Research Note

EFFECT OF GRANULAR NEMATICIDES AND THE FUNGUS PAECILOMYCES LILACINUS *IN NEMATODE CONTROL IN WATERMELON*[1]

Vegetable crops including cucurbits are widely cultivated in the southern coast of Puerto Rico. These are very susceptible to different pathogens that diminish yields. Nematodes are frequently associ-ated with vegetable production[2]. In vegetable crops, weed and nematode control ensure greater growth and yields[3]

Chemicals have proven effective for the control of nematodes in cucurbits in the United States[4] and Puerto Rico[5]. Johnson and Harmon[6] obtained good control in cantaloupe with fensulfothion and phenamiphos. Working with pumpkin (*Cucurbita pepo* L.) and watermelon (*Citrullus vulgaris* Schrad.), Román et al.[2] increased the production by 52 and 33%, respectively, with 16.8 kg/ha of phenamiphos 15G.

In addition to nematicide application, biological agents for nematode control can be useful. Organisms like *Paecilomyces lilacinus* (Thom) Samson, a parasite of nematode eggs, have shown good performance against *Meloidogyne incognita* and *Globodera pallida*[7].

A field experiment was conducted to re-evaluate the most effective treatments of a previous study[8].

The experiment was established in a Coto clay soil infested with *M. incognita* (root-knot nematode) and *Rotylenchulus reinformis* (reinform nematode) at the Isabela Agricultural Experiment Substation. Five treatments were included: fungus (*P. lilacinus*) added to soil 2 weeks before planting, carbofuran (Furadan® 10G) at 2.24 kg ai/ha, phenamiphos (Nemacur® 15G) at 6.73 kg ai/ha and 13.46 kg ai/ha and nontreated control.

Plots (5.54 m x 3.69 m) consisted of six microplots, each 1.85 m x 1.85 m.

Two weeks before planting, *P. lilacinus* was applied. Approximately 150 g of *P. lilacinus*-colonized rice was added to each microplot and incorporated 8 to 12 cm deep.

The rice inocula were obtained following the methodology suggested by Dr. Parviz Jatala, International Potato Center, Lima, Perú. Commercial rice was soaked in water and left overnight, then washed in tap

[1]Manuscript submitted to Editorial Board 27 November 1990.

[2]Román, J., X. Rivas, I. Reyes and G. Mangual, 1972 Studies on the use of nematicides on vegetable crops. *Nematropica* 2: 23 (Abstr.).

[3]Johnson, A. W., C. A. Jaworski, N. C. Glaze, D. R. Sumner and R. B. Chalfont, 1981. Effects of film mulch and soil pesticides on nematodes, weeds and yields of vegetable crops. *J. Nematol.* 13(2): 141-48.

[4]Society of Nematologists, 1971. Committee on crop losses, estimated crop losses due to plant-parasitic nematodes in United States, Spec. Publ. No. 1, 7 pp.

[5]Acosta, N., C. Cruz and J. Negrón, 1986. Insect and nematode control in cucumber (*Cucumis sativus*) in Puerto Rico. *J. Agric. Univ. P. R.* 70 (1): 19-24.

[6]Johnson, A. W. and S. A. Harmon, 1974. Cantaloup yield and grade increased by chemical control of *Meloidogyne incognita*. *Plant Dis. Rep.* 58: 746-49.

[7]Jatala, P., R. Kaltenbach, M. Bocangel, A. J. Devaux and R. Campos, 1980. Field application of *Paecilomyces lilacinus* for controlling *Meloidogyne incognita* in potatoes. *J. Nematol.* 12 (4): 226-27. (Abstr.)

[8]Vicente, N. E., N. Acosta and L. A. Sánchez, 1989. Nematicides and *Paecilomyces lilacinus* in nematode control in watermelon. *J. Agric. Univ. P. R.* 73 (1): 75-77.

TABLE 1.—*Number of fruits, weight of fruits and yields of watermelon cv. Charleston Gray in plots treated with fungus* (P. lilacinus) *or nematicides. Isabela, 1988*

Treatments	Number of fruits	Wt/fruit (kg)	Yield (kg/plot)
Fungus	7.25 a[1]	5.06 a	36.53 a
Carbofuran 10G 2.24 kg ai/ha	7.75 a	4.87 ab	38.18 a
Phenamiphos 15 G 6.73 kg ai/ha	9.00 a	4.65 b	42.00 a
Phenamiphos 15G 13.46 kg ai/ha	7.00 a	4.53 bc	32.00 a
Control	4.25 b	4.16 c	17.58 b

[1]Values in columns followed by different letters different statistically at the 5% probability level.

water and autoclaved for 50 minutes. The autoclaved rice was then transferred to 24 polyethylene bags (150 g rice/bag) each inoculated with 10 ml of a fungal suspension (*P. lilacinus*) and incubated at 28 to 30° C for 10 days or more. *Paecilomyces lilacinus* was obtained from an original isolate from Peru provided by Dr. P. Jatala[9].

Nematicides were applied in each microplot by hand with glass jars and incorporated 5 to 8 cm deep into the soil with a hoe immediately before planting. After application, 5 seeds of Charleston Gray watermelon were planted in the center of each of the microplots. At emergence plants were thinned to two plants per microplot.

Treatments replicated four times each were included in a complete randomized block design. Soil samples (250 cm^3 per plot) for nematode assays were taken 15 cm deep before and 6 weeks afterwards. Conventional methods were used to extract nematodes from the soil. Ninety days after planting, data on number of fruits, fruit weight, total yield and final nematode population were recorded.

Cultural practices, control of weeds and fertilization were those recommended by the Agricultural Experiment Station[10]. Data were analyzed following standard procedures for analysis of variance.

Significant differences in the number of fruits among all treatments versus the check were obtained (table 1). Weight per fruit was significantly higher in fungus and carbofuran-treated plots than in all other treatments.

Plots treated with carbofuran and phenamiphos (lower dose) showed higher fruit weight than the control. Total yield increases of 52, 54, 58 and 45% over the check were obtained with treatments of *P. lilacinus*, carbofuran 10G, and phenamiphos 15G at 6.73 and 13.46 kg ai/ha, respectively.

[9]Vicente, N. E., N. Acosta and A. Sánchez, 1989. Sustratos de arroz (*Oryza sativa* L.) y el crecimiento del hongo biocontrolador de nematodos *Paecilomyces lilacinus*. *J. Agric. Univ. P. R.* 73 (1): 79-82.

[10]Anónimo, 1979. Conjunto tecnológico para la producción de hortalizas. Esta. Exp. Agric., Univ. P. R. Río Piedras, P. R.

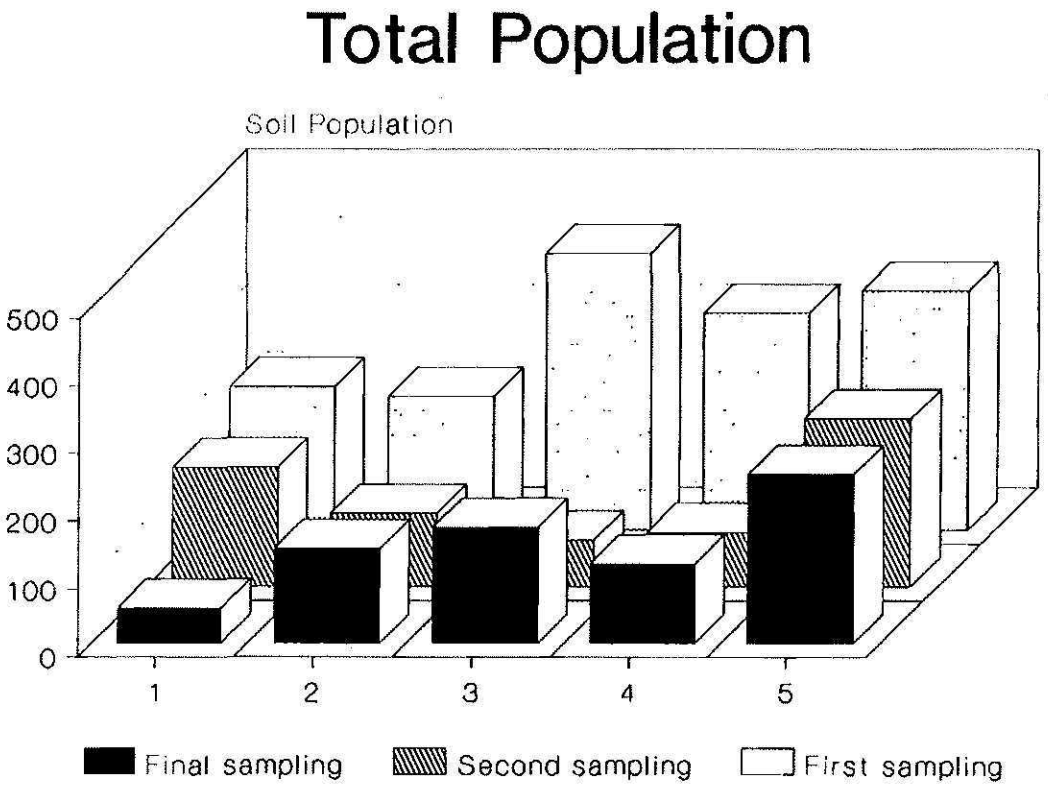

Fig. 1.—Soil nematode population fluctuations.

1 - Fungus added 2 wks. before planting;
2 - Carbofuran 10G (2.24 kg ai/ha);
3 - Phenamiphos 15G (6.73 kg ai/ha);
4 - Phenamiphos 15G (13.46 kg ai/ha);
5 - Control.

Johnson et al.[3] working with squash, and Román et al.[11] working with watermelon, obtained highest yields from phenamiphos 15G-treated plots. Our findings are consistent with those of Acosta[12] and Acosta et al.[5] who found significantly higher yield increases in watermelon and cucumber in plots treated with carbofuran 10G at 1.12 kg ai/ha.

Fungus and nematicide treatments effectively controlled nematodes in the soil (fig. 1).

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[11]Johnson, A. W., W. A. Rhode and W. C. Wright, 1982. Soil distribution of phenamiphos applied by overhead sprinkler irrigation to control *Meloidogyne incognita* on vegetables *Plant Dis.* 66: 489-91.

[12]Acosta, N., 1984. Evaluation of granular nematicides for the control of root-knot nematodes in watermelon, 1979. Fungicide and Nematicide Tests 39: 100 (188).