EFFECT OF FENAMIPHOS ON POPULATIONS OF *HETERODERA SCHACHTII* AND SUBSEQUENT PLANT INJURY IN A CABBAGE-CUCUMBER ROTATION

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ABSTRACT

Rhoades, H. L. 1982. Effect of fenamiphos on populations of *Heterodera schachtii* and subsequent plant injury in a cabbage-cucumber rotation. Nematropica 12:289-293.

In a greenhouse experiment, cabbage growing in soil heavily infested with *Heterodera schachtii* was treated with 6.72 kg/ha of fenamiphos. Growth of cabbage was over tenfold greater than growth in nontreated pots and was essentially the same as growth in the noninfested check pots. However, the nematode population returned to extremely high levels after 60 days on the nematicide treated cabbage. When the non-host crop cucumber was planted in heavily infested pots, plant growth was reduced 63%. Larval penetration of the roots occurred and injury symptoms were prevalent although there was no further development of the nematode. After 60 days growth of the cucumbers, larval populations were reduced 86%. Larval populations were extremely low after treating with 6.72 kg/ha of fenamiphos followed by 60 days growth of cucumber.

Additional key words: Brassica oleracea, Cucumis sativus, sugarbeet cyst nematode, Nemacur

RESUMEN

Rhoades, H.L. 1982. Efecto del fenamifos sobre poblaciones de *Heterodera schachtii* y daños subsiguientes en una rotación de coles con pepinos. Nematrópica 12:289-293.

En un experimento de invernadero con coles en un suelo infestado con *Heterodera schachtii* se estudió el efecto de un tratamiento con fenamifos en dosis de 6.72 kg/ha. El desarrollo de las coles en suelos con el tratamiento fué 10 veces mayor que en suelos sin fenamifos y esencialmente igual al de suelos sin inocular. Sin embargo, las poblaciones del nematodo alcanzaron niveles extremadamente altos 60 días después del tratamiento. Cuando se sembraron pepinos, especie que no es hospedera del nematodo, el desarrollo de las plantas disminuyó en un 63%. Se observó penetración de las larvas en las raíces así como síntomas de daño aunque el desarrollo del nematodo no continuó. Después de 60 días de crecimiento de los pepinos las poblaciones de larvas fueron reducidas en un 86%. También, las poblaciones de larvas fueron extremadamente

bajas seguido el tratamiento con 6.72 kg/ha de fenamifos en conjunción con 60 días de crecimiento de los pepinos.
Palabras claves adicionales: Brassica oleracea, Cucumis sativus, nematodo enquistador de la remolacha azucarera, Nemacur.

INTRODUCTION

The sugarbeet nematode, *Heterodera schachtii* Schmidt, was first reported in Florida in 1970 (5) where it was found parasitizing cabbage (*Brassica olearacea* L.). Subsequent studies (6) demonstrated that this population was highly pathogenic to cabbage and caused severe injury in heavily infested fields. Since cucumber (*Cucumis sativus* L.) is a non-host of this nematode (4) and is widely grown as a commercial crop in the area of infestation in central Florida, it has been used extensively in rotation with cabbage in addition to the use of a nematicide. This control program has been used for several years, with good success in most instances. However, in a few cases, injury to cabbage has continued to occur. During 1981 and 1982, a greenhouse experiment was conducted in which continuous cabbage and alternate crops of cucumber and cabbage with and without fenamiphos were compared. The objectives of the experiment were to determine the efficacy of fenamiphos for controlling *H. schachtii*, the effect of the nematode on the growth of cucumber as well as cabbage, and the effect of the nonhost crop cucumber on population level of the nematode.

MATERIALS AND METHODS

High populations of *H. schachtii* were built up in the greenhouse by adding freshly hatched larvae to sterilized Myakka fine sand then growing cabbage continuously for 6 mo. Soil samples taken at that time and processed by a centrifugal-flotation technique (2) revealed a population of approximately 2000 second stage larvae per 100 cm^3 of soil. This soil, plus noninfested soil in which cabbage had grown for 6 mo was used for conducting the experiment in 20 cm pots. The experimental design was a randomized complete block with five replicates. The first planting consisted of 7-8 cm high 'Rio Verde' cabbage plants transplanted singly into the pots and 'Poinsett' cucumbers seeded directly then thinned to two plants per pot when 2-3 cm high. Treatments consisted of check (no nematodes), infested, and infested treated with granular fenamiphos incorporated in the top 5 cm of soil at the rate of 6.72 kg a.i./ha. The plants were fertilized as needed and allowed to grow for 60 days, then cut and weighed. When it was found that the growth of the nonhost cucumber had been reduced by the nematode, the roots were removed, washed, and weighted, then stained with acid fuchsin and cleared with phenol to examine for the presence of larvae. Following this, the soil in the pots was kept fallow with periodic weeding for 30 days and then sampled for second stage larval populations. All pots were then replanted with cabbage. In this

planting, the treatments were repeated in the same pots. Cabbage followed both cabbage and cucumber with and without *H. schachtii* present, and where the nematode was present, with and without fenamiphos applied at 6.72 kg/ha. These plants were also grown for 60 days, then cut and weighed. Soil samples were again removed and processed for second stage larve.

RESULTS AND DISCUSSION

In the first crop, cabbage was injured severely in infested pots with practically no plant growth occuring (Table 1). In infested pots treated with 6.72 kg/ha of fenamiphos, cabbage growth was essentially as good as in check pots. This confirms the good performance reported for fenamiphos against this nematode (1,3). However, a much higher larval population was present in the soil following the treated cabbage than the untreated. This was apparently due to the more extensive root system that developed following treatment.

Cucumber plants in infested pots treated with fenamiphos were essentially as large as in check pots. However, plant growth was greatly reduced in the infested pots that were not treated. Root systems were also greatly reduced by the nematodes (Table 2) and stained roots exhibited many second stage larvae. None were found that had progressed beyond the second stage, however, which confirms an earlier report of this occurrence (4).

Table 1. Effect of *Heterodera schachtii* on the growth of cabbage and cucumber with and without nematicide treatment.

First crop[x]	Treatment	Plant wt.[y] (grams)	Larval population[z]	Second crop	Treatment	Plant wt. (grams)
Cabbage	Check	197	0	Cabbage	Check	137
Cabbage	Infested	18	754	Cabbage	Infested	20
Cabbage	Infested + fenamiphos	188	3870	Cabbage	Infested + fenamiphos	142
LSD .05		18				21
Cucumber	Check	92	0	Cabbage	Check	140
Cucumber	Infested	34	365	Cabbage	Infested	19
Cucumber	Infested + fenamiphos	83	91	Cabbage	Infested + fenamiphos	150
LSD .05		15				18

[x]All but check pots had an initial population of approximately 2000 larvae per 100 cm^3 of soil.
[y]One plant per pot for cabbage and two for cucumber.
[z]Average number of second stage larvae per 100 cm^3 of soil at end of first crop.

Table 2. Effect of *Heterodera schachtii* on the growth of cucumber roots with and without nematicide treatment.

Treatment	Root wt. (grams)
Check	22.6
Infested[x]	9.9
Infested + Fenamiphos	15.4
LSD .05	4.5

[x]The initial population of second stage larvae was approximately 2000 per 100 cm^3 of soil.

In the second planting, which consisted of cabbage only, plant growth was essentially the same in check pots and pots treated with fenamiphos following both cabbage and cucumber. Although the second stage larval population was much lower following cucumber than cabbage, the subsequent growth of cabbage was greatly reduced and approximately the same in both cases.

The data obtained in this experiment demonstrate that although *H. schachtii* does not reproduce on cucumber, the pentration of the root system by high populations of second stage larvae results in greatly reduced top and root growth. The data also show that even though populations of the second stage larvae are greatly reduced by a single crop of cucumber, the use of a nematicide would probably still be needed for adequate growth of cabbage.

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