BAHIAGRASS FOR THE MANAGEMENT OF RING NEMATODE IN PEACH

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Past research has demonstrated that peach trees tend to grow better and survive longer in cooler environments such as West Virginia when planted into killed fescue middles. Unfortunately, most fescue sods are not well adapted to our warm climate in the lower elevations of the southeastern United States. Grasses that do adapt well to warm climates and are cold tolerant include certain bahiagrasses, such as Pensacola and Tifton-9. Greenhouse studies have indicated that Pensacola and Tifton-9 bahiagrass are poor hosts to the ring nematode, Criconemella xenoplax. This nematode 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 loss 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 different types of bahiagrass, planted as a preplant nematode management system, would contribute to improved peach tree growth and survival on a PTSL site.

Materials and Methods Phase 1 (Preplant Groundcover Establishment). Briefly, this phase of the experiment was initiated in November 1991 in an orchard known to be infested with C. xenoplax and having a long history of PTSL. The orchard was planted to Redhaven on Nemaguard rootstock at a tree spacing of 4.9 m x 6.1 m in January 1992. Plots consisted of four groundcover management systems that were maintained over the entire orchard floor, which included: 1) Pensacola bahiagrass, 2) Tifton-9 bahiagrass, 3) Stacy winter wheat, and 4) natural weeds (control). Wheat plots had to be replanted every fall. Groundcover treatments were established in blocks (24.4 m x 3.1 m) between tree rows, except the herbicide-strip area (1.5 m) on either side of the tree row. Treatments were arranged in a randomized complete block design with six replications, except the natural weed plots which had 12 replications. Nematode population densities were determined on 1 April 1992, 2 December 1992, 3 July 1993, 2 December 1993, and 21 June 1994.

Phase 2 (orchard Establishment). In September 1994, glyphosate was applied to all groundcover plots and at which time all peach trees were removed. In November 1994, half the natural weed plots were preplant fumigated with methyl bromide. In January 1995, Goldprince on Nemaguard rootstock was planted into killed bahiagrass sod, wheat, and fumigated and unfumigated plots at the same spacing described above. Nematode population densities were determined on 6 December 1994 (preplant), 14 December 1995, 8 April 1996, 10 December 1996, and I April 1997. Tree trunk diameters were measured on 6 February 1996 and 26 February 1997. Tree mortality resulting from PTSL was recorded on 23 April 1996 and 17 April 1997. -

Results and Conclusions Phase 1. The mean preplant population density of C. xenoplax for six replications in Phase 1 was 108 + 48 nematodes/100 cm3 soil. The population density of C. *xenoplax* decreased in all groundcover treatments during the 3-year-period while the various groundcovers were in place (Table 1). However, the population density of C. *xenoplax* increased under peach trees adjacent to the groundcover treatments.

Phase 2, The resurgence of the ring nematode population density was detected over time as one would expect. In December 1995, the ring nematode population density was greatest ($P = 0.10$) in the unfumigated plots and lowest in the plots fumigated with methyl bromide (Table 2). Furthermore, there were no differences among the three groundcover plots or between the three groundcover plots and the fumigated or unfumigated plots. In April 1996, ring nematode population density was still greatest ($P \leq 0.05$) in the unfumigated plots as compared to all other treatments. There was no difference among the three groundcover treatments or between the groundcover and fumigated plots. Fumigation collapsed two years after application, as evidenced by no difference in nematode population density among any of the treatments in December 1996 and April 1997. In 1996, tree growth was greatest ($P \leq 0.05$) in fumigated and Pensacola bahiagrass plots, intermediate in wheat and Tifton-9 bahiagrass plots, and lowest in the unfumigated (Table 3). Trees growing in fumigated and Pensacola and Tifton-9 bahiagrass plots were larger than trees in wheat and unfumigated plots by February 1997. No differences in tree growth were detected among fumigated, Pensacola bahiagrass, and Tifton-9 bahiagrass plots or between the wheat and unfumigated plots. Percentage of tree survival from PTSL was greatest ($P \leq 0.05$) for trees growing in wheat and fumigated plots as compared to unfumigated plots in 1996. Percentage of trees growing in either bahiagrass plot did not survive any better than trees in the unfumigated plots. No differences in tree survival were detected between trees grown in Stacy wheat plots or soil preplant fumigated with methyl bromide. In April 1997, a greater ($P = 0.10$) percentage of trees planted in wheat plots survived PTSL tree death as compared to trees in Pensacola bahiagrass and unfumigated plots.

In summary, peach trees grew better in killed Pensacola or Tifton-9 bahiagrass sod middles than in wheat or the unfumigated plots. However, neither bahiagrass was as effective as preplant methyl bromide fumigation or wheat in increasing tree survival from PTSL disease complex.

Table 1. Effect of four different groundcover systems and peach on the population density of *Criconemella xenoplax.*

Number of *C. xenoplax* per 100 cm^3 soil

Treatment	2 Dec. 1992	7 July 1993	2 Dec. 1993	21 June 1994
Pensacola bahiagrass	0	0	5	0
Tifton-9 bahiagrass	0	0	8	0
Wheat	10	3	0	5
Weeds	8	0	0	0
Peach	24	39	36	795

Data are means of six replicates, except for peach which had seven replicates and weeds which had 12 replicates.

Table 2. Population density of *Criconemella xenoplax* on peach planted into soil previously established in four groundcover systems (1991-94) and compared to preplant fumigation with methyl bromide[x]

Number Of *C. xenoplax* per 100 cm^3 soil

Treatment	14 Dec. 1995	8 April 1996	10 Dec. 1996	1 April 1997
Unfumigated (weeds)	43 a[y]	268 a[z]	168 a[z]	1509 a[z]
Pensacola bahiagrass	25 ab	95 b	523 a	1993 a
Tifton-9 bahiagrass	8 ab	30 b	455 a	1901 a
Wheat	38 ab	40 b	388 a	1411 a
Fumigated (weeds)	3 b	15 b	350 a	2638 a

[x]Data are means of six replicates.
[y]Means within a column followed by the-same letter are not different according to LSD (P = 0.10).
[z]Means within a column followed by the same letter are not different according to LSD (P _e, 0.05).

Table 3. Peach tree growth and percentage PTSL tree survival as influenced by four groundcover systems and preplant fumigation with methyl bromide[x]

	Trunk diameter (mm)		% PTSL tree survival	
Treatment	6 Feb. 1996	26 Feb. 1997		23 Apr. 1996
Fumigated (weeds)	22.6 a[y]	49.4 a[y]	87 a[y]	46 ab[z]
Wheat	19.0 b	40.5 b	87 a	54 a
Tifton-9 bahiagrass	20.0 b	48.6 a	63 ab	25 ab
Pensacola bahiagrass	22.6 a	53.2 a	63 ab	24 b
Unfumigated (weeds)	15.1 c	39.7 b	46 b	21 b

[x]Data are means of six replicates.
[y]Means within a column followed by the same letter are not different according
to LSD (P s 0.05).
[z]Means within a column followed by the same letter are not different according to LSD (P = 0.10).