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USE OF DAZOMET AND OXAMYL FOR CONTROLLING THE ROOT-KNOT NEMATODE *MELOIDOGYNE JAVANICA* IN GLASS HOUSES

by
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Summary. *Meloidogyne javanica* was successfully controlled on tomato under glasshouse conditions using either dazomet with oxamyl, or oxamyl alone. Significant yield increases ranging from 23.5% to 47.1% were achieved over the controls while the ratio of the incremental crop value over the nematicidal cost was significantly in favour of oxamyl being applied alone via drip irrigation.

In Cyprus, the early production of vegetables in glasshouses has recently expanded. In 1992 a total of 10,130 tonnes of tomatoes, with a crop value of CY£ 2.7, was produced from an area of 70 ha. Other crops grown under glass include watermelons, cucumbers, peppers and eggplants. All of these crops are subject to attack by root-knot nematodes, *Meloidogyne javanica* (Treub), Chitw. and *M. incognita* (Kofoid *et* White) Chitw. race 2 (Philis, 1983) and because of favourable weather that prevails on the island almost throughout the year development of the root-knot nematodes is enhanced with consequent serious crop losses (Philis, 1984). Nematode resistant cultivars of tomatoes have been successfully tested to reduce crop losses (Philis, 1990) but for several reasons they have not been used commercially. Instead, nematicidal chemicals have been applied for root-knot nematode control. Methyl bromide has been used extensively but because of its high cost, difficulty of application into the soil, and concern about environmental hazards, alternative nematicides have been investigated.

Materials and methods

An experiment was undertaken in a glasshouse at the ARI Experimental Station at Ackelia, near Paphos, from autumn, 1992, until late spring, 1993. It consisted of applications of dazomet and oxamyl applied to soil infested with *M. javanica*. Plot size was 12 m^2 with three replicates of each of three treatments arranged in a randomized complete block design. One month before planting the tomato crop, dazomet (as Basamid$^{(R)}$) was applied with a hand applicator at the rate of 49 g a.i. per m^2 and incorporated with a rotavator into the soil to a depth of 12 cm. Water was then applied with a watering can to seal the soil surface. Control plots were left untreated but were watered. A liquid formulation of oxamyl (as Vydate 24% a.i.) was applied at the rate of 0.26 cc formulated product per plant via drip irrigation to three plots treated with dazomet and to three untreated plots on 7 December, 1992. The treatment was then repeated three times at monthly intervals but the dosage was increased each time by 50%, over the previous one, to match the increasing root mass of the plants, while the water at each application was regulated to achieve a concentration of 260 ppm of oxamyl. Soil samples were taken to determine the root-knot nematode populations just prior to dazomet application and just prior to planting; nematodes were extracted from 200 g soil samples by a modification of the Baermann funnel technique and collected and counted after 24 hrs. Tomato cv. Petra seedlings were planted on 9 November, 1992. Root samples to determine the number of root-knot galls were taken at 64, 98, 124 and 197 days from planting and plants were uprooted and final nematode infestation of the roots was determined 229 days after planting. Commercial yields of fruit were recorded every 3-4 days from the time of the first ripe fruits until the plants were uprooted.

Results and discussion

The application of dazomet prior to planting reduced the nematode population in the soil by 75% compared with the untreated controls (Table I). This treatment combined with oxamyl, applied after planting via drip irriga-

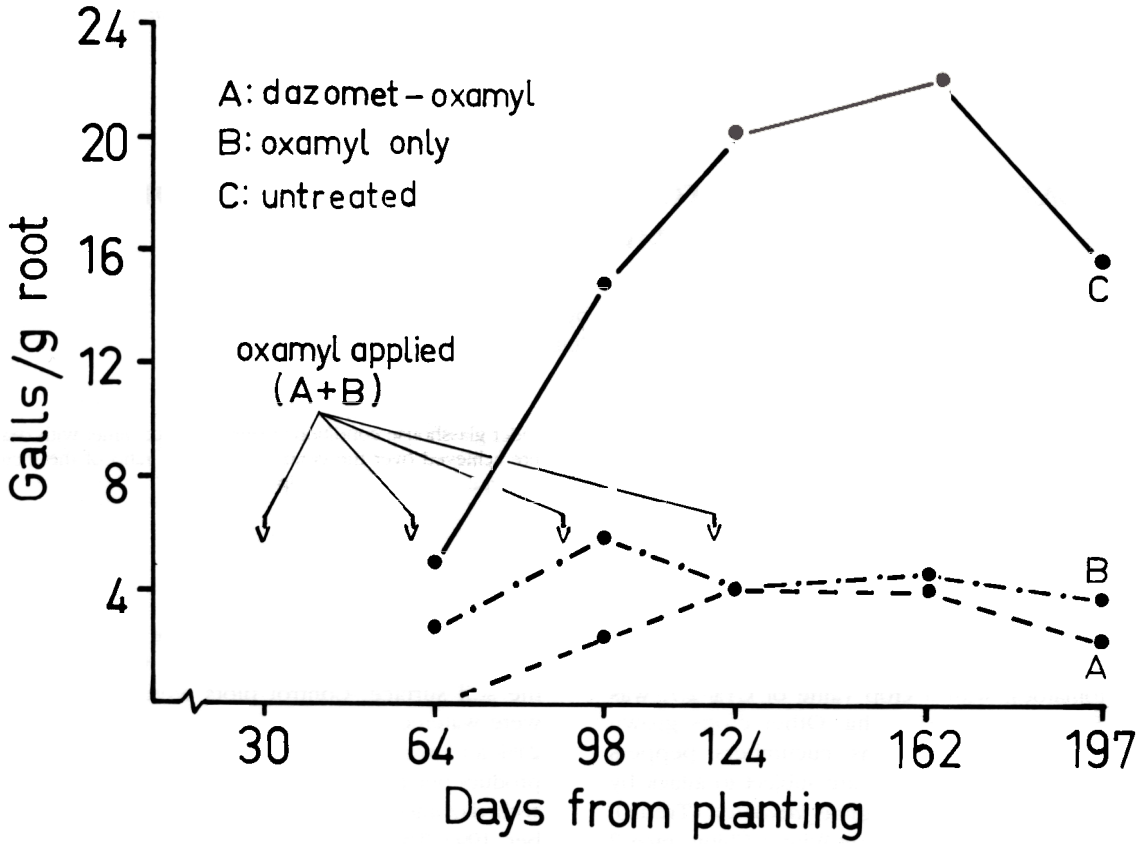

Fig. Number of galls caused by *M. javanica* on tomato roots

TABLE I *Effect of oxamyl and dazomet treatments on nematode control and yield of tomato.*

Treatment	Application rate (a.i./ha)		Mean population (juveniles/g soil)		Final root-knot galling-index (0-4)[1]	Yield		Eggs/g root[2]
	kg	litres	Before treatment with dazomet	Before planting		Kg/plant[3]	Tonnes/ha	
A. Dazomet-oxamyl	490	13.9	1.9	0.5 a	0.9	2.5 a	68.7	5 a
B. Oxamyl	–	13.9	1.9	1.8 b	1.3	2.1 ab	57.7	24 a
C. Untreated		–	1.8	2.0 b	3.8	1.7 b	46.7	128 b

[1] 0: Clean roots; 4: Severe galling.
[2] Determined at 197 days from planting.
[3] Column figures having the same letter are not significantly different from each other (P = 0.05).

tion, considerably reduced the final root-knot galling index, determined at 229 days from planting and increased yields by 47.1% over the untreated (Table I). Egg density per gram of root was also significantly reduced by 96.1% when both nematicides were used, while when oxamyl only was applied yields were significantly increased by 23.5% and the number of eggs significantly reduced by 81.3%. Both nematicidal treatments controlled galling compared to the untreated (Fig. 1). However, root samples from the dazomet-oxamyl treated plots harboured fewer galls than those treated with oxamyl only, particularly with the first two root samplings at 64 and 98 days

from planting. This, to a great extent, explains the increased yield of dazomet-oxamyl treated plots over the oxamyl only treated plots since early stages of plant development predetermine overall crop production. Serious root galling in the untreated plots was evident from the second sampling, approximately three months after planting, while a peak was reached at the fourth sampling. However, at 197 days from planting there was an apparent reduction in the number of galls on plants from the untreated plots. This undoubtedly was due to the difficulty in distinguishing and counting the numerous and large galls in close proximity to each other. The same phenomenon, but to a much lesser extent, occurred in the treated plots but this, obviously, was the result of normal sampling error since few galls developed on the roots.

Under the conditions of the experiment, the ratio between the incremental crop value over the nematicidal cost was considerably higher when oxamyl was used alone than when combined with dazomet.

The present trial also suggests that oxamyl should be applied early to protect the young root system of the seedlings from the invading juveniles.

No residues of oxamyl were found in the fruit.

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