Control of *Pratylenchus vulnus* on American Boxwood[1]

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Abstract

Post-plant applications of Nemacur 15G, Vydate 10G, Furadan 10G, and Temik 15G controlled lesion nematode, *Pratylenchus vulnus,* on roots of American boxwood. Combination of fall and spring nematode applications provided season long nematode control. One year after application, significant increases in shoot numbers and plant growth occurred with treated plants compared to nontreated plants.

Index words: *Buxus sempervirens* var. globosum, lesion nematode, granular nematicides

Introduction

Boxwood decline caused by *Pratylenchus vulnus* Allen & Jenson can be a serious problem of field-grown nursery stock and landscape plantings in the Southeastern United States. Field studies have shown that sodium selenate and DBCP (dibromochloropropane) controlled *P. vulnus* on several boxwood species (1, 3, 4, 5). Increases (3, 4) or no changes (1, 5) in plant vigor have also been noted on boxwoods treated with these nematicides. However, these chemicals are not currently registered for nematode control on ornamentals. Benson and Barker (1) have demonstrated that Temik 15G will provide good control of *P. vulnus* on boxwoods up to 1 year after treatment.

The objectives of this study were to determine the efficacy of granular nematicides for the control of *P. vulnus* on boxwood and monitor the subsequent growth response.

Materials and Methods

A block of 3-year-old American boxwood (*Buxus sempervirens* var. *globosum*) exhibiting typical symptoms of boxwood decline in a nursery in northeast Alabama was selected for this study.

The boxwoods were grown in a Hartsells fine sandy loam soil. A broadcast application of 13N-5.6P-10.8K (13-13-13) at 896 kg/ha (800 lb/A) was made each spring. Weed control was maintained with a spring application of Surflan A.S. (orzalin) at a rate of 2.2 kg/ha (2.0 lb/A) plus cultivation as needed. The plot area was not irrigated.

Soil tests revealed that high population densities of *P. vulnus* were present within the root zone of chlorotic, stunted boxwoods while few nematodes were found within the root zone of several apparently healthy plants. Nemacur 15G at 25.2 kg ai/ha (phenamiphos-150 lb/A), Vydate 10G at 33.6 kg ai/ha (oxamyl-300 lb/A), Furadan 10G at 13.4 kg ai/ha (carbofuran-120 lb/A) and Temik 15G at 20.2 kg ai/ha (aldicarb-120 lb/A) were broadcast over a 929 cm² (1 ft²) area around each plant and incorporated to a depth of 2.5 cm (1 in). All treatments were applied on September 17, 1981 and again on March 30, 1982. The experimental design was a randomized complete block of 4 replications with 6 plants per replicate. Severely damaged plants were not included within the plot design.

Plots were sampled prior to both nematicide applications and periodically through the year to monitor nematode densities. Soil cores 2.5 x 12.5 cm (1 x 5 in) were collected from the root zone of each plant and bulked. Nematodes were extracted from the soil samples using the flotation sieving techniques of Byrd et al (2).

Plant growth data included 1) number of current season shoots on November 19, 1981, and on November 4, 1982, and 2) growth index (height + width + width/3 were recorded on September 17, 1981, and on July 7, 1983.

Results and Discussion

High population densities of *P. vulnus* were found within the root zones of plants in all plots prior to the first nematicide application (Fig. 1). Sharp declines in nematode densities were noted in all plots, including the nontreated control between September and November. Densities in the treated plots did fall slightly but not significantly ($P = 0.2625$) below those on the nontreated controls during this time period.

Seasonal declines in *P. vulnus* densities occurred between November and late March in all treatments (Fig. 1). All nematicide treatments significantly reduced ($P = 0.0058$) the overwintering populations of *P. vulnus* below the densities of the nontreated control. Densities of *P. vulnus* ranged from 3-6 to 29 nematodes per 100cc soil on the treated and nontreated plants, resp. Further declines in nematode populations were observed on all treatments by early May. Although *P. vulnus* was vir-

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tually undetectable on Nemacur 15G and Temik 15G-treated plants, no significant differences ($P = 0.2794$) in population densities were noted between the nontreated control and 4 nematicide treatments at this time. By November 1982, *P. vulnus* densities had increased within root zones of all treatments. Yet all nematicides significantly reduced ($P = 0.001$) nematode densities well below levels noted around the nontreated plants. Densities of *P. vulnus* on the nontreated controls were comparable to pretreatment levels found in September, 1981. Although *P. vulnus* densities were consistently lower on Temik 15G-treated plants, no significant differences in nematode populations were observed between Temik 15G and the other nematicide treatments.

Effective control of *P. vulnus* by Nemacur 15G, Vydate 10G, Furadan 10G, and Temik 15G resulted in increased number of current-season shoots on the boxwoods. In November 1981, slight but not significant increases in the production of new shoots were recorded on the Vydate 10G, Furadan 10G and Temik 15G-treated plants (Table 1). In November 1982, sizable reductions in current-season shoot numbers were noted on plants in all treatments, including the nontreated controls (Table 1). It appeared that shoot elongation, as indicated by the increase in growth indices in all treatments were favored over bud break. However, shoot production was significantly higher on the nematicide-treated plants than the nontreated controls (Table 1). New shoot numbers were similar among the different nematicide treatments. Growth indices of the treated boxwood nearly doubled over the 22-month period following the first nematicide application while those of the nontreated control increased only 29% (Table 1). Growth indices of plants treated with the 4 nematicides were similar.

Nemacur 15G, Vydate 10G, Furadan 10G, and Temik 15G reduced *Pratylenchus vulnus* population densities on the root system of American boxwood. Spring applications of these nematicides suppressed increases of *P. vulnus* densities through the fall. Results of this study agree with Benson and Barker (1) that Temik 15G would provide good *P. vulnus* control on American boxwood up to 1 year after treatment.

This is the first report of a positive growth response of *P. vulnus*-damaged boxwoods following treatment with a granular nematicide. Significant increases in shoot numbers and overall plant size were associated with the control of *P. vulnus*. Benson and Barker (1) did not record any growth response on Temik 15G-treated boxwoods despite effective control of *P. vulnus*. Haasis et al (3) and Skinner (4) have reported increased plant vigor with root growth but not plant size following treatment with DBCP and sodium selenate, resp.

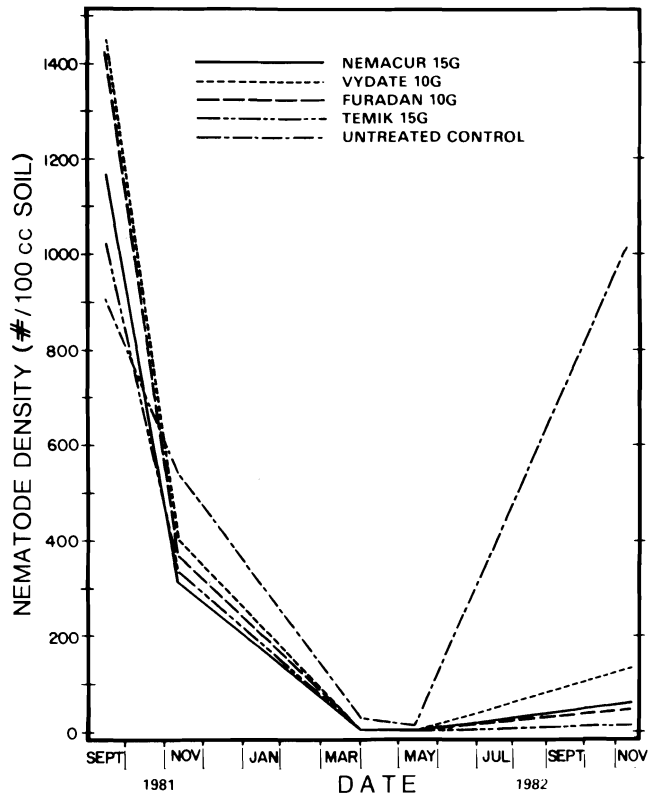

Fig. 1. Effect of granular nematicides on *Pratylenchus vulnus* densities within the root zone of American boxwood. Nematicides were applied on September 17, 1981 and March 30, 1982.

Significance to the Nursery Industry

Despite good nematode control and subsequent growth responses, the usefulness of post-plant applications of granular nematicides to field grown boxwood infested with *P. vulnus* in nurseries is questionable. Plant response to applications of granular nematicides was quite slow, delaying the marketing of these plants. Repeated nematicide applications may be needed before nematode-damaged plants are finally sold. In addition, none of the nematicides evaluated in this study are currently registered for use on boxwood. Vydate L, a liquid formulation of oxamyl, is labeled for nematode control

Table 1. Response of *P. vulnus* infected boxwoods to nematicide applications.

	Rate	No. new shoots/plant		Growth Index	
Nematicide	kg ai/ha	11/81	11/82	9/81	7/83
Nemacur 15G	25.2	12.0 a[z]	10.5 a	14.1 a	26.2 a
Vydate 10G	33.6	14.0 a	9.1 a	13.9 a	25.8 a
Furadan 10G	13.4	20.8 a	8.2 a	15.2 a	27.5 a
Temik 15G	20.2	19.5 a	7.6 a	14.0 a	28.1 a
Check	—	11.3 a	2.0 b	14.0 a	19.7 b

[z]Mean separation within columns followed by the same letter are not significantly different at the 5% level using Duncan's Multiple Range Test.

on a variety of ornamentals including boxwood. It is not known whether this formulation of oxamyl will perform as well as Vydate 10G.

To avoid nematode-related losses, production areas should be sampled prior to planting boxwoods to spot populations of *P. vulnus* or other plant parasitic nematodes. If nematodes are detected, nurserymen would then have the option of selecting a nematode free site or making a pre-plant application of a fumigant nematicide. Supplemental applications of labeled non-fumigant nematicides may be needed to maintain effective nematode control following the use of a fumigant nematicide.

(*Ed note:* This paper reports the results of research only, and does not imply registration of a pesticide under amended FIFRA. Before using any of the products mentioned in this research paper, be certain of their registration by appropriate state and/or federal authorities.)

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Effect of Time of Spacing on the Growth of Container-Grown *Ilex cornuta* 'Dwarf Burford,' Lindl. and Paxt., and *Pittosporum tobira*, Thumb.[1]

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Abstract

Ilex cornuta 'Dward Burford,' Lindl. and Paxt., and *Pittosporum tobira,* Thumb. liners were transplanted into unspaced (adjacent) black 15.2 cm (6 in) diameter containers and later spaced 30 cm (12 in) apart 0, 30, 61 and 126 days after transplanting. Keeping plants can-to-can (unspaced) significantly reduced growing-media temperatures. Delaying spacing until required by crowding resulted in improved root and shoot growth in *Pittosporum tobira* and to a lesser degree in *Ilex cornuta.*

Index words: temperature, spacing, woody plants, container culture

Introduction

In general, root growth is superior with lower rather than higher soil temperatures (1). Excessive media temperatures often damage plants grown in containers (4, 12, 13). Roots of 5 woody-plant species grown in containers were killed when exposed to 50 °C (122 °F) for 4 hours (15). Daily exposure to 40°-45 °C (133 °F) killed root tips and 35 °C (95 °F) for 6 hours reduced growth of 1 species. Ingram and Buchanan (7) found substantial direct heat injury to roots of woody ornamentals when container media temperatures exceeded 50 °C (122 °F) for 20 minutes, but only minimal injury was observed when temperatures were below 45 °C (113 °F). Woody plants can usually withstand higher media temperatures than citrus (8). Reductions in growing-media temperatures have been attained with light colored containers (2, 3, 5, 13, 14).

Varying media mixtures has had only a slight influence on the media temperature (4, 2). Ingram and Johnson (6) evaluated treatments of row orientation, north-south vs northwest-southeast; plant spacing, 30 and 46 cm (12 and 18 in); and placement pattern, triangular vs rectangular; with azalea in 3 l (#3) black containers. They found that a north-south orientation, 30 cm (12 in) spacing and a triangular placement seemed to be the superior combination for root growth. Ingram and Johnson (9) also found that a growing-media tempera-

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