IJPS INTERNATIONAL JOURNAL OF PLANT SCIENCES
e ISSN-0976-593X Volume **11** | Issue 2 | July, 2016 | 262-264

DOI: 10.15740/HAS/IJPS/11.2/262-264
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RESEARCH ARTICLE

Identification of resistance in mulberry, *Morus* spp. for root knot nematode, *Meloidogyne incognita*

■ **S. GNANAPRAKASH, B. MADHUMITHA, C. JAYAPRADHA, S. DEVIPRIYA AND P. KALAIARASAN**

SUMMARY

Ten numbers of mulberry (S1635, S36, MR2, RFS 135, DD, C20, Kanwa 2, Srinagar Local, Berhampur Local and Local) varieties/genotypes were investigated under field conditions for their resistance against the root-knot nematode, *Meloidogyne incognita*. Among the ten varieties, only one variety *viz.*, RFS 135 showed resistance response against *M. incognita*, while the varieties, C20 and DD showed moderate resistant reaction. A positive correlation was observed between the root knot nematode resistance and peroxidase enzyme activity in mulberry genotypes.

Key Words : Root knot nematode, *Meloidogyne incognita*, Mulberry, *Morus* spp.

How to cite this article : Gnanaprakash, S., Madhumitha, B., Jayapradha, C., Devipriya, S. and Kalaiarasan, P. (2016). Identification of resistance in mulberry, *Morus* spp. for root knot nematode, *Meloidogyne incognita*. *Internat. J. Plant Sci.*, **11** (2): 262-264, **DOI: 10.15740/HAS/IJPS/11.2/262-264**.

Article chronicle : Received : 02.02.2016; **Revised :** 27.04.2016; **Accepted :** 06.06.2016

Mulberry (*Morus* spp. L.), the food plant of silkworm (*Bombyx mori* L.), is cultivated both in tropical and temperate countries of the world. The total area of mulberry in India is around 1.92 lakh ha (Central Silk Board Report, 2013). Infestation with plant-parasitic nematodes reduces the yield and quality of leaves besides the life span of mulberry plants. Among the nematodes associated with mulberry, root-knot nematode, *M. incognita* is economically important as it affects the crop both quantitatively and qualitatively. Root-knot nematode is found worldwide but it is most serious problem in tropical and subtropical countries like India. The root-knot nematode has got a wide range of host plants and causes economic damage to many agricultural crops (Sesser, 1989). The nematode disease is manifested by the formation of galls in the root accompanied by stunted growth, chlorosis and loss of vigour of the plant (Babu *et al.*, 1999).

Few chemicals have been reported for the management of nematodes in mulberry, but the problem of environmental pollution and toxicity to silkworm limit their use. Therefore, better alternative methods are needed for the management of *M. incognita* in mulberry. Use of host resistant is one of the best ways to evade the root-knot nematode infestation in mulberry. Hence, the present study was made to identify the root-knot nematode resistance in mulberry under field conditions.

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MATERIAL AND METHODS

Collection of mulberry varieties :

The mulberry varieties (S1635, S36, MR2, RFS 135, DD, C20, Kanwa 2, Srinagar Local, Berhampur Local and Local) used in this study were obtained from the department of Agricultural Entomology, Agricultural College and Research Institute, Killikulam, TNAU.

Field assessment :

Pre-planting population of root knot nematode was tested in the sick field (more than J2/ g of soil). Followed by the raised nursery beds were prepared with 1-2 inch height. The 15 to 20 cm length of cuttings were prepared in all the testing varieties and laid in the nursery bed. For each variety 10 replications were maintained for recording the number of galls present in the rooted cuttings at monthly interval. However, data obtained at 120 days after planting were taken for assessing the root knot index. Watering was done at twice in a week upto the termination of experiment. Experiment was terminated at 120 days after planting. Plants were uprooted and number of galls per plant was recorded.

Root knot index :

The standard root knot index 1-5 scale was followed for evaluating the resistance response in mulberry varieties Muthulakshmi *et al.* (2010) and Nishitha *et al.* (2010) (Table A).

Scale	Root knot index (knots/plant)	Host response
1	Nil	Immune (I)
2	0-10	Resistant (R)
3	10.1-30	Moderately resistant (MR)
4	30.1-100	Susceptible (S)
5	>100	Highly susceptible (HS)

Scoring index for degree of resistant /susceptibility (1-5 scale)

Assay of peroxidase :

As a source of peroxidase leaf portion of 10 mulberry varieties were collected from test field and kept at 4°C to the laboratory. One gram sample was washed with distilled water and homogenized in a blender using 3ml of 0.1M phosphate buffer of pH 6.0. The extract was centrifuged at 16000g for 15 minutes and the supernatant was used as enzyme source.

Assay of peroxidase was carried out according to the method of Malik and Singh (1980) with certain modifications. To 1ml of phosphate buffer (pH 6.0/ pH 7.0), 0.2 of plant extract, 2.5 ml of distilled water and 1ml of o-dianisidine solution were added. The reaction was initiated by adding 100ul of 0.2×10^{-3} M H_2O_2 and the absorbance was read at (460 nm) every 30 second interval up to 5 minutes and to stop the reaction by adding adding 1ml of 2N H_2SO_4. The peroxidase activity was calculated using extinction co-efficient of o-dianisidine and the enzyme activity was expressed as unit per mg of protein.

Statistical analysis :

All the data were analysed by Agres verson.7 software.

RESULTS AND DISCUSSION

Out of ten mulberry varieties tested, only one variety, RFS 135 showed resistant reaction against *M. incognita* with the root-knot index of 2, while the varieties, C20 and DD were moderately resistant with the root-knot index of 3. However, all the other varieties showed susceptible reaction with the root-knot index of 4 (31-

Table 1 : Reaction of mulberry varieties against root knot nematode, *M. incognita* resistance

Sr. No.	Variety	Number of galls / plants	Root knot index (1-5 Scale)	Host reaction	Enzyme activity (IU)
1.	S1635	42	4	Susceptible	107.07
2.	S46	92	4	Susceptible	040.68
3.	MR2	62	4	Susceptible	038.42
4.	RFS135	9	2	Resistant	474.60
5.	DD	29	3	Moderately Resistant	188.71
6.	C20	19	3	Moderately Resistant	160.68
7.	Kanwa 2	40	4	Susceptible	077.91
8.	Srinagar local	96	4	Susceptible	006.78
9.	Berhampur local	82	4	Susceptible	051.98
10.	Local	35	4	Susceptible	005.65

IU- International unit (Quantity of the enzyme which is used to digest the one microgram of substrate at 37^0C for 1 h.)

Table 2 : Growth parameters of mulberry varieties (120 DAP)

Sr. No.	Varieties	Shoot length* (cm)	Root length* (cm)	Shoot weight* (g)	Root weight* (g)	No. of galls*	No. of egg mass*	No. of eggs per egg mass
1.	S1635	44.00	12.00	22.31	1.12	42.00	12.33	60.00
2.	S46	33.00	7.67	14.90	3.12	92.00	29.67	101.00
3.	MR2	39.33	9.00	17.56	1.30	62.00	12.33	59.00
4.	RFS135	79.00	23.00	39.57	1.48	9.00	2.00	47.00
5.	DD	55.67	21.00	32.10	1.57	29.00	5.67	60.00
6.	C20	60.33	21.33	36.87	0.69	19.00	4.67	58.00
7.	Kanwa 2	50.67	14.33	24.57	1.04	40.00	9.67	61.00
8.	Srinagar local	24.00	7.67	10.93	2.63	96.00	45.00	77.00
9.	Berhampur local	39.00	8.67	15.55	1.97	82.00	28.00	51.00
10.	Local	52.33	17.33	26.10	1.11	35.00	6.00	77.00
	S.E. ±	5.83	4.89	5.96	0.55	21.15	9.97	21.26
	C.D. (P=0.05)	12.49	11.07	13.49	1.24	47.84	22.56	48.09
	CV%	45.11	68.20	51.61	75.82	82.61	131.20	47.34

100galls/plant) (Table 1). Among the different varieties, more length and weight of shoot and roots were observed in RFS 135 (Table 2).

The results of peroxidase enzyme assay revealed that the higher peroxidase enzyme activities were found in the resistant plants compared to susceptible ones (Table 1 and Fig. 1). The resistance may be related to elevated peroxidase activity, which is important in the reinforcement of cell walls at the border of infestation in resistant plants and also essential for lignin biosynthesis (Bruce and West, 1989).

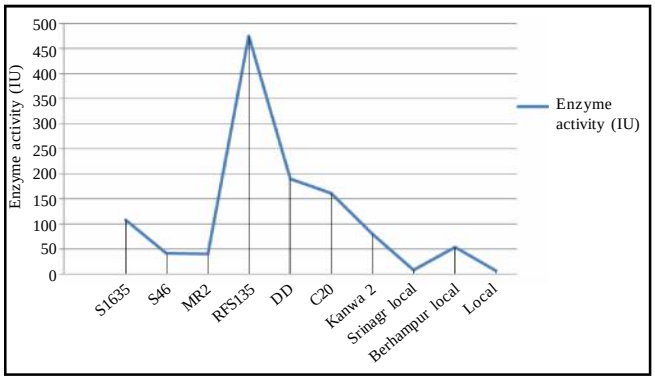

Fig. 1: Peroxidase activity against mulberry root knot nematode, *M. incognita*

Acknowledgement :

The authors are thankful to the Dean, Agricultural College and Research Institute, Killikulam and the Professor and Head, Department of Agricultural Entomology for providing necessary facilities to carryout this experiment Sharma and Govindaiah (2004).

REFERENCES

Babu, A. M., Kumar, Vineet and Philip, Tomy (1999). Root knot nematode – A hard to kill parasite . *Indian Silk,* **38** : 11-12.

Bruce, R.J. and West (1989). Elicitation of lignin biosynthesis and isoperoxidase activity by pectic fragments in suspension culture of castor bean. *Plant Physiol.*, **91** : 889-897.

Central Silk Board Report 2013.

Malik, C. P. and Singh, M.B (1980). *Plant enzymology and histoenzymology*, Kalyani Publishers, p. 431.

Muthulakshmi, M., Devarajan, K. and Jonathan, E.I. (2010). Biological control of root knot nematode *Meloidogyne incognita* chitwood in Mulberry. *J. Biopesticides,* **3**(2) : 479-482.

Nishitha Naik, V., Sharma, D.D. and Dayakar Yadav, B.R. (2010). Screening of mulberry varieties against root knot disease complex. *Indian J. Nematol.*, **40**(2) : 240-242.

Sasser (1989). World perspective on nematology, the role of society, In vistas on Nematologyed, Society of nematologist, Inc. 7-14.

Sharma, V. N. and Govindaiah (2004). Progress of research on disease and pest management in sericulture. Seri Scientific Publishers, Bangalore, India, pp.29-35.