BIOFUMIGATION AND MANAGEMENT OF RING NEMATODE ON PEACH

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Biofumigation is a non-chemical approach to control nematodes, weeds, and various diseases by planting crops which produce toxic breakdown products upon decomposition. Some potential green manure crops include rape seed, barley, sudangrass, and velvetbean. In addition to managing soil-borne pests, biofumigation has also been shown to improve soil chemical, physical, and biological characteristics.

The ring nematode, *Mesocriconema xenoplax*, causes peach trees to be more susceptible to peach tree short life disease (PTSL), specifically cold injury and/or bacterial canker (*Pseudomonas syringae*), and is widespread throughout the major peach producing areas of Georgia and South Carolina. Tree losses due to this nematode-associated disease has generated a growing awareness that suitable alternatives to presently registered nematicides have not been developed for peach and need to be explored. Rootstock resistance, crop rotation, and nematode suppressive groundcovers are some key research areas being investigated at our location and have been reported on at past MBAO conferences. The objective of this study was to determine if incorporating sorghum as a preplant biofumigant green manure would contribute to improved nematode control, tree growth, and survival on a PTSL site. To ensure reproducible conditions for this study, a grain sorghum variety known to suppress ring nematode under greenhouse and field conditions was used.

The experiment was initiated at the USDA, ARS Southeastern Fruit and Tree Nut Research Laboratory in Byron, Georgia. The study was conducted on a Faceville sandy loam soil with a previous history of PTSL. The site had no previous history of sorghum production. The test site was subsoiled, disked, and rotovated before planting sorghum. Plots consisted of five preplant treatments: i) sorghum as a green manure under plastic; ii) sorghum as a green manure w/o plastic; iii) preplant methyl bromide fumigation under plastic; iv) unfumigated soil under plastic; and v) unfumigated soil w/o plastic. The sorghum was incorporated into the soil with a rototiller following flail mowing. The experimental design is a randomized complete block with treatments being replicated six times. An estimate of the Pi of *M. xenoplax* was determined prior to methyl bromide application and incorporation of sorghum into the soil in September 1998. All plots were planted to 'Goldprince' peach on Nemaguard rootstock in January 1999. Nematode population densities were also determined approximately every three months after planting peaches beginning in September 1999.

Results to date indicate that 1) the ring nematode populations did not differ among the five treatment plots prior to application of experimental treatments; 2) at four months after incorporation of the sorghum green manure into the soil and application of methyl bromide, but prior to planting peach trees, ring nematode populations were greatest ($P \leq 0.05$) in the unfumigated soil than in sorghum green manure under plastic, sorghum green manure w/o plastic, and methyl bromide fumigated plots; 3) no differences in ring nematode populations were detected among the unfumigated and sorghum plots at 12 months after incorporation of sorghum green manure into the soil; and 4) at 24 months after methyl bromide application, the nematode population density in fumigated plots did not differ from those in the unfumigated and sorghum plots. Peach trees have developed typical PTSL symptoms and died during the experiment. No differences in PTSL tree survival among treatments have been detected to date.

In summary (to date), the use of this grain sorghum as a preplant biofumigant to manage ring nematode on peach does not seem to be a feasible alternative to methyl bromide fumigation at this time. Although, there was some indication of nematode suppression by the sorghum green manure in the early stages of the experiment, it did not last as long as methyl bromide fumigation (i.e., 12 months vs. 24 months, respectively). This study is still ongoing and additional sorghum “silage” and sudangrass cultivars are being evaluated for their efficacy against ring and root-knot nematodes.