Preplanting Bahia Grass or Wheat Compared for Controlling *Mesocriconema xenoplax* and Short Life in a Young Peach Orchard

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ABSTRACT

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The effects of four preplant ground cover systems as alternatives to chemical control of *Mesocriconema xenoplax* were investigated from 1991 to 1998. Ground cover establishment was initiated in 1991 in an orchard known to be infested with *M. xenoplax* and having a history of peach tree short life (PTSL). Ground cover systems included (i) Pensacola bahia grass, (ii) Tifton 9 bahia grass, (iii) winter wheat (*Triticum aestivum* 'Stacy'), and (iv) naturally occurring weeds that were maintained over the entire orchard floor. Ground cover evaluation was initiated in 1994, when herbicide was applied to the ground cover plots and half the weed plots were fumigated with methyl bromide. Peach trees were planted into all plots in 1995. Fumigation effect on *M. xenoplax* population density collapsed 25 months after application. Young peach trees grew faster for the first 13 months in killed Pensacola bahia grass sod and fumigated soil, intermediate in Tifton 9 bahia grass and wheat plots, and slowest in unfumigated weed plots. By the end of the experiment, tree growth was greatest in Pensacola bahia grass killed sod and least in the unfumigated weed plots. Preplant wheat was as effective as fallow for 3 years plus a preplant methyl bromide fumigation in increasing tree survival from PTSL.

Additional keywords: cultural control, ground cover, *Paspalum notatum*, *Prunus persica*, ring nematode, *Triticum aestivum*

Ring nematodes (*Mesocriconema* spp.) are widely distributed throughout the world, with certain species considered to be economically important to the stone fruit industry (12). Probably the most studied ring nematode species on *Prunus* spp. is *M. xenoplax* (Raski) Loof & de Grisse (= *C. xenoplax* (Raski) Luc & Raski). *M. xenoplax* is the only plant-parasitic nematode that has been associated with the peach tree short life (PTSL) complex in the southeastern United States (3,17). Tree loss due to PTSL varies from year to year. In an 8-year tree death survey (1991 to 1998) in South Carolina, a total loss in potential income to growers from PTSL was estimated at \$105 million, which represents over \$5 million per year (R. W. Miller, *personal communication*). Preplant nematicides for ring nematode control are available in the Southeast (16), but growers would prefer alternatives to chemical control that are less hazardous to

human beings, cheaper, and more environmentally safe. Research on alternatives to conventional nematicide application have concentrated in recent years on crop rotation, rootstock resistance, and nematode suppressive ground covers. Preplant rotation with bahia grass (*Paspalum notatum* Flugge) ground cover has proven beneficial in the suppression of plant-parasitic nematodes (i.e., *M. incognita* and *M. arenaria*), which resulted in increased yields of certain agronomic (5,20,22) and vegetable (25) crops. Bahia grass is reported to be a nonhost to *M. arenaria* (5,19,21). Bahia grass also did not sustain populations of *M. xenoplax* after 4 months in the greenhouse (28). Furthermore, the population density of *M. xenoplax* was suppressed following a 6-year preplant rotation with cv. Paraguayan-22 bahia grass in southern Georgia (6). Additionally, it was reported that PTSL tree survival was greater when trees in the newly established orchard were planted in killed bahia grass sod as compared to trees planted in previous peach tree rows.

Bahia grass is a perennial warm season grass grown widely in the southeastern United States for hay production, erosion control, and grazing (9). Several cultivars have been introduced into the United States since 1913 and differ in cold tolerance. In Georgia, 80% of the peach acreage is located in the central part of the state;

therefore, a cold-hardy bahia grass cultivar, such as Pensacola or Tifton 9, would be required. Tifton 9 is an improved cultivar of Pensacola, which has more seedling vigor, a more upright growth habit, and produces more forage (9). Our objectives were to evaluate the potential of Pensacola and Tifton 9 bahia grass as a preplant management strategy in suppressing the population density of *M. xenoplax* and to determine the influence of a long-term preplant bahia grass rotation has on peach tree growth and incidence of PTSL.

MATERIALS AND METHODS

Greenhouse evaluation. Pensacola and Tifton 9 bahia grass were evaluated for host susceptibility to *M. xenoplax* in the greenhouse. Approximately 2-week-old Nemaguard peach (*Prunus persica* L. Batsch) seedlings or one germinated bahia grass, nimblewill (*Muhlenbergia schreberi* J. Gmelin), or 4-day-old wheat (*Triticum aestivum* L. emend. Thell cv. Stacy) seed were planted singly in 15-cm-diameter plastic pots containing 1,500 cm³ of steam-pasteurized loamy sand (86% sand, 10% silt, 4% clay, pH 6.1, 0.54% organic matter) in May 1992. A susceptible peach cultivar, Nemaguard (1), was used to verify nematode infectivity, whereas wheat (13) and nimblewill (11) were used to verify *Mesocriconema xenoplax* suppression. Approximately 7 days later, the soil in each pot was infested with 2,000 *M. xenoplax* adults and juveniles in 40 ml of water (13). The nematode isolate was obtained from an orchard previously diagnosed as a PTSL site in Byron, GA, and cultured on Nemaguard peach in the greenhouse. Nematodes were extracted from the soil medium by centrifugal flotation (8). Ten replications of each plant species and five replications of fallow were arranged in randomized complete blocks on benches in an air-conditioned greenhouse (27 ± 5°C). Plants were watered as needed and fertilized every 2 weeks (15). Approximately 6 months after soil infestation, all test treatments were harvested and nematodes extracted from a 100-cm³ soil subsample with a semi-automatic elutriator (4) and centrifugal flotation (8). The nematode reproduction factor (Rf = final population density [Pf] of all life stages divided by initial population density [Pi]) was calculated as a measure of host susceptibility among the different plant treatments. Test hosts were grouped

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into three classifications based on the nematode Rf rating, as follows: nonhost, Rf = 0; poor host, Rf = 0.01 to 0.99; and suitable host, Rf $\geq$ 1. The experiment was repeated once.

Ground cover establishment. Pensacola and Tifton 9 bahia grass and Stacy wheat were compared with naturally occurring weeds in a ground cover experiment designed to investigate the effect of preplant rotation on *M. xenoplax*. As in the greenhouse experiment, Stacy wheat was included because it is a known poor host of *M. xenoplax* (13). Nimblewill was not included because this perennial grass is very difficult to establish in sandy soils in warmer peach production areas such as Georgia and South Carolina (18).

The experiment was initiated in November 1991 at the United States Department of Agriculture-Agricultural Research Service Southeastern Fruit and Tree Nut Research Laboratory in Byron, GA. The study was conducted on a Faceville sandy loam soil (pH 5.3) with a previous history of PTSL. Peach trees had been growing on this site since 1983 and were removed in September 1991. The site had no previous history of bahia grass or small grain production. Dolomitic limestone was broadcast (2,242 kg/ha) over the site in October 1991 to increase the soil pH to 6.0. The test site was subsoiled, disked, and rotovated before wheat or bahia grass planting in December 1991 and April 1992, respectively, and rotovated when wheat plots were established in subsequent years. Plots consisted of four preplant ground cover treatments, as follows: (i) winter wheat-fallow rotation, (ii) Pensacola bahia grass, (iii) Tifton 9 bahia grass, or (iv) naturally occurring weeds which served as the control. Plot size was 24.4 by 3.1 m. Treatments were arranged in a randomized complete block design with 6 replications, except the naturally occurring weed plots, which had 12 replications. Care was taken not to transport soil among the plots throughout the study. Stacy wheat was planted at a seeding rate of 135 kg/ha with a Vicon Super Flow fertilizer spreader with a broadcasting spreading spout on 9 December 1991, 14 December 1992, and 27 October 1993. Wheat was harvested with a sickle bar, excess straw was removed, and the remaining stubble was incorporated into the soil with a rotovator prior to replanting the following fall. Pensacola and Tifton-9 bahia grass were planted at a seeding rate of 33.6 and 22.5 kg/ha, respectively, using a Republic EZ broadcast spreader on 14 April 1992 and amended on 27 August 1992. In January 1992, a border row of cv. Redhaven on Nemaguard peach rootstock was planted at a spacing of 4.9 by 6.1 m that paralleled the ground cover plots on both sides. A herbicide strip area (1.5 m) was also maintained on either side of the tree row. These trees were only used to assist in monitoring the resurgence of

the *M. xenoplax* soil population density in the orchard plot because Nemaguard peach rootstock is a good host of *M. xenoplax*. However, these trees were not used in the statistical comparison among the different ground cover treatments. All bahia grass, wheat, and peach trees received annual applications of selected fertilizers and herbicides as recommended by the Georgia Cooperative Extension Service for the respective crops (2,7,9,24). Fertilizer was applied to the wheat-fallow plots at 450 kg/ha as 5-10-15 (N-P-K) at planting and top-dressed with N as ammonium nitrate (34-0-0) at 67 kg/ha in the spring. Fertilizer was applied to the bahia grass plots at 361 kg/ha as 10-10-10 (N-P-K) at planting followed by annual applications with N as 10-10-10 at 45 kg/ha. Fertility rates for peach trees were according to the schedule outlined for nonbearing trees using 10-10-10 and 34-0-0 (7). Weeds in the naturally occurring weed plots were controlled initially with glyphosate (4.49 kg a.i./ha) at plot establishment in an effort to synchronize the age of the naturally occurring weed population with the other ground covers. If necessary, volunteer weed vegetation in wheat-fallow plots was eliminated with glyphosate (4.49 kg a.i./ha) before wheat was planted. Paraquat (0.78 kg a.i./ha), oryzalin (4.5 kg a.i./ha), and glyphosate (4.49 kg a.i./ha) were used to control weeds in peach plots.

An estimate of the Pi of *M. xenoplax* was determined on 1 April 1992 from 10 soil cores (2.5 cm in diameter by 30 cm deep) collected within each replicate throughout the test site. Nematode population densities also were determined on 2 December 1992, 7 July and 2 December 1993, and 21 June 1994 from eight soil cores collected arbitrarily throughout each ground cover plot. For *M. xenoplax* monitoring purposes, one soil core was collected from within the drip line of every third tree of each of seven adjacent peach rows. The soil cores were composited by plot within each replicate or tree row and the nematodes were extracted as described for greenhouse evaluation of bahia grass cultivars and counted.

Ground cover evaluation. In September 1994, vegetation in all preplant ground cover plots was eliminated with glyphosate (4.49 kg a.i./ha). Peach trees growing adjacent to the ground cover plots were also removed at this time. Half of the naturally occurring weed plots were then rotovated in October 1994 in preparation for preplant fumigation with methyl bromide. Methyl bromide (98% methyl bromide, 2% chloropicrin) was applied (Hendrix & Dail, Inc., Tifton, GA) in a strip (3.1 m wide) under plastic (483 kg/ha) on 9 November 1994, and the plastic removed from plots on 2 December 1994. Soil conditions at the time of treatment were such that the maximum and minimum temperatures were 21 and 15°C at the 10-cm depth and

19 and 16°C at the 20-cm depth. Soil moisture (10- to 15-cm depth) was adequate. The soil, when compressed in the hand, formed a ball that was easily broken with little disturbance. All plots were planted with cv. Goldprince on Nemaguard rootstock at a tree spacing of 4.9 by 6.1 m in January 1995. Each ground cover plot had six trees, the outer two of which served as borders with the four center trees as the experimental unit. Treatments were replicated six times in randomized complete blocks. All trees received annual applications of fertilizer (10-10-10 and 34-0-0 N-P-K), insecticides, fungicides, and herbicides as recommended by the Georgia Cooperative Extension Service. All rates were according to the schedule outlined for nonbearing and bearing trees (2,7).

Population density of *M. xenoplax*, prior to replanting the ground cover plots back to peach, was determined on 6 December 1994 from eight soil cores collected from within each replicate throughout the test site. *M. xenoplax* population density also was determined on 14 December 1995, 8 April and 10 December 1996, 1 April and 11 December 1997, and 26 March 1998 from one soil core collected within the drip line of each of four test trees of each experimental unit. The four soil cores were composited and nematodes were extracted from a 100-cm³ subsample as described for greenhouse evaluation trial.

Beginning in 1996, trees were pruned in December to enhance the onset of peach tree short life (26). Trunk diameters were measured at 20.3 cm above the soil surface on 6 February 1996, 26 February 1997, and 10 February 1998. Tree mortality as a result of bacterial canker infection or cold injury was recorded on 23 April 1996, 17 April 1997, and 27 April 1998 to monitor PTSL in the site.

Statistics. Nematode data were subjected to analysis of variance with the general linear models (GLM) procedure of SAS (SAS Institute, Cary, NC). For the greenhouse tests, appropriate preplanned single degree-of-freedom comparisons were used to detect differences among treatment means as follows: Nemaguard peach versus combined bahia grass cultivars, peach versus wheat, peach versus nimblewill, and peach versus fallow means following a significant *F* test. Means within a plant species were analyzed using analysis of variance (ANOVA). For the ground cover establishment test, appropriate preplanned single degree-of-freedom comparisons were used to detect differences among treatment means as follows: weeds versus combined bahia grass cultivars and weeds versus wheat means following a significant *F* test. Means within a plant species were analyzed using ANOVA. For the ground cover evaluation test, nematode population and trunk diameter means were compared according to Fisher's protected least significant differ-

ence test following a significant *F* test. The proportion of peach tree survival within each experimental unit for the ground cover and preplant methyl bromide soil fumigation treatments was analyzed for each sampling date with ANOVA. Only significant differences ($P \leq 0.05$) will be discussed unless stated otherwise.

RESULTS AND DISCUSSION

Greenhouse evaluation. In both tests, Nemaguard peach supported greater reproduction and higher populations of *M. xenoplax* than the bahia grass cultivars, Stacy wheat, nimblewill grass, and fallow soil treatments (Table 1). Furthermore, both bahia grass cultivars were rated poor hosts ($Rf = > 0 \leq 0.99$) of *M. xenoplax*, as were the two standards, Stacy wheat and nimblewill grass. No nematodes were detected in the fallow soil treatment and no differences in nematode reproduction were detected between Pensacola and Tifton 9 bahia grass in either test.

Ground cover establishment. The mean initial population density of *M. xenoplax* for six replications was 108 nematodes per 100 cm³ of soil (range 15 to 150), which indicated that the ring nematode was present throughout the test site. On all sampling dates, weedy plots did not support greater numbers of *M. xenoplax* than the bahia grass cultivars or Stacy wheat-fallow rotation (Table 2). One explanation for the small population increases of *M. xenoplax* in the naturally occurring weed plots is due to the presence of such weed hosts as purslane (*Portulaca oleracea* L.) and Carolina geranium (*Geranium carolinianum* L.). Both of these weed plants have been shown to be poor hosts of *M. xenoplax* (28). As in the greenhouse tests, no differences in *M. xenoplax* population density were detected between the two bahia grass cultivars on any sampling date. Furthermore, no *M. xenoplax* was detected in either of the bahia grass cultivar plots on three out of four sampling dates, thus substantiating our greenhouse results and those of others (28) that bahia grass is a poor host to this ring nematode species. Our results also substantiate the effectiveness of preplanting wheat as a nonchemical management strategy to reduce the population density of *M. xenoplax* prior to planting peach (13,14). Wheat is a poor host to *M. xenoplax*; therefore, this would help explain its effectiveness in lowering the nematode population over time. Furthermore, some wheat cultivars are capable of suppressing certain weed species under field conditions (10) that also may serve as alternative hosts that support this nematode in the absence of peach.

Even though the ring nematode population density in any of the ground cover test plots did not exceed 11 *M. xenoplax* per 100 cm³ of soil on any sampling date, this was not the case with the peach tree rows

adjacent to the ground cover plots. As mentioned earlier, the peach rows located on either side of the ground cover test plots were only used to monitor the resurgence in the *M. xenoplax* population because Nemaguard rootstock is a good host. During the first three sampling periods (2 December 1992, 7 July and 2 December 1993), populations of *M. xenoplax* on peach were 24, 39, and 36 nematodes per 100 cm³ of soil, respectively (Table 2). This is not surprising because it usually takes two to three years for the nematode population to reestablish itself following tree planting. Disturbance of the soil ecosystem and lack of a continuous food source following removal of older peach trees could help explain this phenomenon of low nematode population. However, 26 months after planting (21 June 1994), the nematode population density in the peach rows increased to 795 *M. xenoplax* per 100 cm³ of soil, providing further evidence that the population of *M. xenoplax* was still viable throughout the test site and that the ground cover species were poor hosts to this nematode.

Ground cover evaluation. In December 1994, the nematode population density following establishment of the methyl bromide fumigation plots, but prior to replanting peach trees, was greater ($P \leq 0.05$) in the untreated weed plots than in both bahia grass cultivars, wheat, or fumigated plots (Table 3). No differences in *M. xenoplax* populations were detected among the bahia grass, wheat, or fumigated plots. Eleven months (December 1995) after planting peach trees into all ground cover and fumigated plots, nematode populations were greatest in the weed plots, intermediate in Tifton 9 bahia grass, and lowest in the fumigated plots. In April 1996 (15 months after orchard establishment), the *M. xenoplax* population density in the weedy plots increased sixfold following the December 1995 sampling date. As in the December 1994 sampling date, *M. xenoplax* population density was greater in the weedy plots than in the ground cover and fumigated plots. No differences in nematode populations were detected among the other test plot treatments. At 25 months after methyl bromide application

Table 1. Reproduction of *Mesocriconea xenoplax* on bahia grass, wheat, nimblewill, and peach cultivars in the greenhouse after 180 days^x

Plant species, cultivar	Rf ^y		<i>M. xenoplax</i> per 100 cm ³ of soil	
	Test 1	Test 2	Test 1	Test 2
Peach, Nemaguard	70.79 ^z	93.11 ^z	9,414 ^z	12,383 ^z
Wheat, Stacy	0.59	0.03	78	5
Bahia grass				
Pensacola	0.14 a	0.20 a	18 a	27 a
Tifton 9	0.11 a	0.43 a	15 a	57 a
Combined	0.13	0.32	17	42
Nimblewill	0.01	0.05	2	6
Fallow	0.00	0.00	0	0

^x Data are means of 10 replicates, except fallow which had 5 replicates. Means within a plant species and column followed by the same letter are not different ($P \leq 0.05$) according to analysis of variance.

^y Rf = reproductive factor (Pf/Pi), where Pf = final population density and Pi = initial population density of 133 *M. xenoplax* per 100 cm³ of soil.

^z The single degree-of-freedom comparison between the means for peach versus combined bahia grass cultivars, peach versus wheat, peach versus nimblewill, and peach versus fallow was highly significant ($P \leq 0.01$).

Table 2. Reproduction of *Mesocriconea xenoplax* on Pensacola and Tifton 9 bahia grass, wheat, and weeds in field plots in Byron, GA^w

Ground cover, cultivar	<i>M. xenoplax</i> per 100 cm ³ of soil ^x			
	1992		1993	
	2 December ^y	7 July ^y	2 December ^y	21 June ^y
Weeds	6 ^z	0 ^z	11 ^z	0 ^z
Wheat, Stacy	0	3	0	5
Bahia grass				
Pensacola	0	0	5 a	0
Tifton 9	0	0	8 a	0
Combined	0	0	6	0

^w Data are means of 6 replicates, except weeds, which had 12 replicates.

^x Mean preplant soil population density of *M. xenoplax* (April 1992) was 108 adults and juveniles per 100 cm³ of soil. Means within a plant species and column followed by the same letter are not different ($P \leq 0.05$) according to analysis of variance.

^y Nematode population density on peach trees adjacent to ground cover plots on 2 December 1992, 7 July and 2 December 1993, and 21 June 1994 was 24, 39, 36, and 795 *Mesocriconea xenoplax* per 100 cm³ of soil, respectively. Not included in statistical analysis.

^z The single degree-of-freedom comparison between the means for weeds versus combined bahia grass cultivars and weeds versus wheat was not significant on any sampling date.

(December 1996), the nematode population density in the fumigated plots did not differ from those in the untreated weeds, wheat, or bahia grass plots; similar results were observed for subsequent sampling dates. The benefit of preplant fumigation, one of the major components in the 10-point management program to control *M. xenoplax* in the PTSL disease complex, was confirmed in our study (3). However, it is not unusual for the effect of preplant fumigation to diminish over time. In South Carolina, it was reported that managing *M. xenoplax* with the preplant fumigant 1,3-D was not effective beyond 2 years following initial treatment (29). Our results substantiate those of Sharpe et al. (23), who reported that a resurgence in the mean *M. xenoplax* population density on cv. Redhaven on Nemaguard rootstock occurred 25 months (November 1984 to December 1986) after a preplant broadcast treatment with methyl bromide.

Differences in trunk diameter were detected among the ground cover and fumigation treatments on all three sampling dates (Table 4). In 1996, approximately 13 months after the trees were planted, tree growth was lowest ($P \leq 0.05$) in trees in the weedy plots, intermediate in the Tifton 9 bahia grass and wheat plots, and greatest in those in the Pensacola bahia grass and fumigated plots. At 25 months after planting (February 1997), trees growing in fumigated and both bahia grass ground

cover plots were larger than trees in weed and wheat plots. No differences in tree growth were detected between the fumigated and bahia grass plots or between the weed and wheat plots. In February 1998 (37 months after tree planting), tree growth was greatest ($P \leq 0.10$) in trees in the Pensacola bahia grass plot and lowest in the weed plots. Our results substantiate those of Welker and Glenn (27) and Evert and Bertrand (6), who reported that tree growth was increased in trees planted in killed sod. One explanation for why planting a living ground cover prior to planting trees and then killing the ground cover with a herbicide increased tree growth could be attributed to (i) increased water infiltration rates, (ii) prevention in soil organic matter depletion, (iii) increased aggregate stability and macroporosity, and (iv) an increase in microbial respiration. It was also reported that the changes in soil structure lasted for up to 3 years (27).

Peach trees developed typical PTSL symptoms and died during the experiment. In April 1996 (15 months after trees were planted), more ($P \leq 0.05$) trees in the weed ground cover plots developed PTSL symptoms and died than in the wheat or fumigated plots (Table 4). Tree survival in wheat plots was comparable to trees growing in preplant methyl bromide-fumigated soil. Tree death in both bahia grass plots was intermediate and did not differ from either the weed or fumigated and

wheat plots. Differences in PTSL tree death were not detected in April 1997, but similar trends among the different ground cover and fumigation treatments were observed. In April 1998 (39 months after planting), a greater ($P = 0.07$) number of trees survived in wheat plots (51%) than in the weed or Pensacola bahia grass plots. No differences in PTSL tree death were detected among the weed, bahia grass cultivars, and fumigated soil plots. Peach growers in the Southeast would consider $\geq 49\%$ tree loss three years after replanting to be very disconcerting. Furthermore, in our orchard study, tree survival ($>50\%$) in preplant methyl bromide-fumigated plots was not as long as in previous studies (23). Three possible explanations for the longer-lasting effect of methyl bromide in the previous study (23) could be (i) the higher rate of methyl bromide used (561 kg/ha) than in the present study (483 kg/ha), (ii) the present study was conducted on a site that possibly provided more PTSL disease pressure, and (iii) environmental conditions for PTSL tree death were possibly more favorable during the present study. It is not uncommon to have dramatic differences in PTSL tree death among years that may seem similar. Furthermore, the use of Nemaguard rootstock in conjunction with December pruning will severely accelerate PTSL pressure during an experiment. This combination of poor PTSL management practices can minimize an otherwise useful

Table 3. Populations of *Mesocriconema xenoplax* on peach as influenced by four ground cover systems and preplant soil fumigation in field plots in Byron, GA^w

Treatment	Rate (kg/ha)	<i>M. xenoplax</i> per 100 cm ³ of soil						
		1994	1995	1996		1997		1998
		6 December	14 December	8 April	10 December	1 April	11 December	26 March
Ground cover								
Weeds	...	18 a ^x	43 a ^y	268 a ^x	168 a ^x	1,509 a ^x	1,012 a ^x	1,129 a ^x
Wheat	135	8 b	38 ab	40 b	388 a	1,411 a	1,141 a	813 a
Bahia grass								
Pensacola	33.6	3 b	25 abc	95 b	523 a	1,993 a	644 a	293 a
Tifton 9	22.5	5 b	8 bc	30 b	455 a	1,901 a	1,656 a	1,413 a
MBr ^z	483	0 b	3 c	15 b	350 a	2,638 a	966 a	1,346 a

^w Data are means of six replications per treatment, except on the last two sampling dates which had five replicates.

^x Nematode means followed by the same letter are not different ($P \leq 0.05$) according to Fisher's least significant difference.

^y Nematode means followed by the same letter are not different ($P \leq 0.10$) according to Fisher's least significant difference.

^z MBr = Methyl bromide (98% methyl bromide, 2% chloropicrin); application date was 9 November 1994 to half of the naturally occurring weed plots.

Table 4. Effect of four ground cover systems and preplant soil fumigation on trunk diameter of cv. Goldprince/Nemaguard and development of peach tree short life (PTSL), in field plots in Byron, GA, 1996 to 1998^w

Treatment	Rate (kg/ha)	Trunk diameter (mm)			Cumulative PTSL mortality (%)		
		6 Feb 1996	26 Feb 1997	10 Feb 1998	23 Apr 1996	17 Apr 1997	27 Apr 1998
Ground cover							
Weeds	...	15.1 c ^x	39.7 b ^x	60.2 b ^y	54 a ^x	79 a	92 a ^y
Wheat	135	19.0 b	40.5 b	64.4 ab	14 b	49 a	49 b
Bahia grass							
Pensacola	33.6	22.6 a	53.2 a	78.2 a	37 ab	75 a	87 a
Tifton 9	22.5	20.0 b	48.6 a	71.7 ab	37 ab	75 a	79 ab
MBr ^z	483	22.6 a	49.4 a	65.3 ab	14 b	53 a	72 ab

^w Data are means of six replications per treatment, except on the last sampling dates which had five replicates.

^x Means within a column followed by the same letter are not different ($P \leq 0.05$) according to Fisher's least significant difference.

^y Means within a column followed by the same letter are not different ($P \leq 0.10$) according to Fisher's least significant difference.

^z MBr = Methyl bromide (98% methyl bromide, 2% chloropicrin); application date was 9 November 1994 to half of the naturally occurring weed plots.

management practice (i.e., preplant fumigation), but, on the other hand, is a useful short-term evaluation test procedure.

In summary, peach trees generally grew better in killed bahia grass sod, but neither bahia grass cultivar provided greater tree survival than the unfumigated weed ground cover soil on a PTSL site. Furthermore, Stacy wheat continues to show potential as a preplant ground cover management tool for suppressing the population density of *M. xenoplax* and prolonging tree survival on PTSL sites.

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