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Preliminary Observations on the Varietal Resistance of Chillies to the Root-knot Nematode, *M. arenaria* (Neal, 1889) Chitwood, 1949

by

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Introduction: Among the root-knot nematodes, *Meloidogyne arenaria* (Neal, 1889) Chitwood, 1949 is commonly prevalent in the chilli growing tracts of Tamilnadu. Recent studies carried out by Rajagopalan and Seshadri (1969) have proved the pathogenic effect of this nematode on chillies *Capsicum annum* variety Sathur samba, Rajagopalan *et. al.* (1969) have observed that of the three species, *M. incognita* (Kofoid & White, 1919) Chitwood, 1949 *M. javanica* (Treub, 1885) Chitwood, 1949 and *M. arenaria* (Neal, 1889) Chitwood, 1949 the last one is more harmful to the chilli variety Sathur samba of *Capsicum annum*. No investigations have ever been made to select any resistance variety of chilli against the root-knot nematode infection except stray and causal observations made by Hare (1956). Therefore, the authors have made preliminary screening of as many as nineteen varieties of chillies against *M. arenaria* and the results of the observations are presented in this paper.

Materials and methods: Three sets of pot-culture studies were carried out under glasshouse condition at the Agricultural College and Research Institute, Coimbatore. Nineteen varieties of chillies were screened for their susceptibility to the root-knot nematode, *M. arenaria*. In the first set of studies, varieties (1) 17-1-1, (2) G.2 (3) South Malabar, (4) Jayapuri (5) Long Red, (6) 15-1-5 (7) Pandhruna (8) N.P. 46-A (9) Indole and (10) C.A. 743-3 were used. Four other varieties (1) No. 685 (2) Ceylon (3) Frutuscens and (4) Annevum – were tested in the second series, while in the last set of pot culture studies five varieties (1) Bombay 742, (2) Bombay 750, (3) Bombay 756, (4) Bombay 759 and (5) Bombay 760 were taken up for screening their susceptibility or otherwise.

The nematode inoculum required for the study was obtained from the pure cultures raised in the glass house on chillies from single egg mass picked from infested chilli plant collected from Pollachi area of Coimbatore District.

The chilli seedlings were raised in seedlings pans filled with steam sterlisied soil. Seedlings of 30 to 55 days old were transplanted in quarter size pots 17.0 cm diameter and 16.0 cm height. The pots were filled with steam sterlisied pot mixture containing equal proportions of sand, red earth, tank

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silt and farm yard manure. One seedling was planted in each pot and nematode inoculum of 1000 larvae per pot was pipetted into the soil at the base of the plant as close to the root system as possible.

In each variety four inoculated pots and equal number of uninoculated check plants were maintained except in the first series in which only one check plant was kept for observations. The plants were maintained till they reached the bearing stage when they were uprooted and the data on the plant characters such as shoot height, shoot weight, root length, root weight, number of roots infested total number of roots produced per plant and number of galls per root by examining ten roots of 10 cm length selected at random in each plant, were recorded. Smith and Taylor (1947) method has been adopted for assessing the relative degree of root-knot infection based on the number of galls per root as light 0–25 galls, medium 26–50 galls, heavy 51–57 galls and very heavy 76–100 galls.

Results: The data on the percentage of roots infested and the number of galls per root recorded are furnished in Table 1.

It is evident from the examination of the root system that one of the variety tested is free from nematode infection. Of the nineteen varieties eight had 14.32 to 24.00 galls/root, four with 28.50 to 48.02 galls, three with 51.00 to 54.75 galls while the remaining four varieties showed heavy galling on the roots ranging from 84.92 to 123.05 per root. According to Smith and Taylor (1947) the varieties can be rated as follows:

Light: 17-1-1, Frutuscens, Ceylon, South Malabar, N.P. 46A, 685, Pandhruna, G.2

Medium: Bombay 756, 15-1-5, Annevum, C.A. 743-3

Heavy: Long Red, Bombay 759, Indole

Very heavy: Bombay 760, Bombay 750 Bombay 742, Jayapuri.

The data on the plant characters-shoot length, shoot weight, root length and root weight are presented in Table 2.

Comparison of the inoculated with uninoculated check plants reveal that in some of the varieties the plant growth has been perceptibly affected due to root-knot nematode infection while some exhibited tolerance to the nematode. Five varieties, 17-1-1, Bombay 759, Bombay 760 Ceylon and Annevum exhibited marked reduction in the plant growth. Two other varieties, G.2 and Bombay 742, recorded perceptibly increased plant growth characters inspite of gall formation on the roots. The remaining varieties reacted to the root-knot infection in one way or the other.

TABLE 1. *Nematode infestation*

S. No.	Variety	Mean of four replications: No. of roots per plant	No. of infested roots/ plant	% of roots infested/ plant	No. of galls/root (root length of 10 cm)
Series I; (1965):	Date of sowing : 11-1-65				
	Date of transplanting: 6-2-65				
	Date of inoculation : 15 to 23-2-65				
	Date of removal : 28-7-65				
1.	15-1-5	160	115	66.66	34.00
2.	Pandhruna	159	153	79.30	15.65
3.	17-1-1	144	139	81.36	24.20
4.	NP. 46. A.	110	105	77.93	16.15
5.	Jayapuri	124	120	83.11	84.92
6.	CA-743-3	107	105	84.20	28.50
7.	Long Red	133	128	79.18	54.75
8.	G. 2	147	106	52.22	14.32
9.	Indole	84	82	84.00	51.00
10.	South Malabar	110	108	84.61	18.00
Series II: (1967):	Date of sowing : 4-3-67				
	Date of transplanting : 28-4-67				
	Date of inoculation : 23-5-67				
	Date of removal : 15-11-67				
1.	685	175	141	61.62	15.72
2.	Ceylon	167	142	67.34	23.25
3.	Frutuscens	172	133	62.55	23.69
4.	Annevum	161	143	74.45	29.75
Series III: (1968-69):	Date of sowing : 22-8-68				
	Date of transplanting : 28-9-68				
	Date of inoculation : 29-10-68				
	Date of removal : 12-3-69				
1.	Bombay-742	110	110	90.00	96.90
2.	Bombay-750	87	86	87.81	113.75
3.	Bombay-756	122	114	80.30	48.02
4.	Bombay-760	111	106	82.88	123.05
5.	Bombay-759	60	42	70.79	54.47

TABLE 2. *Plant Characters*

S. No.	Variety	Shoot length Control cm	Shoot length treated cm	Shoot weight Control gm	Shoot weight treated gm	Root length Control cm	Root length treated cm	Root weight Control gm	Root weight treated gm
1.	15-1-5	115.0	100.3	73.5	72.3	26.0	23.0	19.8	20.8
2.	Pandhurana	132.8	101.8	91.6	63.7	27.5	35 0	17.6	17.1
3.	17-1-1	124.0	65 0	81.0	64.6	38.0	28.3	38.4	20.2
4.	NP. 46-A	94.5	61.2	53.5	46.1	28.0	29.0	17.9	13.1
5.	Jayapuri	120.5	115.2	55.0	63.1	30.0	33.6	13.1	19.0
6.	CA-743-3	99.0	103.9	34.9	36.1	21.0	27.1	16.6	13.6
7.	Long Red	141.3	120.9	113 0	70.1	38.5	38.2	35.2	17.8
8.	G. 2	87.5	112.8	30.8	39.7	22 5	26 5	15.5	15.5
9.	Indole	110.5	69.8	68.5	38.7	32.0	32.4	15.5	21.7
10.	South Malabar	77.0	129.8	60.2	63.7	21.0	32.2	21.5	17.1
1.	685	94.46	99.75	36.86	30.50	25.43	26 60	24.50	14.50
2.	Ceylon	118.32	111.52	52.50	35.90	27.20	26.40	23.20	17.20
3.	Frutuscens	55.30	87.40	29.40	40.70	30.05	29.00	17.12	15.30
4.	Annevum	147.00	123.30	72 30	34.02	35.80	31.50	26 70	14.90
1.	Bombay-742	155.75	176.90	63.87	72.50	33.11	36.75	18.45	21.10
2.	Bombay-750	179.40	149.62	69.40	50.62	34.75	42.50	19.10	13.90
3.	Bombay-756	151.62	147.40	72.75	56.40	38.00	37.70	18.60	17.90
4.	Bombay-760	138.00	114.90	42.10	30.62	40.62	29.25	20.90	14.62
5.	Bombay-759	138.60	119.10	66.25	40.10	48.00	45.10	17.10	11.90

Discussion: Reynolds and Bannon (1960) studied the susceptibility of sixteen varieties of alfalfa to two species of root-knot nematodes, *Meloidogyne javanica javanica* and *M. incognita acrita* Chitwood, 1949 by rating the degree of infection on the roots. Fassuliotis and Rau (1963) evaluated the resistance of *Cucumis* spp. to the root-knot nematode, *M. incognita acrita* Chitwood, 1949 based on the number of females and egg masses on the roots. Prasad and Das Gupta (1964) made observations on the varietal susceptibility of commercial tomatoes to root-knot nematodes, *Meloidogyne* spp. by assessing the root-knot index ninety days after transplantation Sauer (1967) measured the root-knot tolerance of five varieties of grapevine root-stocks on the extent of galling developed on the root system. Similar observations made on the degree of gall formation on the roots of different varieties of chillies have indicated that eight varieties had light root-knot infection on the roots ranging from 14.32 to 24.20 galls per root. Among them, the variety G.2, was apparently healthy and did not exhibit any retardation in the plant growth. Seven varieties showed heavy to very heavy galling of the roots but it is

interesting to note that one of these varieties, Bombay 742, inspite of heavy gall formations on the roots, the plants in general were healthy and appeared normal in appearance. Taking into account the intensity of gall formation on the roots as well as the host reaction to the parasite with reference to plant growth, the variety G.2, can be considered as comparatively more resistant to the root-knot nematode, *M. arenaria*, than the other varieties tested

Summary: Three sets of pot culture experiments were carried out under glass house conditions at the Agricultural College and Research Institute, Coimbatore, to find out the resistance or susceptibility of 19 chilli varieties to the root-knot nematode *Meloidogyne arenaria*. Seedlings of 30 to 55 days old were transplanted in quarter size pots. In each variety 4 inoculated and 4 uninoculated plants were maintained. Each plant was inoculated with 1000 larvae of larvae of root-knot nematode. None of the varieties tested is free from nematode infection. The varieties 17-1-1, Bombay-760, Bombay-759, Ceylon and Anneveum were found to be more susceptible. The Varieties Bombay 742 and G2 were found to be tolerant. Eventhough there was heavy galling on the roots of Bombay 742, there was not adverse effect on the growth of the plants. However, the variety G2 recorded less incidence of root-knot nematode.

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