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EFFECT OF AGE OF PAPAYA SEEDLINGS ON THE DEVELOPMENT OF DISEASE COMPLEX CAUSED BY *MELOIDOGYNE INCOGNITA* AND *FUSARIUM SOLANI*

by
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Summary. Plant growth reduction, nematode reproduction factor and *Fusarium* root-rot decreased with the increase in age of papaya seedlings at the time of inoculation whether inoculated individually or concomitantly with *Meloidogyne incognita* and *F. solani*. Reduction in growth was maximum when seedlings were inoculated at the age of one week and minimum when inoculated at the age of 12 weeks. No root-rot and significant differences, in plant growth were observed when eight, ten and twelve-weeks old seedlings were inoculated with *F. solani*.

Papaya (*Carica papaya* L.) is reported to be a good host of *Meloidogyne* species in many tropical and subtropical regions. It causes leaf yellowing and low leaf production as well as premature dropping of both leaves and fruits of papaya (Inserra and Cartia, 1977; Roy and Das, 1980; Khan, 1989). Khan (1989) encountered mixed infection of root-knot nematode, *Meloidogyne incognita* (Kofoid *et* White) Chitw, and root-rot fungus, *Fusarium solani* (Mortius) Appel *et* Wollenweber on papaya that caused severe root rotting and ultimate death of plants over a large area in Panna, Chattarpur and Tikamgarh districts of Madhya Pradesh, India. The age of plants at the time of initial infection by nematodes (Jaffee and Mai, 1979; Griffin, 1981; Jain and Bhatti, 1986) or fungi (Howell *et al.*, 1976) is reported to have significant bearing on disease development. But, no such information is available on the development of the disease complex involving nematode and fungus. We thought it useful to study the effect of age of papaya seedlings on the development of root-knot and root-rot complex of papaya.

Materials and methods

Papaya (C.V. Honey Dew) seedlings of 1, 2, 4, 6, 8, 10 and 12 week age were grown in 30 cm earthen pots containing 2 Kg sterilized soil + river sand + farm yard manure (3:1:1) mixture and inoculated with 2000 second stage juveniles of *M. incognita* and 2.5 g fungal suspension (Mycelium + Spores) of *F. solani* both individually and concomitantly. Inoculation was made by pipetting the nematode or fungal suspension over the root surface carefully exposed earlier and later covered with soil. Uninoculated plants served as control. Each treatment was replicated five times and suitably randomized on a glasshouse bench.

Data were obtained after 3 months on plant growth (weight of shoot and root), number of galls/root system, percentage of root-rot and nematode reproduction factor. Reproduction factor (Rf) was calculated by the formula $Rf = \frac{P_f}{P_i}$ where Pf represented the final and Pi initial population of the nematode. To estimate nematode populations in roots, one g root in water was comminuted in a Waring blender for 30 seconds, thus releasing the females and eggs in the roots for counting. Nematodes from the soil washings in each pot were also counted. Data obtained were analysed statistically.

Results and discussion

Data presented in table I clearly show that reduction in plant growth was more when younger seedlings were inoculated with *M. incognita* and *F. solani* whether individually or concomitantly. With increased seedling age at the time of inoculation, the rate of reduction in plant growth decreased with the least reduction when twelve-week old seedlings were inoculated. Similarly, nematode reproduction factor, intensity of galling and root-rot were greatest when one-week old seedlings were inoculated and decreased with the increase in seedling age. Inoculation of *F. solani* in the eight, ten and twelve-week old seedlings failed

to establish any root rot and there was no significant reduction in plant growth compared with uninoculated plants.

On the basis of these results it was concluded that younger seedlings of papaya plants were more prone to infection of *M. incognita* and/or *F. solani*. The apparent tolerance of older seedlings may be due to histological and/or biochemical changes in the plant (Wood, 1967).

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TABLE I - *Effect of age of seedlings of papaya on the interaction of* Meloidogyne incognita *and* Fusarium solani.

Age of seedlings/ Treatments	Plant length	Plant dry weight	Percentage increase or decrease over control	Nematode population/Pot	$R = \frac{P_f}{P_i}$	No. of galls/ root system	Percentage of rotting/ root system
1 - Week							
CONTROL	73.4	50.6	—	—	—	—	—
M. incognita (Mi)	46.5	26.0	48.6	24100	12.05	118	—
F. solani (Fs)	58.6	36.1	28.6	—	—	—	19
Mi + Fs	18.8	5.9	88.3	11040	5.52	58	95
2 - Weeks							
CONTROL	78.2	56.4	—	—	—	—	—
M. incognita (Mi)	50.9	29.1	48.4	22870	11.43	124	—
F. solani (Fs)	65.4	44.0	22.0	—	—	—	16
Mi + Fs	24.5	8.3	85.3	9260	4.63	65	87
4 - Weeks							
CONTROL	86.5	62.3	—	—	—	—	—
M. incognita (Mi)	61.6	39.6	36.4	19570	9.78	109	—
F. solani (Fs)	70.7	52.0	16.5	—	—	—	12
Mi + Fs	34.3	14.1	77.4	6680	4.08	45	67
6 - Weeks							
CONTROL	93.4	66.4	—	—	—	—	—
M. incognita (Mi)	73.8	48.1	27.6	15570	7.78	90	—
F. solani (Fs)	86.5	58.0	12.6	—	—	—	10
Mi + Fs	47.9	28.8	56.6	8153	3.34	35	52
8 - Weeks							
CONTROL	101.7	73.5	—	—	—	—	—
M. incognita (Mi)	85.0	58.6	20.3	14200	7.10	94	—
F. solani (Fs)	97.9	75.8	+ 3.1	—	—	—	0
Mi + Fs	67.3	40.2	45.3	6560	3.28	40	42
10 - Weeks							
CONTROL	120.1	79.2	—	—	—	—	—
M. incognita (Mi)	104.5	66.5	16.0	11520	5.76	55	—
F. solani (Fs)	123.5	80.5	+ 1.6	—	—	—	0
Mi + Fs	91.6	51.0	35.6	5380	2.69	32	29
12 - Weeks							
CONTROL	135.6	82.4	—	—	—	—	—
M. incognita (Mi)	125.7	72.0	12.6	10390	5.19	38	—
F. solani (Fs)	138.3	78.3	3.8	—	—	—	0
Mi + Fs	107.9	56.3	31.7	4240	2.12	18	21
L.S.D. (at 5% level)	9.466	4.127			0.582	8.672	5.287
L.S.D. (at 1% level)	12.537	5.474			0.774	11.533	7.074

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