

Department of Vegetable Crops, Landscaping and Floriculture, Punjab Agricultural University
Ludhiana - 141004, India

EFFECT OF TWO TEMPERATURE REGIMES ON THE EXPRESSION OF RESISTANCE TO *MELOIDOGYNE INCOGNITA* IN RESISTANT TOMATO CULTIVARS

by
D. J. KAUR and R. MAHAJAN

Summary. Resistant reaction to *Meloidogyne incognita* of tomato cultivars was overcome at temperature above 35°C and juveniles left resistant roots after penetration.

Temperature is one of the most important environmental factors that may alter the host response to root-knot nematodes. It affects nematode penetration, survival, development and symptom expression in plants (Bergeson, 1959; Joubert and Rappard, 1971; Jatala and Russel, 1972; Vrain *et al.*, 1978).

Resistance to root-knot nematodes is controlled by a major gene (Mi) (Gilbert and McGuire, 1955) which is the only source of root-knot nematode resistance in all currently available tomato cultivars (Medina-Filho and Tanksley, 1983). However, tomato genotypes carrying the Mi gene lose resistance when exposed to high temperatures (Dropkin, 1969).

The present study compared the expression of resistance to root-knot nematode in two locally bred resistant genotypes at two different temperature regimes.

Materials and methods

Two trials were conducted in a glasshouse with two locally bred tomato (*Lycopersicon esculentum* Mill.) cultivars, Punjab NR-7 and line 1-6-1-4, resistant to *Meloidogyne incognita* (Kofoid *et al.* White) Chitw. Another local cultivar, Punjab Chuhara, was used as the susceptible control. The nematode inoculum was obtained from a pure culture maintained on eggplant.

The first trial was undertaken at a temperature range of 28-35°C. Plants were grown singly in plastic pots containing 500 ml of steam sterilized soil-sand mixture (3:1). A water suspension with 1000 second stage juveniles was pipetted into three holes around the roots of each plant 30 days after sowing. Four plants of each cultivar were uprooted at 7, 15 and 21 days after inoculation and their roots stained in 0.01% acid fuchsin-lactophenol and cleared overnight in lac-

tophenol. Juveniles and developmental stages were counted directly under the stereoscopic microscope. Gall index on a 1-5 scale was recorded 40 days after inoculation.

The second trial conducted at a temperature range of 38-44°C in a glasshouse was as described before except that observations on penetration and development of nematode juveniles were recorded at 3, 10 and 21 days after inoculation and gall index calculated after 30 days.

Results and discussion

The data presented in Table I show that both the resistant cultivars show a high degree of resistance to *M. incognita* at the lower temperature range as reflected in the gall indices and nematode penetration. However, the resistant reaction was modified at the upper temperature range, leading to higher gall indices. Similar results have been reported by Holtzmann (1965), Laterrot and Pecaut (1965), Dropkin (1969) and Araujo *et al.* (1982) with other root-knot resistant tomato cultivars.

However, fewer juveniles were recorded at higher temperatures in both the resistant cultivars at 10 days than at 3 days after inoculation, suggesting that the juveniles leave the resistant roots after initial penetration.

The increase in the number of juveniles observed at 21 days may be due to the modifying effect of high temperature on the expression of resistance, leading subsequently to renewed penetration and establishment of the nematode in the root. Second stage *M. incognita* juveniles are known to migrate from resistant or non host roots a few days after penetration (Reynold *et al.*, 1970). It appears that although high temperatures lower the resistance against *M. incognita* in both cultivars, the level of resistance is much higher in line 1-6-1-4 than in Punjab NR-7.

Table I - Effect of temperature on the expression of resistance to *Meloidogyne incognita* in resistant tomato cultivars.

Cultivar	Temperature Range 28-35°C				Temperature Range 38-44°C			
	Nematode juveniles in roots/plant			Gall Index	Nematode juvenile in roots/plant			Gall Index
	Days 7	15	21	40	7	10	21	30
Punjab NR-7 (R)	8	29	23	2.0	43	35	308	4.3
Line 1-6-1-4 (R)	1	0.5	22	1.0	3	6	103	3.3
Punjab Chhuhara (S)	90	148	262	4.7	94	95	339	4.7
C.D. (0.05)	0.83	1.66	2.37	0.49	1.97	1.27	2.91	N.S.
(0.01)	1.26	2.52	3.59	0.74	N.S.	2.11	4.83	N.S.

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