HOST SUITABILITY OF CABBAGE CULTIVARS TO RACES OF *MELOIDOGYNE* SPECIES

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Summary. Twenty one cultivars of cabbage were screened under glasshouse conditions for their reactions to races of 1 and 2 of *Meloidogyne incognita*, 1 and 2 of *M. javanica* and 2 of *M. arenaria*. Three cultivars, Flat Dutch, Jersey Wakefield and Bonanza were highly resistant; Red Rock and Earliest Stone Head were tolerant to all five nematode races. Nine cultivars were highly susceptible to all the nematodes and the rest showed different reactions.

In India, vegetables suffer 12-15% losses due to root-knot nematodes (Khan and Khan, 1990). Cabbage is widely grown and is frequently attacked by *Meloidogyne* species. Therefore, an attempt was made to evaluate the reaction of cabbage to five races of *Meloidogyne* species.

MATERIALS AND METHODS

Populations of *M. incognita* (Kofoid *et* White) Chitw. race 1 and race 2, *M. javanica* (Treub) Chitw. race 1 and race 2 (newly identified races by Patel *et al.*, 1993) and *M. arenaria* (Neal) Chitw. race 2 were maintained in a glasshouse on susceptible tomato (*Lycopersicon esculentum Mill.*) cv. Pusa Ruby by inoculating with single egg mass. Seedlings of 21 cabbage *Brassica oleracea* var. *capitata* L. cultivars were raised in pots filled with autoclaved soil. Twenty-day old seedlings were transplanted to individual 20 cm diam pots (one seedling/pot) and five days after transplanting each pot was inoculated with 5000 freshly hatched second-stage juvenile (Pi). The pots were arranged in randomized complete blocks with three replicates of each cultivar. The plants were grown in a glasshouse at 27-30 °C for 60 days. Then, plants of each cultivar were uprooted from pots and washed under running tap water to remove soil particles from the roots. Gall index (GI) was rated on a 0-5 scale (Taylor and Sasser, 1978). Roots were chopped and then comminuted in a Waring blender in 1% NaOCl to extract the eggs. Eggs were stained by adding a few drops of acid fuchsin acetic acid solution, and the eggs (Pf) from each plant were counted. The reproduction factor (RF = Pf/Pi) was calculated for each root system, where Pf was the final population and Pi was the initial population (5000 J_2). Based on GI and RF, the host suitability of each cultivar (degree of resistance) was designated according to the scheme of Canto-Saenz (Sasser *et al.*, 1984).

RESULTS AND DISCUSSION

Of the 21 cultivars of cabbage screened, nine (Danish Ball Head, Triumph, Summer Head, Green Monster, Sutton's Best of All Savoy, Elizabeth, Sutton's Earliest, Red Cabbage and Aligarh Local) were susceptible, two tolerant (Earliest Stone Head and Red Rock) and three resistant (Flat Dutch, Jersey Wakefield and Bonanza) to all the race of the nematodes tested (Table I). Of the remaining seven cultivars, four (Earliest of All Savoy, Drum Head, Kalimpong English Ball and Rochas Triumph) were susceptible to the two races of *M. incognita* and tolerant to the other *Meloidogyne* races; Kalimpong Eclipse Drum Head and Vernia's Pride were susceptible to all races, except *M. arenaria* to which Kalimpong Eclipse Drum Head was tolerant and Vernia's Pride was resistant; finally Early Wonder was tolerant to *M. incognita* and resistant to *M. javanica* and *M. arenaria* (Table I).

The susceptible cultivars included in the tests are not suitable for growing in fields infested with races of *Meloidogyne* species. The tolerant cultivars Red Rock and Earliest Stone Head and three resistant cultivars viz. Flat Dutch, Jersy Wakefield and Bonanza can be recommended for cultivation, in areas where such nematodes are endemic. These cultivars can also be utilized efficiently in breeding programmes for improvement of cabbage cultivars.

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Table I. Host suitability of 21 cultivars of cabbage to races of *Meloidogyne* spp.

Cultivars	*M. incognita*						*M. javanica*						*M. arenaria*		
	Race 1			Race 2			Race 1			Race 2			Race 1		
	GI	RF	Rating	GI	RF	Rating	GI	RF	Rating	GI	RF	Rating	GI	RF	Rating
Earliest of All Savoy	4.0	4.33	S	3.6	3.96	S	1.6	1.84	T	1.3	1.53	T	2.0	1.25	T
Flat Dutch	1.6	0.45	R	1.6	0.21	R	1.6	0.18	R	1.3	0.16	R	2.0	0.11	R
Danish Ball Head	4.6	3.45	S	4.3	2.97	S	3.3	2.46	S	3.0	2.10	S	3.0	2.08	S
Triumph	5.0	6.12	S	4.0	5.11	S	3.6	2.89	S	3.3	2.72	S	3.3	2.15	S
Early Wonder	2.0	1.72	T	2.0	1.44	T	1.6	0.15	R	1.3	0.42	R	1.0	0.17	R
Earliest Stone Head	2.0	1.98	T	1.6	1.85	T	2.3	1.74	T	2.0	1.68	T	1.3	1.54	T
Summer Head	5.0	7.46	S	4.0	6.35	S	5.0	5.36	S	4.6	4.43	S	4.0	3.78	S
Jersey Wakefield	1.6	0.53	R	1.3	0.42	R	1.3	0.23	R	1.3	0.16	R	1.6	0.14	R
Green Monster	5.0	5.04	S	5.0	4.76	S	4.6	3.82	S	4.3	3.20	S	4.0	2.77	S
Red Rock	2.0	1.80	T	1.6	1.73	T	1.6	1.66	T	1.3	1.49	T	1.3	1.30	T
Sutton's Best of All Savoy	5.0	6.89	S	4.6	5.07	S	4.3	4.32	S	4.0	3.66	S	5.0	3.43	S
Kalimpong Eclipse Drum Head	5.0	7.94	S	5.0	7.27	S	5.0	4.61	S	4.6	4.15	S	3.0	1.72	T
Elizabeth	5.0	8.46	S	5.0	7.12	S	5.0	6.68	S	5.0	6.37	S	4.0	5.03	S
Drum Head	4.6	3.74	S	4.0	2.79	S	2.6	1.64	T	2.3	1.43	T	3.0	1.27	T
Kalimpong English Ball	4.0	4.65	S	4.3	3.43	S	1.3	1.32	T	1.5	1.28	T	1.3	1.12	T
Bonanza	1.6	0.40	R	1.3	0.31	R	1.6	0.27	R	1.3	0.16	R	0.6	0.14	R
Verma's Pride	5.0	6.86	S	5.0	6.71	S	4.3	3.79	S	4.0	3.27	S	4.3	2.75	R
Rochas Triumph	4.6	4.53	S	4.0	3.24	S	1.6	1.83	T	1.3	1.52	T	1.3	1.15	T
Sutton's Earliest	5.0	5.78	S	4.3	3.64	S	4.0	3.38	S	4.0	3.09	S	4.0	2.34	S
Red Cabbage	5.0	9.62	S	5.0	8.40	S	5.0	7.16	S	5.0	6.23	S	5.0	5.82	S
Aligarth Local	5.0	10.83	S	5.0	9.36	S	4.6	8.74	S	4.3	8.02	S	5.0	6.70	S
SED (df = 24)	0.74	1.42		0.66	1.14		0.82	1.36		0.52	1.44		0.42	0.70	

GI = Gall index; RF = Reproduction factor; R = Resistant; T = Tolerant; S = Susceptible.

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