stapleton and Devay, 1986). Solarization also affects the indigenous microbial activity which ultimately result in soil suppressiveness and(or) increased antagonistic activity. This special mulching process, which causes hydrothermal disinfestation and other biological and physical changes to the soil, has also been shown to be beneficial to plant growth and health. In California, it was further demonstrated that nematode population densities were suppressed more when soils were preplant fumigated with 1,3-dichloropropene (1,3-D) in combination with soil solarization than either treatment alone. Other beneficial effects of solarization include the reduction of competitive thermotolerant populations of resident bacteria and fungi in favor of less competitive antagonistic bacteria that were introduced into the soil following treatment (Gamliel and Katan, 1991).

Materials and Methods

In 1995, a field study was initiated at the USDA-ARS station in Byron, Georgia to determine if the pairing of solarization with the subsequent introduction of a bacterial antagonist [*Pseudomonas aureofaciens* (BG33)] increases the potential for management of the ring nematode (*Criconemella xenoplax*) and prevention of peach tree short life (PTSL) tree death. Plots consisted of four treatments: 1) solarized soil alone; 2) solarized soil + BG33; 3) nonsolarized soil; and 4) nonsolarized soil + BG33. Treatment plots were replicated nine times in a randomized complete block design. Each treatment plot consisted of six trees with all data taken from the four center trees. Bacteria were applied to peach roots and soil of 108 trees at time of planting in February 1996, following soil solarization the previous summer. Bacteria were applied again to the rhizosphere orchard soil in the fall 1996. Nematode population dynamics were monitored every 3 months, whereas tree growth, as measured by trunk circumference, is determined in late winter each year.

Results and Conclusions

As shown by analysis of fatty acids extracted directly from soil, the native microbial community was significantly affected both quantitatively and qualitatively by solarization. This alteration of the microbial community effectively reduced the competitive stress on the introduced bacteria BG33 in the solarized plots, which was not observed in the nonsolarized plots. There appeared to be a positive synergistic effect between soil solarization and the biocontrol agent BG33 in the control of the ring nematode population. The initial population density of *C. xenoplax* at planting in February 1996 (post solarization) was lower ($P \leq 0.05$) in both solarized treatment plots as compared with the nonsolarized. Subsequent nematode sampling indicated a similar trend until June 1998, when no significant differences among

treatments was detected. No differences in tree growth were detected among any of the treatments in 1997 and 1998.

In summary, preplant soil solarization is effective in lowering the population density of the ring nematode near economic threshold levels

on a PTSL site for up to 2 years. In these same solarized plots the soilborne microbial community was both quantitatively and qualitatively altered for at least 11 months post solarization. Both of these results are similar to those obtained by others with soil treated with methyl bromide. This study is still in progress.

References Cited

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