Journal of Agricultural Sciences
Vol. 46, No 2, 2001
Pages 185 - 189

UDC: 635.64:595.13
Preliminary communication

RESPONSE OF F_1 HYBRIDS OF THE *LYCOPERSICON* GENUS TO MELOIDOGYNE INCOGNITA AND GLOBODERA ROSTOCHIENSIS

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Abstract: F_1 hybrids of *Lycopersicon chilense* and *Lycopersicon peruvianum* var. humifusum were tested for resistanse to Meloidogyne incognita (Kofoid et White, 1919) chitw 1949 and Globodera rostochiensis (Woll, 1923) Mulvey, Stone, 1976, under glasshouse conditions. All hybrids showed resistance to M. incognita. Two hybrids were resistant to G. rostochiensis.

Key words: cyst nematodes, root-knot nematodes, resistance.

Introduction

Tomato plants (*Lycopersicon esculentum* Mill.) have been found seriously damaged by many nematodes species. They are an excellent host for root-knot and cyst forming nematodes. Root-knot nematodes Meloidogyne spp. occur world-wide and are important pest on many crops (Sasser, 1977). The studies carried out by Stoyanov (1980; 1989); Stoyanov, Trifonova (1994); Trifonova (1995; 2000) showed that M. incognita and G. rostochiensis are widely distributed in many regions of Bulgaria. These nematodes can be controlled by chemicals but they are expensive and may pollute the environment. Good control can also be achieved using resistant cultivars and wild tomato species (Choleva et al, 1988; Trifonova et al, 1995).

The objective of this study was to establish the resistance of F_1 hybrids from *L. chilense* x *L. peruvianum* var. *humifusum* to G. rostochiensis and M. incognita.

Materials and Methods

Fourteen hybrids obtained from the Institute of Genetics-Sofia were used in this experiment conducted in the glasshouse. Twenty seeds of each hybrid were

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kept for germination in small plastic pots filled with a sterilised mixture of peat and sandy soil (v:v 1:1). Later seedlings were transplanted in PVC plots (12 cm diameter and 15 cm height) with 500 g sterilised soil for inoculation. Each plot contained one plant.

The inoculum from M. incognita was initially isolated from infested tomato plants and multiplied under greenhouse conditions for 2 months. After this period, heavily infested tomato roots (cr. Rutgers) were washed of adhering soil and used for preparing inocolum. The seedlings were inoculated with ten egg masses/per plant of M. incognita of equal size obtained from tomato roots and deposited near the roots.

The population of G. rostochiensis was obtained from an infested fields from Smoljan region. Cysts were extracted from soil by the wet- sieve decantation technique. Inoculum of 50 viable cysts put in nylon mesh bags was placed in each pot. Each treatment was replicated 5 times.

Tomatos (L. *esculentum* cr. Ideal) were used for control. The plants were irrigated daily according to the apparent needs of the plant. The experiment was evaluated 45 and 90 days after inoculation. After this period the plants were uprooted, the roots were gently washed and the gall index (GL) was then assessed according to a (0-5) scale, where 0=no gall on the roots, 1=1-2 galls, 2=3-10, 3=11-30, 4=31-100 and 5=more than 100 galls per root (Taylor and Sasser, 1978). A tomato plant was considered resistant when the gall index (GL) was < 2.

Final cyst densities were determined by the wet-sieve decantation technique. Cysts were crushed and their egg content determined. The degree of infection was assessed on a 0-3 scale (0= no cyst, 1=number of cysts up to 10; 2= number of cysts up to 30; 3= number of cysts more than 30) per plant height, fresh weight of the stem and of root system were recorded.

Results and Discussion

All F_1 hybrids grew well in the glasshouse and the two nematode populations used reproduced actively on the susceptible control tomato plants. No galls were found on the roots of the twelve plant hybrids. Some galls were observed on the roots of the hybrids - No 140 and No 144 (GL= 1.2 and 1.3). The roots of the control – cv. Rutgers tomato were heavily infested by M. incognita with GL=5. Data on plant growth characters in inoculated plants were similar to uninoculated. These results indicate that F_1 hybrids of *L. chilense x L. peruvianum* var. humifusum are resistante to root-knot nematode M. incognita. This finding is very important because the areas where tomato is cultivated are generally infested by M. incognita or by other root-knot nematode species.

T a b . 1. - Reaction of F_1 hybrids of the *Lycopersicon* spp. to Meloidogyne incognita

F_1 hybrids		Growth parameters			Gall index	Reaction type
		Height	Fresh weight (g)			
			root	stem		
No	57	30.4	10.3	20.1	0	R
No	59	32.3	11.4	21.2	0	R
No	72	33.4	10.8	22.4	0	R
No	73	32.8	12.0	20.3	0	R
No	79	31.8	11.0	19.8	0	R
No	116	32.4	10.5	21.3	0	R
No	117	30.4	9.8	20.4	0	R
No	118	31.5	11.3	21.8	0	R
No	138	30.8	10.4	20.5	0	R
No	139	31.4	10.8	19.7	0	R
No	140	30.2	10.3	20.4	1.2	R
No	142	32.3	11.0	21.2	0	R
No	143	30.3	10.4	20.3	0	R
No	144	32.2	10.5	20.8	1.3	R
Tomato (check)		20.3	7.2	15.3	5	S

Gall index = see text.

Results from Table 2 showed that twelve F_1 hybrids were susceptible to G. rostochiensis and only two of them (No 72 and No 73) were resistant. These results differ from a previous study (C h o l e v a et al. 1988).

T a b . 2. - Reaction of F_1 hybrids of the *Lycopersicon* spp. to Globodera rostochiensis

F_1 hybrids		Growth parameters			Infection rating*	Number of eggs and juveniles/ per plant	Reaction type**
		Height	Fresh weight(g)				
			root	stem			
No	57	41.0	11.2	20.3	1	53.8	S
No	58	42.0	10.2	22.3	1	54.6	S
No	72	41.3	10.4	24.4	0	0	R
No	73	43.3	11.0	21.3	0	0	R
No	79	42.2	11.5	20.5	1	70.1	S
No	116	40.1	10.3	22.3	1	47.5	S
No	117	42.1	10.5	24.5	1	66.0	S
No	118	40.3	11.6	21.5	1	64.2	S
No	138	41.2	11.8	20.5	1	27.3	S
No	139	41.1	10.5	23.3	1	56.2	S
No	140	42.3	11.3	21.5	3	144.5	S
No	142	40.5	12.0	24.3	1	44.5	S
No	143	42.3	10.3	23.3	1	26.3	S
No	144	40.2	11.3	20.5	1	48.3	S
Tomato (check)		30.2	6.7	15.4	3	10080.3	S

* Infection rating based on mean numbers of cyst/plant, 0= no; 1= number of cyst up to 10; 2= number of cyst up to 30; 3= number of cysts more than 30

** reaction type: S= susceptible; R= resistant

Complex resistance to G. rostochiensis and M. incognita was found in F_1 hybrids - No 72 and No 73. Gene Mi confers resistance to M. incognita in all the known tomato resistant hybrids in the world (Viglierchio 1978; Ammati et al. 1985). The results of this work indicate that the Mi gene activity against G. rostochiensis was not completely transferred from parent to F_1 hybrid and confirms the findings of previous tests (Rao et al., 1998).

Conclusion

Fourteen hybrids of *L. chilense* x *L. peruvianum* var. humifusum were resistant to M. incognita.

Two F_1 hybrids were resistant to G. rostochiensis.

F_1 hybrids were resistant to M. incognita and G. rostochiensis (No 72 and No 73) and could be used in plant breeding programmes.

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Acknowledgements Author thank Prof. V. Sotirova of Institute of Genetics BAS, for providing the seeds which were used in the present study.

Received September 28, 2001
Accepted November 7, 2001

OSETLJIVOST F_1 HIBRIDA NEKIH VRSTA RODA *LYCOPERSICON* PREMA MELOIDOGYNE INCOGNITA I GLOBODERA ROSTOCHIENSIS

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Rezime

U radu je ispitivana otpornost više F_1 hibrida paradajza *Lycopersicon chilense* i *Lycopersicon peruvianum* var. *humifusum* prema južnoj korenovoj nematodi (Meloidogyne incognita) (Kofoid et White, 1919) Chitw., 1949) i prema zlatno žutoj krompirovoj nematodi (Globodera rostochiensis) (Voll. 1923; Mulvey, Stone, 1976).

Svi ispitivani hibridi paradajza ispoljili su rezistentnost prema južnoj korenovoj nematodi (M. incognita), dok su samo dva hibrida ispoljila rezistentnost prema zlatno žutoj krompirovoj nematodi (G. rostochiensis).

Primljeno 28. septembra 2001.
Odobreno 7. novembra 2001.

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