

CONTROL OF *PRATYLENCHUS SCRIBNERI* ON SPEARMINT,
MENTHA SPICATA, WITH NONFUMIGANT NEMATOCIDES¹

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ABSTRACT

Rhoades, H.L. 1984. Control of *Pratylenchus scribneri* on spearmint, *Mentha spicata*, with nonfumigant nematicides. Nematropica 14:85-89.

Granular formulations of the nonfumigant nematicides carbofuran, fenamiphos, oxamyl, and terbufos were applied to spearmint, *Mentha spicata* L., heavily infested with *Pratylenchus scribneri* Steiner in greenhouse pots. Carbofuran, fenamiphos, and oxamyl were applied at 5.6 and 11.2 kg/ha and terbufos at 11.2 kg/ha. All of the nematicides greatly reduced nematode populations, with fenamiphos being the most effective, followed by terbufos. Foliage yields of the first four harvests of the mint from both rates of fenamiphos were not significantly different from those of the uninfested check. However, yields of the fifth harvest from both fenamiphos treatments were significantly less than for the check, and nematode injury symptoms were present. Similar results were obtained for terbufos applied at 11.2 kg/ha. Total foliage yields for the fenamiphos and terbufos treatments were not significantly less than for the uninfested check. Both rates of carbofuran and oxamyl were less effective than the fenamiphos and terbufos treatments, and the last two harvests and total yields were significantly less than for the uninfested checks.

Additional key words: mint, lesion nematode, nematode control, chemical control, pest management.

RESUMEN

Rhoades, H.L. 1984. Control del *Pratylenchus scribneri* en la menta de julepe, *Mentha spicata*, con nematicidas no-fumigantes. Nematropica 14:85-89.

Las formulaciones granuladas de los nematicidas no-fumigantes carbofurán, fenamifós, oxamil y terbufós fueron aplicados a la menta de julepe, *Mentha spicata* L., severamente infestada con *Pratylenchus scribneri* Steiner en pruebas con macetas en el invernadero. Carbofurán, fenamifós y oxamil fueron aplicados a 5.6 y 11.2 kg/ha y terbufós a 11.2 kg/ha. Todos los nematocidas redujeron grandemente las poblaciones del nematodo siendo el fenamifós el más efectivo seguido del terbufós. Los rendimientos de follaje de la menta en las primeras cuatro cosechas para las dos dosis de fenamifós no fueron significativamente diferentes a la de los controles no infestados, sin embargo, los rendimientos correspondientes a la quinta cosecha fueron significativamente inferiores, estando presentes los síntomas de daños del nematodo. Resultados similares se obtuvieron con el terbufós. Los rendimientos totales de follaje para los tratamientos de fenamifós no fueron significativamente menores a los del control no infestado. Las

dos dosis de carbofurán y oxamil probadas fueron menos efectivas que las de los tratamientos de fenamifós y terbufós, y además las dos últimas cosechas así como los rendimientos totales fueron significativamente menores que los obtenidos para los controles no infestados.

Palabras claves adicionales: menta, nematodo de las lesiones, control de nematodos, control químico, manejo de plagas.

INTRODUCTION

Commercial spearmint (*Mentha spicata* L.) production is a small but expanding business in central Florida. This crop is propagated vegetatively and maintained in production beds for a number of years, allowing nematode pests to build up to injurious levels. Stunted, non-productive beds in Florida were found to be infested with *Belonolaimus longicaudatus* Rau, *Dolichodorus heterocephalus* Cobb, and *Pratylenchus scribneri* Steiner, all of which were subsequently found to be pathogenic to *M. spicata* (3). Since *P. scribneri* was determined to be the most injurious of these nematode pests, a greenhouse experiment was conducted to determine the efficacy of certain nonfumigant nematicides for controlling it. Aldicarb and oxamyl have been reported to be effective for controlling *Longidorus elongatus* (deMan) Thorne & Swanger and increasing yields of peppermint, *M. piperita* L. (2).

MATERIALS AND METHODS

Rooted sprigs of *M. spicata* L. were transplanted singly in 15-cm pots of steamed Myakka fine sand in a greenhouse in April, 1983. Three weeks later, when the sprigs had become established and were growing rapidly, approximately 1000 *Pratylenchus scribneri* in 50 ml of water were poured in a small hole in the center of each of the pots that were to be treated later with nematicides. The nematodes had been cultured on *M. spicata* and were extracted from the roots by the Young technique (4). Before adding them to the pots, the nematodes were passed twice through 4-layer pads of Kimwipe® tissues to remove root fragments, other debris, and soil. After addition of the nematodes to the pots, the plants were maintained in the greenhouse with periodic clipping and fertilization with a 10-4-10 NPK mixture until 12 July, 1983. On this date, stunting and leaf discoloration were visible in most of the infested pots, demonstrating that nematode populations had increased to injurious levels. A randomized complete block experiment with five replicates was then established to determine the efficacy of the nonfumigant nematicides carbofuran, fenamiphos, oxamyl, and terbufos for controlling the nematodes. Granular formulations of carbofuran, fenamiphos, and oxamyl were

sprinkled on the soil surface at rates of 5.6 and 11.2 kg ai/ha and terbufos at 11.2 kg ai/ha. The experiment was maintained until 15 December, 1983. During this period, the spearmint was clipped five times and the foliage weighed. After each clipping, the pots were uniformly fertilized with a 10-4-10 NPK mix. On 1 September, soil and root samples were taken by removing three 2-cm cores from each pot. The roots were picked from the soil and processed by the Young technique (4), then the soil was processed by the centrifugal flotation method (1) for recovering nematodes. After the final harvest, the roots were washed, blotted, and weighed.

RESULTS AND DISCUSSION

Fifty days after the nematicides were applied, nematode populations were reduced in both soil and roots by all nematicides (Table 1). The greatest reduction occurred in the fenamiphos treatments. Fenamiphos applied at 11.2 kg/ha reduced the population 97% and 99% in the soil and roots, respectively, when compared with infested pots that were untreated. The reduction in the 11.2 kg/ha terbufos treatment was 72% and 74% for soil and roots. Similar reductions also occurred for oxamyl and carbofuran at the 11.2 kg/ha rate. The 5.6 kg/ha rate of fenamiphos, oxamyl, and carbofuran was generally less effective than the 11.2 kg/ha rate. However, fenamiphos at 5.6 kg/ha rate was more effective than the other materials at 11.2 kg/ha.

Yields corresponded closely to degree of nematode control. Foliage yields on all clipping dates and total foliage from infested pots with no nematicide added were significantly less than from the check. The foliage yields on the first four clipping dates and the total foliage yields from both fenamiphos treatments and terbufos treatments were not significantly different from the check. However, yields on the fifth clipping date were significantly less for all treatments and nematode damage symptoms were obvious, demonstrating that nematode populations had returned to injurious levels. Oxamyl and carbofuran were less effective and, although clipping weights were greatly increased over untreated infested pots, the final two clippings and the total clipping weights were significantly less than the check. Total foliage yields were inversely proportional to the number of nematodes in the soil ($r = -0.961$, $P \leq 0.01$) and in roots ($r = -0.956$, $P \leq 0.01$). Root weight at the end of the experiment corresponded to degree of nematode control in the soil ($r = -0.713$, $P \leq 0.05$) and in roots ($r = -0.682$, $P \leq 0.05$). Although all treatments weighed significantly less than the uninfested checks, the weights from pots treated with terbufos and fenamiphos were much greater than those treated with oxamyl and carbofuran. These results

Table 1. Effects of nematicides on control of *Pratylenchus scribneri* and growth of *Mentha spicata*.

| Treatment | Nematicide rate (kg/ha) | Number of nematodes* | | Foliage weight (g) | | | | | | Root weight (g) |
|----------------------|-------------------------|----------------------|-------|--------------------|---------|----------|---------|---------|-------|-----------------|
| | | Soil | Roots | July 28 | Aug. 25 | Sept. 27 | Oct. 24 | Dec. 15 | Total | |
| Check (no nematodes) | — | 0 | 0 | 34.5 | 26.7 | 31.5 | 24.0 | 47.0 | 164 | 271 |
| Untreated | — | 1367 | 763 | 19.9 | 12.3 | 4.4 | 3.4 | 7.7 | 48 | 111 |
| Terbufos | 11.2 | 382 | 198 | 26.1 | 24.9 | 37.8 | 21.4 | 25.3 | 136 | 201 |
| Fenamiphos | 5.6 | 147 | 38 | 27.5 | 28.3 | 40.5 | 28.1 | 24.4 | 149 | 181 |
| " | 11.2 | 43 | 6 | 29.7 | 32.7 | 43.7 | 31.6 | 34.8 | 173 | 194 |
| Oxamyl | 5.6 | 651 | 395 | 29.1 | 21.0 | 28.1 | 9.2 | 12.3 | 98 | 116 |
| " | 11.2 | 402 | 254 | 33.2 | 25.1 | 31.3 | 10.1 | 8.6 | 108 | 137 |
| Carbofuran | 5.6 | 569 | 263 | 21.2 | 17.7 | 29.5 | 12.4 | 15.9 | 97 | 103 |
| " | 11.2 | 412 | 178 | 26.3 | 28.0 | 33.0 | 13.9 | 19.4 | 121 | 127 |
| LSD .05 | | | | 8.6 | 5.4 | 8.7 | 7.1 | 11.2 | 32 | 58 |
| .01 | | | | — | 7.3 | 11.7 | 9.6 | 15.1 | 39 | 79 |

* Average number of nematodes extracted from 100 cm³ of soil and from one gram of roots (fresh wt.), 50 days after treatment.

demonstrate that the nonfumigant nematicides, when applied as granules to the soil surface and watered in, are effective for controlling *P. scribneri* on *M. spicata*. Fenamiphos was the most effective and gave good protection for approximately 4 months in the greenhouse.

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