Nematol. medit. (1983), *11*: 115-118.

Section of Plant Pathology and Nematology, Department of Botany, Aligarh Muslim University, Aligarh - 202001, India

ATTRACTIVENESS OF *MELOIDOGYNE INCOGNITA* LARVAE TO ROOTS OF TOMATO AND CHANGES IN BIOCHEMICAL CONTENT OF PLANTS AS AFFECETD BY OILCAKES AND NEMATICIDES

by
S. P. SINGH, VEENA PANT, A. M. KHAN and S. K. SAXENA

Oilcake organic amendments have proved to be effective in controlling plant parasitic nematodes on many different crops (Khan *et al.*, 1974; Singh and Sitaramaiah, 1971; Singh *et al.*, 1979). The mechanism of control is not fully understood but several theories have been advanced, including an increase in predaceous activity of microorganisms in the amended soil (Linford and Oliveira, 1937), release of toxic substances during decomposition of organic matter (Sayre, 1971) and the acquisition of increased resistance by the plant (Giebel, 1974). Singh *et al.* (1980) have attempted to reduce the economic cost of treatment by coating the seeds with oilcakes and obtained a level of nematode control almost equal to that obtained by the usual soil amendment. It, therefore, seemed appropriate to find out how nematodes behave in the presence of oilcake-coated seeds and the effect on the biochemistry of the plants grown from such treated seeds. Specifically, the present study examined the relative attractiveness of roots of tomato cv. Marglobe seedlings, grown from seeds treated with oilcakes, to the larvae of *Meloidogyne incognita* (Kofoid *et* White) Chitw. and the changes in the phenolic and aminoacid content of the seedlings. Comparative treatments were made with several nematicides.

Materials and Methods

The oilcakes used were castor (*Ricinus communis* L.), mustard (*Brassica campestris* L.) and neem (*Azadirachta indica* Juss.). Seeds

were immersed in a suspension of finely ground oilcake to give an approximate rate of application of 2g/10g seeds. The nematicides used were Carbofuran (Furadan 3G), Dimethoate (Rogor 5G) and Aldicarb (Temik 10G) applied at the rate of 0.2g/10g seeds. The treated seeds were dried at room temperature before sowing them in petri dishes containing 1% water agar. Untreated seeds were sown as controls. About 20 (± 2) freshly hatched *M. incognita* larvae, obtained from a culture maintained on tomato, were placed in the petri dishes at a distance of about 5 mm from the roots of the seedlings. Some 15 day old seedlings were also placed on a agar film on microscope slides and nematodes were similarly added to these. After inoculations petri dishes and slides were left for 48 hours at 25°C. They were then examined for nematode activity and the tracks of individual nematodes were recorded by means of a camera lucida. The roots were stained with cotton blue lactophenol to determine the number of larvae that had penetrated.

Total free phenols, o-dihydroxyphenols and total free aminoacids in the seedlings were determined by the method of Biehn *et al.*, (1968) using Folin Ciocalteau reagent (Bray and Thorpe, 1954) at 660 nm for total free phenols, and the method of Johnson and Schaal (1952) with Arnows reagent at 530 nm for o-dihydroxyphenols. Total free aminoacids were determined with modified ninhydrin reagent (Moore and Stein, 1954) at 570 nm in a Bausch and Lomb Spectronic-20 colorimeter.

Results and Discussion

No larvae penetrated the roots of any of the seeds treated with oilcakes or nematicides (Table I) compared with a penetration rate of 70% in the untreated controls. Observation of the nematodes showed that many of the nematodes were repelled from the roots of treated seeds.

There was no increase of phenols or aminoacids in the nematicide treatments compared with the untreated controls. However, oilcake treatment of the seeds produced seedlings that had significant increase in total free phenols, o-dihydroxyphenols and aminoacids (Table I). This increase may provide resistance to nematode attack (Singh and Chowdhury, 1973; Giebel, 1974) either by repelling the larvae or by

Table I - *Penetration of larvae of* M. incognita *and changes in total free phenols, o-dihydroxyphenols and aminoacids content in seedlings of tomato cv. Marglobe.*

Treatments	No. of larvae entered in roots	Total free phenols mg/100 mg sample	o-dihydroxy-phenols mg/100 mg sample	Aminoacids mg/100 mg sample
Control (Untreated)	14	0.20	0.037	0.26
Castor cake	0	0.26**	0.045**	0.29
Mustard cake	0	0.27**	0.049**	0.32*
Neem cake	0	0.30**	0.050**	0.30
Carbofuran	0	0.20	0.036	0.25
Dimethoate	0	0.21	0.036	0.27
Aldicarb	0	0.19	0.037	0.27
* L.S.D. (at 5% level)		0.044	0.01	0.05
** L.S.D. (at 1% level)		0.059	0.01	0.06

N. B.: each value is an average of 3 replicates.

adversely affecting the development of those larvae that entered the roots.

The award of C.S.I.R. Senior Fellowship to the first two authors (S.P.S. and V.P.) is gratefully acknowledged.

SUMMARY

When *Meloidogyne incognita* larval suspensions were placed in petri dishes containing water agar at a distance of about 5 mm from the roots of tomato seedlings grown from seeds treated with different oilcakes and nematicides, the larvae were repelled from roots. Moreover, plants grown from seeds treated with oilcakes had higher amounts of total free phenols, o-dihydroxyphenols and aminoacids as compared to untreated plants. Plants from seed treated with nematicide showed no difference in these biochemical contents.

LITERATURE CITED

BIEHN W. L., KUC J. and WILLIAMS E. B., 1968 - Accumulation of phenols in resistant plants, fungi interactions. *Phytopathology, 58*: 1255-1260.

BRAY H. G. and THORPE W. V., 1954 - Analysis of phenolic compounds of interest in metabolism. *Meth. Biochem. Anal., 1*: 27-52.

GIEBEL J., 1974 - Biochemical mechanism of plant resistance to nematodes: a review. *J. Nematol., 6*: 157-184.

JOHNSON G. and SCHAAL L. R., 1952 - Relation of chlorogenic acid to the scab resistance in potatoes. *Science, 115*: 627-629.

KHAN A. M., ALAM M. M. and AHMAD R., 1974 - Mechanism of control of plant parasitic nematodes as a result of the application of oilcakes to the soil. *Indian J. Nematol., 4*: 93-96.

LINFORD M. B. and OLIVEIRA J. M., 1937 - Stimulating activity of natural enemies of nematodes. *Science, 85*: 123-124.

MOORE H. and STEIN W. H., 1954 - Modified ninhydrin reagent for the spectrophotometric determination of aminoacids. *J. Biol. Chem., 24*: 904-913.

SAYRE R. M., 1971 - Biotic influences in soil environment. In « *Plant Parasitic Nematodes* » Vol. I. (Eds. Zukerman B. M., Mai W. F. and Rhode R. A.), Academic Press, New York and London, pp. 235-256.

SINGH B. and CHOWDHURY B., 1973 - The chemical characteristics of tomato cultivars resistant to root-knot nematodes (*Meloidogyne* spp). *Nematologica, 19*: 443-448.

SINGH R. S. and SITARAMAIAH K., 1971 - Control of root-knot through organic and inorganic amendments of soil - Effect of oilcakes and sawdust. *Indian J. Mycol. Plant Pathol., 1*: 20-29.

SINGH S. P.., KHAN A. M and SAXENA S. K., 1979 - Effect of watering and mode of application of oilcakes and nematicides on their efficacy in controlling root-knot nematode on tomato. *Acta Bot. Indica., 8*: 193-195.

SINGH S. P., AHMAD M., KHAN A. M. and SAXENA S. K., 1980 - Effect of seed treatments with certain oilcakes or nematicides on the growth of tomato and rhizosphere population of nematodes and fungi. *Nematol. medit., 8*: 193-198.

Accepted for publication on 25 January 1983.