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Trifoliates and their hybrids are resistant to Citrus nematode, *Tylenchulus semipenetrans* Cobb 1913

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Abstract: The response of 15 rootstocks of trifoliates and their hybrids to *Tylenchulus semipenetrans* was determined in a greenhouse test. All the tested trifoliates and their hybrids did not support nematode reproduction. Hence, trifoliates and their hybrids may be used in a breeding programme to combine *T. semipenetrans* resistance with the other desirable characteristics in an improved citrus rootstock.

INTRODUCTION

Citrus is grown on grafted trees worldwide in Mediterranean and subtropical climates. Numerous species of plant-parasitic nematodes have been associated with the citrus rhizosphere but few reproduce on citrus and cause damage to the trees. *Tylenchulus semipenetrans, Radopholus similis, Pratylenchus coffee* and *Meloidogyne* spp. are considered major nematode pests because they cause significant economic losses in multiple regions of the world. The degree of infection and damage to trees due to *Tylenchulus semipenetrans* greatly depends upon the rootstock used. This nematode causes a disease syndrome that result in debilitation of the citrus plant. With the purpose of finding out resistant rootstocks, trifoliates and their hybrids were screened against Citrus nematode, *Tylenchulus semipenetrans*.

MATERIALS AND METHODS

The screening of rootstocks was carried out under screen house conditions. Open-pollinated seeds from rootstock trees grown at NRCC Farm, Nagpur, were used in these studies. Seeds of each rootstock were planted in plastic trays containing steam-sterilized soil. One-year-old seedlings were

transplanted in earthen pots (20 cm. diameter) filled with steam sterilized soil mixture of field soil and sand in 1:1 ratio. Each rootstock was replicated five times. Two weeks after transplanting, each seedling was inoculated with 5000 active juveniles of *T.* semipenetrans obtained from culture pots maintained at N.R.C.C. Nagpur. The plants were watered regularly and maintained. One year after inoculation the experiment was terminated. Juvenile population in soil was determined by processing 250 cc soil from each pot as per Cobb's decanting and sieving technique. The roots were dried off water with blotting paper and weighed. The fibrous roots were cut into pieces and mixed well before taking half gram of roots for staining in hot acid fuschin lactophenol for 30 seconds. The stained roots were cleared in plain lactophenol before counting the females infecting the roots. The reproduction factor (Rf) of *T.* semipenetrans on each rootstock was calculated by dividing the final population (soil population + root- wash population + root population) with initial population. Based on reproduction factor of the nematode, plant reaction was classified into three groups: highly resistant, resistant and susceptible.

RESULTS AND DISCUSSION

Wide variation in the reaction of rootstocks to citrus nematode, *Tylenchulus semipenetrans* was observed (Table 1).

Table 1. Reaction of different rootstocks to citrus nematode, *Tylenchulus semipenetrans*

S. No.	Rootstock	Scientific name	Rf*	Reaction
1.	CRH 12	*Poncirus trifoliata*	0.00	HR
2.	CRH 47	*Poncirus trifoliata*	0.00	HR
3.	Hybrid 46	SFS x Argentina Trifoliate orange	0.80	R
4.	Swingle citrumelo	*Citrus paradisi* X *Poncirus trifoliata*	0.60	R
5.	L1P2	Hybrid of trifoliate	0.98	R
6.	L2P2	Hybrid of trifoliate	0.13	R
7.	L2P6	Hybrid of trifoliate	0.17	R
8.	L3P1	Hybrid of trifoliate	0.58	R
9.	L3P4	Hybrid of trifoliate	0.24	R
	L3P5	Hybrid of trifoliate	0.18	R
10.	Trifoliate orange Chethali	*Poncirus trifoliata*	0.10	R
11.	Trifoliate orange Gonicoppal	*Poncirus trifoliata*	0.20	R
12.	Trifoliate orange (Yamaguchi)	*Poncirus trifoliata*	0	R
13.	Trifoliate orange (Rubidox)	*Poncirus trifoliata*	0	R
14.	Trifoliate orange (Argentina)	*Poncirus trifoliata*	0	R
15.	Trifesta trifoliate	Hybrid of trifoliate	0.06	R

Rf	Reaction
0 - 0.09	Highly resistant (HR)
0.1 - 1.0	Resistant (R)
> 1.0	Susceptible (S)

All the trifoliates and their hybrids were found highly resistant. The nematode did not multiply on trifoliates. Trifoliates have also been reported resistant to citrus nematode by Baines *et al.* (1960); Hutchinson and O'Bannon (1978); Ibrahim *et al.* (1989), Singh (1997), Bamel and Singh 2012 (a) and Bamel and Singh, 2012 (b). This could have an important bearing in a breeding programme where a variety may react differently in different locations.

SUMMARY

The citrus nematode, *Tylenchulus semipenetrans* is a

serious pest of citrus and is widely distributed in India. Studies on the resistance in rootstocks against this nematode could be of practical value in its management. Seventeen rootstocks were screened for resistance against *Tylenchulus semipenetrans* under screen house conditions. One year after inoculation, the reproduction factor was calculated on the basis of final and initial population. The females per gram roots were also counted. Based on Rf value all the trifoliates and some hybrids were found resistant to *T. semipenetrans* (Rf less than one). All other rootstocks were found to be susceptible. There was much variation in the Rf values of different rootstocks.

The result of this experiment will help determine which parental types should be used in a breeding programme to combine *T. semipenetrans* resistance with the other desirable characteristics in an improved citrus rootstock.

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