Nematol. medit. (1999), 27: 31-33

Department of Plant Pathology, Faculty of Agriculture,
Alexandria University, El-Shatby, Alexandria, Egypt

PATHOGENICITY AND CONTROL OF *MELOIDOGYNE INCOGNITA* ON EGGPLANT

by
I. K. A. IBRAHIM, W. T. SHAHDA and O. A. I. DAWOOD

Summary. The eggplant cvs Black Beauty, Black Long and White Long were highly susceptible to *Meloidogyne incognita* in pot experiments in glasshouse at 28±1 °C. Soaking of eggplant seeds and foliar spray of seedlings with 50 and/or 100 µg/ml water solutions of thiamine, the amino acids cystin, tryptophan, tyrosin, aspartic acid and phenylalanine, or the plant growth regulators gibberellic acid, indolbutyric acid and indol-3-acetic acid significantly reduced the numbers of galls and egg masses of *M. incognita* on roots of cv. Black Beauty. The higher concentration of the tested substances was more effective in reducing the nematode infestation. Also, treatment with the fungi *Paecilomyces lilacinus* and *Hirsutella rhossiliensis* resulted in 69%, and 47% reduction in numbers of galls and egg masses of *M. incognita* on roots of cv. Black Beauty.

Eggplant is one of the most important vegetable crops in Egypt, highly susceptible and a good host to the root-knot nematodes, *Meloidogyne* spp. (Ahuja and Muchopadhyaya, 1988; Hasan *et al.*, 1988).

The objectives of the present research were to study the pathogenicity of *Meloidogyne incognita* (Kofoid *et* White) Chitw. on three eggplant (*Solanum melongena* L.) cultivars and to test the possibility of biological and chemical control.

Materials and methods

Experiments were carried out in glasshouse at 28±1 °C in 15 cm diam clay pots filled with autoclaved sandy clay soil. Seeds of the cvs Black Beauty, Black Long and White Long were sown and seven days after emergence, seedlings were thinned to two plants per pot. Soil was inoculated with 6000 eggs/pot, pipetted into the root zone, of an Egyptian population of *M. incognita*. There were four replicates per cv. and uninoculated pots served as control.

Control trials were undertaken with cv. Black Beauty, with five replicates per treatment including control pots.

Seeds were soaked for 24 hours in 100 µg/ml solutions of L (+) cystine hydrochloride, D-L tryptophan, L (-) tyrosine, L aspartic acid, D-L phenylalanine and thiamine (VB) or 50 or 100 µg/ml solutions of indol-3-acetic acid (IAA), gibberellic acid (GA) and indolbutyric acid (IBA) for 48 hr, then sown, as previously indicated and seven days after emergence, soil was infested with 8000 nematode eggs/pot. Solutions of 100 µg/ml conc. of the tested substances were sprayed on the foliage of eggplant seedlings at the rate of 20 ml/pot, 24 hr before and at the time of nematode inoculation.

Inocula of *Paecilomyces lilacinus* Thom. *et* Samson and *Hirsutella rhossiliensis* Minter *et* Brady were prepared by growing each fungus in a 200 ml conical flask containing 20 g steril-

TABLE I - *Effect of* Meloidogyne incognita *on growth of three eggplant cultivars.*

Treatment	Shoot length (cm)		Root length (cm)		Shoot dry wt. (g)		Root dry wt. (g)	
	Control	Infested	Control	Infested	Control	Infested	Control	Infested
Black Beauty	26	21*	21	19	0.85	0.75	0.68	0.68
Black Long	20	21	19	21	0.87	0.67	0.78	0.58
White Long	19	19	15	16	1.03	0.62*	0.96	0.52*

* Significant at P=0.05, with respect to the control, according to the Student's "t" test.

ized wheat grains and incubated at room temp. for two weeks. Soil was infested with 10 g/pot of sterilized or fungal-infested wheat grains, and seven days later eggplant seeds were sown. One week after emergence, soil was infested with 7000 *M. incognita* eggs/pot. Aldicarb (Temik 10G) was added at the rate of 0.25 g c.p./pot at inoculation time.

Sixty days after inoculation roots were washed free of soil and egg masses were stained in aqueous phloxine B (0.15 g/litres of water) for 15 minutes. Numbers of root galls and egg masses/plant and, for the pathogenicity tests, dry weight and length of roots and shoots were determined. Data were statistically analysed according to SAS Institute (1988) system.

Results and discussion

The eggplant cvs Black Beauty, Black Long and White Long were highly susceptible to *M. incognita* with large numbers of galls (427-451/root system) and nematode egg masses (408-430/root system) recorded on roots. Nematode infestation had no significant effect on the length or dry weight of root and shoot of the tested cultivars except that cv. White Long had a significant reduction in plant dry weight (Table I). These results are similar to those of Hassan (1979) and Gul and Saead (1990).

Treatments with thiamine (VBI) and amino acids significantly reduced the numbers of galls and nematode egg masses on the roots of eggplant cv. Black Beauty as compared with control (Table II). Treatments with thiamine and phenylalanine induced the highest reductions (81-84%) in galls and egg masses, whereas other amino acid treatments resulted in 71-80% reductions in galls and egg masses. Recent studies by El-Zawahry and Hamada (1994) showed that soaking eggplant seeds in 50 or 100 µg/ml solutions of ascorbic acid, VBI or VBG reduced root galling of *M. javanica* and increased the weights of shoot and roots as compared with the control.

Treatments with plant growth regulators IAA, IBA and GA resulted in significant reductions in the numbers of root galls and nematode egg masses on eggplant cv. Black Beauty (Table III). Treatments with GA (100 µg/ml) induced great reduction (80-81%) in the numbers of galls and

TABLE II - *Effect of some amino acids and thiamine on the infestation of* M. incognita *on eggplant cv. Black Beauty.*

Treatment	No. of galls/ plant	No. of egg masses/ plant	% Reduction with respect to control	
			Galls	Egg masses
Control	1170 a	1019 a	–	–
Thiamine	185 f	164 e	84	84
Phenylalanine	204 ef	192 de	83	81
Cystin	237 de	225 cd	80	78
Tryptophan	290 cd	284 b	75	72
Aspartic acid	320 cb	277 cb	73	73
Tyrosine	341 b	282 b	71	72

Values within a column followed by the same letter are not significantly different at P=0.05.

TABLE III - *Effect of plant growth regulators on the infestation of* M. incognita *on eggplant cv. Black Beauty.*

Treatment	No. of galls/ plant	No. of egg masses/ plant	% Reduction with respect to control	
			Galls	Egg masses
Control	951 a	871 a	–	–
Gibberelic acid 100 µg/ml	177 g	174 f	81	80
Gibberelic acid 50 µg/ml	398 d	380 c	58	56
Indolbutyric acid 100 µg/ml	220 f	210 e	77	76
Indolbutyric acid 50 µg/ml	478 b	462 b	48	47
Indol-3-acetic acid 100 µg/ml	452 e	431 d	52	50
Indol-3-acetic acid 50 µg/ml	547 b	523 b	42	40

Values within a column followed by the same letter are not significantly different at P=0.05.

TABLE IV - *Effect of aldicarb and biocontrol agents on* M. incognita *infestation on eggplant cv. Black Beauty.*

Treatment	No. of galls/ plant	No. of egg masses/ plant	% Reduction with respect to control	
			Galls	Egg masses
Control	940 a	948 a	–	–
Aldicarb	90 d	97 d	90	91
Paecilomyces lilacinus	297 c	287 c	68	69
Hirsutella rhossoliensis	504 b	486 b	47	47
Wheat grains	569 b	547 b	39	40

Values within a column followed by the same letter are not significantly different at P=0.05.

Accepted for publication on 10 October 1998.

egg masses, followed in this respect by IBA treatment (100 µg/ml) with 76-77% reduction while other treatments showed 40-58% reductions. These results are in agreement with those reported by other workers (Hassan, 1979; Ibrahim *et al.*, 1980; El-Sherbiny, 1995).

Data of Table IV showed that aldicarb treatment reduced the numbers of galls and egg masses by 90-91% followed by, *P. lilacinus* and *H. rhossiliensis* with 69% and 47% reduction, respectively. These results confirm the findings of El-Sherbiny (1995) on corn, Zid (1996) on sunflower, and Mahgoub (1996) on cowpea roots.

Literature cited

AHUJA S. and MUCHOPADHYAYA M. C., 1988. Variability in the occurrence of root-knot nematode, *Meloidogyne incognita* in various vegetable crops. *Plant Breeding Abstr., 58*: 7902.

EL-SHERBINY A. A. I., 1995. Survey and pathological studies on plant parasitic nematodes in north Egypt. M. Sc. Thesis. Faculty of Agric., Alexandria Univ., Egypt. 85 pp.

EL-ZAWAHRY A. M. and HAMADA A. M., 1994. The effect of soaking seeds in ascorbic acid, pyridoxine thiamine solutions on nematode (*Meloidogyne javanica*) infection and on some metabolic processes in eggplant. *Assiut. J. Agric Sci., 22*: 233-247.

GUL A. and SAEAD M., 1990. A survey of root-knot nematodes (*Meloidogyne spp.*) in North west frontier Province (NWFP) of Pakistan. *Sarhad J. Agric, 6*: 495-502.

HASAN A., CHHABRA H. K., PATTAK S. P. and DIXIT J., 1988. Preliminary field screening of some cultivars of eggplant against root-knot nematode. *J. Agric. Res., 1*: 171-172. (Plant Breeding Abstr. 58: 9002).

HASSAN B. E. M., 1979. Studies on plant parasitic nematodes attacking certain crops of the solanaceae family. M. Sc. Thesis. Faculty of Agric., Alexandria Univ., Egypt. 75. pp.

IBRAHIM I.K. A., REZK M. A. and KHALIL H. A.A., 1980. The influence of plant growth substances on pathogenicity of *Meloidogyne javanica* on soybeans and cotton. *Alex. J. Agric. Res., 28*: 233-237.

MAHGOUB S. A. S., 1996. Studies on root-knot nematodes attacking some common bean, cowpea and pea crops. Ph. D. Thesis, Faculty of Agric., Alexandria Univ., Egypt. 91 pp.

SAS Institute, 1988. SAS/STAT User Guide. Release 6.03 Edition. SAS Institute Inc., Cary, NC 27512-8000. 11028 pp.

ZID A. A. E., 1996. Studies on root-knot nematodes attacking sunflower and flax. M. Sc. Thesis, Faculty of Agric., Alexandria Univ., Egypt. 79 pp.