Control of the Root-knot Nematode, Meloidogyne incognita, on Mimosa (Albizzia julibrissin) by Chemical Dips[1]

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Root-knot nematodes severely attack mimosa (*Albizzia julibrissin* Durazz.) and increase the incidence of wilt caused by *Fusarium oxysporum* Schlecht. f. sp. *perniciosum* (3). Fusarium-resistant clones are propagated from root-cuttings which often are infected by nematodes. Softwood cuttings of sprouts from roots readily take root (2, 5) and are a means of propagation which eliminates nematodes. However, it is often desirable for nurserymen to propagate directly from root-cuttings, thus elimination of nematodes from root-cuttings would be of value.

The purpose of the present research was to evaluate the effectiveness of nematicides for control of root-knot nematodes and their effect upon growth of mimosa root-cuttings.

O-ethyl, S,S-dipropyl phosphorodithioate (Prophos), a mixture of the 2,4-dichlorophenyl ester of methanesulfonic acid and 1,2-dibromo-3-chloropropane (SD 1897), *O,O*-diethyl *O*-[(*p*-methylsulfinyl) phenyl] phosphorothioate (Bay 25141), and ethyl 4-(methylthio)-m-tolylisopropylphosphoramidate (Bay 68138) were used as dip treatments on mimosa root-cuttings that were moderately infected (1 female/cm) with the root-knot nematode, *Meloidogyne incognita* (Kofoid & White) Chitwood.

Treatments were as follows: (i) control; (ii) Prophos, 500 ppm; (iii) SD 1897 (500 ppm of SD 7727 plus 1075 ppm DBCP); (iv) Bay 25141, 500 ppm; and (v) Bay 68138, 500 ppm. Each treatment was replicated 10 times. Infected roots of mimosa plants from one clone (B-1) were dug, washed, cut (approximately 10-cm lengths), grouped according to size (large, medium, and small roots averaged 1.6, 0.9, and 0.5 cm diameter, respectively) and bundled. Each bundle consisted of 10 root-pieces that were dipped separately into emulsions of nematicides for 15, 30, and 60 min. Treated root-pieces were taken from solutions, allowed to air dry for 15 min, placed upright in flats containing moist vermiculite and grown for 11 weeks under greenhouse conditions with air temperatures ranging from 19 to 27 C. Rooted cuttings were lifted from the flats and placed in No. 10 cans filled with a steamed mixture of Dothan loamy sand and peat moss (3:1 v/v) and grown in partial shade for 9 months. At the conclusion of the experiment, plant heights were measured and the tops were cut off at the surface of the soil and weighed. Each plant was removed from the can and the roots were submerged and washed thoroughly in tap water, blotted, weighed and indexed for severity of root galling. Root-gall index scale (1-5); 1 = no galls, 5 = maximum galling.

Plant height and top weight were affected by chemical treatment, size of original root-pieces, and dip time. Final heights of plants treated with nematicides were significantly less than height of control plants. There was a direct relationship between the size of the original root-piece and final plant height. Growth rates (plant height) of plants from root-pieces dipped for 30 min were 15% greater than those dipped for 15 or 60 min. Top weight of plants treated with Prophos was 27% greater than weight of plants treated with Bay 68138 and Bay 25141 (Table 1).

Phytotoxicity from Bay 25141 and Bay 68138 also was reflected in percent plant survival. A higher percent of plants survived from large (98%) and medium-sized (87%) *vs.* small (36%) root-pieces and those dipped for 30 (82%) or 15 min (73%) *vs.* 60 min (67%).

Chemical treatment, size of root-pieces, and

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TABLE 1. Plant height, top weight, percent survival, root-weight and root-gall indices of mimosa root-cuttings as influenced by chemical dips 500 ppm (active), size of root pieces and time (15, 30, and 60 min)†.

	Plant ht.‡ (cm)	Top wt. (g)	Percent survival	Root wt. (g)	Root-gall index§ (1-5)
Chemical					
Control	23.6 b	5.71 ab	77 b	34.88 b	1.97 c
Prophos	17.8 a	6.41 b	76 b	48.68 c	1.06 b
SD 1897	20.0 a	5.70 ab	78 b	38.37 b	1.09 b
Bay 25141	18.1 a	4.99 a	72 ab	24.95 a	1.00 a
Bay 68138	18.1 a	4.93 a	67 a	27.89 a	1.00 a
Root-piece size					
Small	5.3 a	1.53 a	36 a	14.46 a	1.00 a
Medium	19.1 b	6.13 b	87 b	42.36 b	1.00 a
Large	34.0 c	8.98 c	98 c	48.05 c	1.88 b
Time (min)					
15	18.6 a	5.33 a	73 b	33.57 a	1.11 b
30	21.4 b	5.96 b	82 c	39.07 b	1.22 c
60	18.4 a	5.45 a	67 a	32.23 a	1.00 a

† Mean across all treatments, size, or time.
‡ Small letters indicate Duncan's multiple range groupings of treatments which do not differ significantly at the 5 percent level.
§ 1 = no galls; 5 = maximum galling.
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dip time also affected weight of roots. Root weight of plants from root-pieces dipped in Prophos was 26 percent greater or more than from other treatments. Sixteen percent more roots were produced from root-pieces dipped 30 min than from those dipped 15 or 60 min (Table 1).

All chemicals were not equally effective in controlling root-knot nematodes, based on root-gall indices. SD 1897 and Prophos controlled nematodes completely in all treatments except those containing large root-pieces. Bay 68138 and Bay 25141 controlled nematodes in all treatments (Table 1).

Plants from root-pieces treated with Prophos grew vigorously, and a noticeable growth response was observed. A similar growth response has been reported on turf grasses following application of organo-phosphate compounds under field (1) and greenhouse conditions (4). Several factors could account for this growth response. Brodie and Burton (1) reported that the response was of a biological nature and possibly involved control of several soil organisms, including soil insects. Johnson (4) suggested that these chemicals may stimulate growth. He observed similar growth response under field conditions with such crops as cotton and lima bean (unpublished data) treated with Prophos. The results of this experiment suggest that nematicidal dips may be used to control root-knot nematodes on mimosa root-cuttings to provide nematode-free plants for propagation.

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