

Screening of Bell Pepper Cultivars Against Root-Knot Nematode (*Meloidogyne incognita*) Under Protected Cultivation

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ABSTRACT

Root-knot nematode (*Meloidogyne incognita*) is the major pest on bell pepper which causes a yield loss upto 15 per cent. Among the non chemical management methods, use of resistant cultivars is considered one of the most effective and environmentally safe alternatives. An investigation was carried out to assess the tolerance level of seven cultivars viz., Indra, Inspiration RZ, Capsicum Yellow Wonder, Capsicum Red Wonder, Yellow Xylo, Red Sweety and California Wonder against *M. incognita*. None of them were found resistant to *M. incognita*. However, the least number of galls and root knot index were recorded in Inspiration RZ with least root-knot index followed by Yellow Xylo. The cultivar Indra was highly susceptible to *M. incognita*.

ROOT-KNOT nematode (*Meloidogyne incognita*) is an important pest on a wide range of crops worldwide. Use of resistant cultivars is considered one of the most effective and environmentally safe alternatives to manage *M. incognita*. Although several resistant cultivars are commercially available, the loss of their effectiveness forces a continuous search for new resistant genes. The durability of the resistance depends on its agronomic management and on the virulence of the nematode populations in different crop areas (Piendra Buena *et al.*, 2004). However, none of the commercially grown bell pepper cultivars exhibit an adequate level of resistance to *M. incognita*. In this context, the present investigation was carried out to assess the tolerance level of the bell pepper cultivar Indra, which is commercially being grown in and around Bengaluru along with other six available cultivars viz., Inspiration RZ, Capsicum Yellow Wonder, Capsicum Red Wonder, Yellow Xylo, Red Sweety and California Wonder against root-knot nematode, *M. incognita*.

Seven bell pepper cultivars/ varieties/hybrids were screened for their reaction to *M. incognita* in polyhouse, AICRP (Nematodes) Department of Plant Pathology, University of Agricultural Sciences, GKVK campus, Bengaluru. A pot experiment was conducted at *M. incognita* infested polyhouse, to assess the level of resistance or susceptibility of the prevailing cultivars

to _____ the _____ *M. incognita*. Nematode free sterilized mixture of soil, vermicompost and sand was filled in 20 cm diameter earthen pots with a capacity of 1 kg soil and two bell pepper seedlings were transplanted in each pot. After transplanting freshly hatched 2nd stage juveniles (J2) of *M. incognita* were inoculated for each pot @ 2,000 J2 / Kg of soil. The pots were watered regularly. Three replications were maintained for each treatment with three plants in each replication. The pots were maintained at 25-30°C for 60 days under protected cultivation.

The severity of the disease was recorded at sixty days after sowing and at harvest. Three plants were selected in each accession of bell pepper and assessed for the susceptibility//resistance/tolerance to the nematode. Observations on the number of galls/root system were recorded and the susceptible, tolerant and resistant levels of varieties or cultivars were scored based on the Root-Knot Index of 1 to 5 scale (Anon, 1993).

The results revealed that none of the cultivars showed resistant reaction (Table II). However, the cultivar Inspiration RZ recorded least number of galls (22.00 galls/plant at sixty DAP (Table 1) and 34 galls/plant at harvest), root-knot indices (3.00 and 4.00 at sixty days after planting and at harvest, respectively)

at 60 DAS

TABLE I
 Screening of bell pepper cultivars against *Meloidogyne incognita* under protected cultivation

| Cultivars | At 60 DAS | | |
|------------------------|-----------------------|-----------------|------------------|
| | Number of Galls/Plant | Root-Knot Index | Disease Reaction |
| Indra | 46.00 | 4.00 | S |
| Inspiration RZ | 22.00 | 3.00 | MR |
| Capsicum Yellow Wonder | 32.00 | 4.00 | S |
| Capsicum Red Wonder | 30.67 | 4.00 | S |
| Yellow Xylo | 36.00 | 3.33 | S |
| Red Sweety | 39.00 | 4.00 | S |
| C | California Wonder | 40.00 | 4.00 S |
| S. Em± | 0.97 | | |
| CD @ 5% | 2.98 | | |

S= Susceptible, MR= Moderately Resistant

TABLE II
 Screening of bell pepper cultivars against *Meloidogyne incognita* under protected cultivation

at harvest

| Cultivars | At 60 DAS | | |
|------------------------|-----------------------|-----------------|------------------|
| | Number of Galls/Plant | Root-Knot Index | Disease Reaction |
| Indra | 137.00 | 5.00 | HS |
| Inspiration RZ | 34.00 | 4.00 | S |
| Capsicum Yellow Wonder | 86.00 | 4.00 | S |
| Capsicum Red Wonder | 71.33 | 4.00 | S |
| Yellow Xylo | 84.00 | 4.00 | S |
| Red Sweety | 93.00 | 4.00 | S |
| California Wonder | 104.00 | 5.00 | HS |
| S. Em± | 1.11 | | |
| CD @ 5% | 3.43 | | |

S= Susceptible, HS= Highly Susceptible,

indicating moderate resistant reaction at 60 DAP and susceptibility at harvest. Pandey and Trivedi (1990) reported chilli cultivar Pusa Jwala as resistant, Mandore local 1 and 2 as moderately resistant varieties to *M. incognita*. Capsicum Red Wonder also followed the same trend with respect to disease reaction with 31.00 galls / plant at 60 days after planting and 71.33 galls / plant at harvest.

The cultivar Indra was highly susceptible to *M. incognita* which recorded maximum number of galls (46.00 galls / plant at 60 days DAP and 137.00 galls / plant at harvest) with root-knot indices (4.0 and 5.0 at 60 days after planting and at harvest, respectively) indicating susceptibility at 60 DAP and highly susceptible at harvest. Reports of Vito *et al.* (1992), Adam *et al.* (2008) indicated the non-availability of

resistant cultivars to *M. incognita* bell pepper. However, a few reports on screening of bell pepper revealed the availability of resistant sources against *M. incognita*. Fery (1998) identified two root-knot nematode resistant cultivars viz., Carolina wonder and Charleston belle.

Although bell pepper cultivars are selected by farmers based on agronomical characteristics such as crop yield or fruit quality, the susceptibility of plants in the present study suggested that these criteria did not favor selection for root-knot nematode resistance. Considering the results obtained and high local interests of farmers in selecting cultivars, further studies need to be focused on plant selection on resistance to root-knot nematode in order to enhance the productivity of bell pepper in nematode infested areas. In the present study, none of the cultivars showed resistant reaction. However, Inspiration RZ exhibited moderate resistant reaction at the beginning of crop growth indicating possible selection of plants against root-knot nematode and nematode population may be managed at the later stage of crop growth by integrating other management measures such as nematicides and bioagents.

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