PRELIMINARY EVALUATION OF *MELOIDOGYNE INCOGNITA* RACE 3 REPRODUCTION ON GARDEN PEA CULTIVARS IN BRAZIL[1]

CARLOS EDUARDO ROSSI[2]
ANA CRISTINA MAGALHÃES ARAÚJO[2]
LUIZ CARLOS CAMARGO BARBOSA FERRAZ[2]

ROSSI, C.E.; ARAÚJO, A.C.M.; FERRAZ, L.C.C.B. Preliminary evaluation of *Meloidogyne incognita* race 3 reproduction on garden pea cultivars in Brazil. *Semina*: Ci. Agrárias, Londrina, v. 21, n. 1, p. 97-99, mar. 2000.

ABSTRACT: *Thirteen garden pea cultivars, were assessed for the reproductive rate of the root-knot nematode Meloidogyne incognita race 3 under greenhouse conditions. Two-week old plants growing were inoculated with 5,000 eggs. The nematode reproduction data was determined 55 days later according to the three adopted evaluation criteria (root-gall and egg-mass indexes, reproduction factor, percentage of reduction of the reproduction factor in relation to the susceptible standard cultivar). The tested cultivars were rated as highly susceptible ('Trolly', 'Jurema'), susceptible ('Luíza', 'Mini', 'Asterix', 'Verde Temprana') or moderately susceptible ('Marina', 'Telephone', 'Dileta', 'Bolero', 'Flávia', 'Viçosa', and 'Maria') hosts for the nematode.*

KEY WORDS: *Pisum sativum; root-knot nematode; host suitability.*

The garden pea (*Pisum sativum* L.) is a Fabaceae broadly grown in the world is known as susceptible to plant-parasitic nematodes, mainly to the root-knot species belonging to the genus *Meloidogyne* (Ravichandra et al., 1988; Bhagawati & Phukan, 1991; Sharma & Fonseca, 1992). Screening of cultivars for resistance to root-knot nematodes has been considered as a relevant step in breeding programs around the world (Hadisoeganda & Sasser, 1982; Ravichandra et al., 1987, 1988; Darekar et al., 1991; Sharma & Giordano, 1992). This paper deals with the evaluation of the reproductive rate of *Meloidogyne incognita* (Kofoid & White) Chitwood race 3 on 13 brazilian cultivars under greenhouse conditions.

A completely randomized design with 13 treatments (= cultivars) and three replications was adopted. The cultivars were as follows: Asterix, Bolero, Dileta, Flávia, Jurema, Luíza, Maria, Marina, Mini, Telephone, Trolly, Verde Temprana, and Viçosa. The seeds were kindly supplied by Dr. L. B. Giordano from Centro Nacional de Pesquisa de Hortaliças/ Embrapa, Dra. Elaine Bahia Wutke from Instituto Agronômico de Campinas, and Asgrow do Brasil Sementes. For each cultivar, one plant was left to grow per polyethylene pot filled with 500 cm^3 of a sterilized : mixture of soil and organic matter.

Nematode eggs were extracted from infected tomato 'Rutgers' roots according to Hussey & Barker (1973) technique, as modified by Boneti & Ferraz (1981). Each two-week old garden pea plant being inoculated with approximately 5,000 eggs (Pi) at the rizosphere zone. Additional tomato 'Rutgers' plants were also inoculated to allow the inoculum viability to be confirmed.

The greenhouse temperature was maintained at a 24-30°C range. Data assessment was carried out 55 days after the inoculation, the root-gall (GI) and egg mass (EMI) indexes according to Taylor & Sasser (1978) and the reproduction factor (RF = Pf/Pi) values according to Oostenbrink (1966) being determined. The criterion suggested by Moura & Régis (1987), based on the percentual reduction of the reproduction factor (% Red. RF) of each cultivar as compared to that one determined for the most favourable cultivar (= susceptible standard) was also practiced.

The tomato plants showed high root infection confirming the inoculum viability, with mean GI and EMI values being 5,0. All garden pea cultivars were also highly infected, with GI and EMI mean values equal to 5,0, except for Viçosa (= 4,7), being rated as susceptible or good hosts (Table 1). The RF mean values were always higher than 1,0, ranging

[1] Finantial support supplied by CNPq
[2] ESALQ/USP, Zoology Department, P.O. Box, 09, 13418-900, Piracicaba, S.P., Brazil (Carlos Eduardo Rossi).

from 1,82 for Maria (Pf = 9,100) to 5,75 for Trolly (Pf = 28,750), all the cultivars being rated again as susceptible/good hosts (Table 1). As Trolly was the cultivar which yielded the highest RF value, it was considered to be the susceptible standard, the % Red. RF values being subsequently determined for the remaining ones. These values, ranging from 14,4 (for Jurema) to 68,3 (Maria), led Jurema to be rated as highly susceptible, Luiza, Mini, Asterix, Verde Temprana, and Telephone as susceptible, and Marina, Dileta, Bolero, Flávia, Viçosa, and Maria as moderately susceptible hosts for the nematode (Table 1).

A predominant condition of the garden pea tested cultivars being favourable plants for *M. incognita* race 3 reproduction was evident when the three different criteria were grouped for evaluating the host suitability. This had been also observed by Hadisoeganda & Sasser (1982) and Ravichandra et al. (1987; 1988) in their studies with *M. incognita* races, and by Sharma & Giordano (1992), in Brazil, in relation to another important root-knot nematode, *M. javanica* (Treub) Chitwood.

These results enhance the need for more intensive research on the genetic breeding of garden pea for resistance to root-knot nematodes and are also rendered to alert growers with regard to: a) the importance of properly select *Meloidogyne*-free areas for cultivating with this leguminous crop; b) the inadequacy of including this crop in rotation programs to reduce meloidogynosis problems.

Table 1 – Average of root gall (GI) and egg-mass (EMI) indexes, reproduction factor (RF), nematode final population (Pf) and reduction of the reproduction factor (% Red. RF), determined for *Meloidogyne incognita* race 3, on garden pea cultivars, under greenhouse conditions[1]

Cultivar	GI	EMI	Reaction[4]	Pf [2]	RF	Reaction[4]	% Red. RF	Reaction
Trolly	5,0[2]	5,0[2]	S	28.750	5,75[2]	S	(standard)	(AS)
Jurema	5,0	5,0	S	24.600	4,92	S	14,4[3]	AS
Luiza	5,0	5,0	S	21.250	4,25	S	26,0	S
Mini	5,0	5,0	S	18.550	3,71	S	35,4	S
Asterix	5,0	5,0	S	16.450	3,29	S	42,7	S
Verde Temprana	5,0	5,0	S	15.200	3,04	S	47,1	S
Telephone	5,0	5,0	S	15.100	3,02	S	47,5	S
Marina	5,0	5,0	S	13.900	2,78	S	51,6	MS
Dileta	5,0	5,0	S	13.000	2,60	S	54,7	MS
Bolero	5,0	5,0	S	11.350	2,27	S	60,5	MS
Flávia	5,0	5,0	S	10.800	2,16	S	62,4	MS
Viçosa	4,7	4,7	S	9.400	1,88	S	67,3	MS
Maria	5,0	5,0	S	9.100	1,82	S	68,3	MS

1. Means of tree replications;
2. GI and EMI values according to Taylor & Sasser (1978); RF values according to Oostenbrink (19 66);
3. % Red. RF values according to Moura & Régis (1987);
4. Reaction designations are: AS = highly susceptible; S = susceptible; MS = moderately susceptible.

ROSSI, C.E.; ARAÚJO, A.C.M.; FERRAZ, L.C.C.B. Avaliação preliminar da reprodução de *Meloidogyne incognita* raça 3 em cultivares de ervilha no Brasil. *Semina*: Ci. Agrárias, Londrina, v. 21, n. 1, p. 97-99, mar. 2000.

***RESUMO**: Avaliaram-se as taxas reprodutivas e caracterizaram-se as reações de 13 cultivares de ervilha em relação ao nematóide de galhas Meloidogyne incognita raça 3, em casa-de-vegetação. Plantas com duas semanas de idade, foram inoculadas com 5000 ovos do nematóide. As avaliações foram realizadas após 55 dias com base nos critérios - índices de galhas/índices de massas de ovos, fator de reprodução e porcentagem de redução do fator de reprodução. Duas cultivares foram consideradas hospedeiras altamente suscetíveis ('Trolly', 'Jurema'); cinco suscetíveis ('Luiza', 'Mini', 'Asterix', 'Verde Temprana', 'Telefone') e seis moderadamente suscetíveis ('Marina', 'Dileta', 'Bolero', 'Flávia', 'Viçosa', 'Maria').*

***PALAVRAS-CHAVE**: Pisum sativum; nematóide de galhas; reação hospedeira.*

REFERENCES

BHAGAWATI, B.; PHUKAN, P.N. Pathogenicity of root-knot nematode, *Meloidogyne incognita* on pea. *Indian J. Nematol.*, v.21, p. 141-144, 1991.

BONETTI, J.I.S.; FERRAZ, S. Modificações do método de Hussey & Barker para extração de ovos de *Meloidogyne exigua* de raizes de cafeeiro. *Fitopatol. Bras.*, v.6, p.533, 1981.

DAREKAR, K.S.; MHASE, N.L.; SHELKE, S.S. Response of pea varieties/selections to *Meloidogyne incognita*. *Current Nematology*, v.2, p.78-80, 1991.

HADISOEGANDA, W.W.; SASSER, J.N. Resistance of tomato, bean, southern pea, and garden pea cultivars to root-knot nematodes based on host suitability. *Plant Disease* , v.66, n.2, p.145-150, 1982.

HUSSEY, R.S.; BARKER, K.R. A comparison of methods of collecting inocula of *Meloidogyne* spp. including a new technique. *Plant Dis. Reptr.*, v.57, p.1025-1028, 1973.

MOURA, R.M.; RÉGIS, E.M.O. Reações de cultivares de feijoeiro comum em relação ao parasitismo de *Meloidogyne javanica* e *M. incognita*. *Nematol. Bras.*, v.11, p.215-225, 1987.

OOSTENBRINK, M. Major characteristics of the relation between nematodes and plants. Meded. Landbouw. *Wageningen*, v.66, p.1-46, 1966.

RAVICHANDRA, N.G.; KRISHNAPPA, K.; SAIFULLA, M.; ANILKUMAR, T.B. Evaluation of field pea varieties for resistance to the root-knot nematode *Meloidogyne incognita*. *Int. Nematol. Network Newsletter*, v.4, n.2, p.9-11, 1987.

RAVICHANDRA, N.G.; KRISHNAPPA, K.; SAIFULLA, M.; ANILKUMAR, T.B. Reaction of certain pea lines to root-knot nematode *Meloidogyne incognita*. *Int. Nematol. Network Newsletter*, v.5, n.2, p.16-17, 1988.

SHARMA, R.D.; FONSECA, C.E.L. Effect of *Meloidogyne javanica* on the growth and grain yield of pea. *Nematol. Bras.*, v.16, p.94, 1992.

SHARMA, R.D.; GIORDANO, L. Reações de algumas cultivares de ervilha a *Meloidogyne javanica*. *Nematol. Bras.*, v.16, p.102, 1992.

TAYLOR, A.L.; SASSER, J.N. *Biology, identification and control of root-knot nematodes* (*Meloidogyne* species). Raleigh: NCSU/USAID, 1978. 111p.