Control of the Lance Nematode, *Hoplolaimus galeatus*, on 'Tifdwarf' Bermudagrass by Chemical Dips[1]

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Abstract: Dipping of bare-rooted 'Tifdwarf' bermudagrass sprigs in 1000 ppm of the 2,4-dichlorophenyl ester of methanesulfonic acid plus 2150 ppm 1,2-dibromo-3-chloropropane or in 1000 ppm ethyl 4-(methylthio)-m-tolyl isopropyl phosphoramidate for 30 min eliminated *Hoplolaimus galeatus* (Cobb) Thorne. No phytotoxic effect was observed and bermudagrass growth was improved. *Key Words: Hoplolaimus galeatus,* Control, Chemical dip, Bermudagrass.

Plant-parasitic nematodes are a major problem in most turf nurseries; some cause visible disease symptoms and many are subject to quarantine regulations and trade restrictions. The lance nematode, *Hoplolaimus galeatus* (Cobb) Thorne, causes considerable loss to nurseries, especially on sandy soils of the Southern Coastal Plain. It feeds both as an ectoparasite and as an endoparasite thus may be spread either in infested soil or in the roots of infected turf sprigs.

Nematode-free planting stock is highly desirable in the nursery industry for profitable production of healthy turf. Heald and Wells (4) reported the use of hot-water treatments to control endo- and ecto-parasitic nematodes in roots of turfgrass. Since the recent introduction of low-phytotoxicity nematicidal chemicals, several workers reported the use of these chemicals as drenches or dips to control nematodes on established turf, citrus seedlings, and ornamentals (1, 3, 6, 7, 8, 9, 10, 12, 13).

The purpose of the present research was to achieve complete nematode control without damage to bermudagrass turf.

Materials and Methods

Ethyl 4-(methylthio)-m-tolyl isopropylphosphoramidate (Bay 68138) and a mixture of the 2,4-dichlorophenyl ester of methanesulfonic acid and 1,2-dibromo-3-chloropropane (SD 1897) were used as dip treatments on 'Tifdwarf' bermudagrass (a selection from *Cynodon dactylon* (L.) Pers. × *C. transvaalensis* Burtt-Davy) heavily infected with the lance nematode, *H. galeatus*.

Treatments were as follows: (i) control; (ii) Bay 68138, 500 ppm; (iii) Bay 68138, 1000 ppm; (iv) SD 1897 (SD 7727, 500 ppm + DBCP, 1075 ppm); and (v) SD 1897 (SD 7727, 1000 ppm + DBCP, 2150 ppm). Each treatment was replicated four times. Emulsifiable materials were mixed with enough tap water to make 3.8 liters of solution. Sprigs were soaked in each chemical for 5, 15, and 30 min. Treated sprigs were taken from the solution, allowed to air dry for 15 min, placed in 15-cm clay pots filled with steamed Tifton sandy loam and allowed to grow for 5 months. The experiment was performed at air temperatures ranging from 28–35 C under greenhouse conditions. Tap water was applied as needed.

The grass was clipped to uniform heights, and clipping weights were recorded once during the experiment. At the conclusion of

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TABLE 1. Average number of *Hoplolaimus galeatus* recovered from four replicate pots of 'Tifdwarf' bermudagrass 5 months after treatment.

Treatment		Rate (actual) ppm	*H. galeatus* per g of roots: Dip time (minutes) 5	15	30
Bay 68138		500	84	78	15
		1000	18	6	0
SD 1897	SD 7727 + DBCP	500	72	48	36
		1075			
	SD 7727 + DBCP	1000	6	0	0
		2150			
Control			300	330	315

LSD for treatment means in same time column: .01 = 61

TABLE 2. Average growth response of four replicate pots of 'Tifdwarf' bermudagrass infected with *Hoplolaimus galeatus* 1 month after chemical treatment.

Treatment		Rate (actual) ppm	Fresh clipping weight (g): Dip time (minutes) 5	15	30
Bay 68138		500	4.6	5.0	6.8
		1000	5.1	3.7	4.4
SD 1897	SD 7727 + DBCP	500	2.6	2.1	3.2
		1075			
	SD 7727 + DBCP	1000	3.4	3.4	2.6
		2150			
Control			1.9	2.0	2.3

LSD for treatment means in same time column: .01 = 1.9

the experiment each plant was removed from the pot, and roots were submerged and washed in 6 liters of water. Water containing soil and root washings was roiled vigorously, and a liter aliquot was processed by sugar-centrifugation (5). To obtain maximum recovery of *H. galeatus* from roots for population estimates, procedures similar to those of Taylor and Loegering (11) and Goodey (2) were followed. Two 2-g samples of chopped root fragments (about 0.6 cm long) to which 40 ml of tap water had been added were macerated at high speed for 20 sec in a food blender. The suspension was sieved through 20-, 200-, and 325-mesh screens, and the screenings were placed on a single thickness of facial tissue in separate Baermann pans. Nematodes were removed from pans and counted at 3-day intervals for 2 weeks. Numbers of nematodes from soil and root samples were combined to give a population estimate per g of root tissue.

RESULTS AND DISCUSSION

Numbers of *H. galeatus* in infected roots of 'Tifdwarf' bermudagrass sprigs were significantly reduced with all concentrations of chemicals used when compared with controls. Control of *H. galeatus* varied from 72–98%, 76–100%, and 86–100% with 5-, 15-, and 30-min immersion, respectively (Table 1). One-hundred percent control, as determined by the assay technique used, was achieved with 1000 ppm of Bay 68138 for 30 min and the high concentration of SD 1897 for 15 and 30 min on rooted turfgrass sprigs.

Phytotoxicity was not observed with any chemical. Treated sprigs grew vigorously compared to non-treated sprigs, and noticeable growth response was observed as early as one month after treatment. This response was characterized by increase in clipping weights (Table 2) and greenness of turf. A growth response of turf following application of organo-phosphate compounds before significant nematode population reduction occurred has been reported under field conditions (1). Several factors could account for this rapid plant response. Brodie and Burton (1) suggested that the response is of a biological nature and possibly involves control of several soil organisms, including soil

insects. In this experiment, the results suggest that the plant response is caused by reduction of *H. galeatus* populations and/or that these chemicals may act as growth stimuli.

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