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Host suitability of date palm seedlings to *Meloidogyne incognita* as influenced by stress of plant age

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Abstract

The influence of date palm *Phoenix dactylifera* L., seedling age was determined on nematode reproduction to susceptible date palm cv., Sewi inoculated with root-knot nematode, *Meloidogyne incognita*. Seedlings of 4, 3 and 2 month old supported more nematode populations than 0 and 1 month old seedlings as indicated by number of galls and egg-masses on roots and juveniles in soil but they were rated as less affected by root-knot nematode depending their plant growth vigor. It is concluded that younger date palm seedlings seem to require root tissue maturation before expressing full resistance against root-knot nematode.

Key words: Plant age, date palm, *Meloidogyne incognita*, vigor.

The host plant is one of the most important biotic factors influencing the nematode behaviour. Griffin (1981) and Olthof (1983) reported that sugar beet plant was less susceptible to infection by *Heterodera schachtii* as with age and size. Susceptibility of tomato and onion to *Meloidogyne incognita* and *Ditylenchus dipsaci*, respectively decreased rapidly with increased in age of plant (Bergeson, 1968; Riedel, 1969). When, Bhatti & Sasser (1972) on *Kobe lespedeza* Rawsthorne & Hague (1986) on oat tested five different host ages, they found that the older seedlings were less infestated by *Heterodera lespedezae* and *H. avenae* as compared to the younger and tender seedlings. There is no information in the literature about behaviour caused by root-knot nematode on seedlings of date palm at different ages. Therefore, the objective of the present research to study reproduction of root-knot nematode, *M. incognita* infecting date palm cv., Sewi as influenced by plant age at inoculation time.

Materials and Methods

For this investigation, seeds of date palm cv., Sewi were soaked in renewable tap water for one week and then incubated in wet cloth for two weeks. Under screen house conditions, sprouted seeds were planted in 20 cm diam., clay pots filled with sterilized sandy loam soil (2 kg) at monthly intervals starting from June, 2013 to form five different plant ages, i.e., 0, 1, 2, 3 and 4 months. Three days after planting the last set of sprouted seedlings, six replicates from each treatment were inoculated with 2,500 newly hatched juveniles of *M. incognita*/pot. All pots were arranged in a randomized complete block design on a greenhouse bench at 30 ± 5 ºC. Twelve months after inoculation in June 2014, plants were uprooted and data on the plant growth as weight and length of shoots and weight of roots and the nematode population in soil and roots as indicated by number of galls and egg-masses on roots and number of juveniles in soil were recorded. The soil of each pot was mixed thoroughly after taking off the plant. Soil was processed for extraction of *M. incognita* juveniles by the sieving and decanting technique (Barker, 1985). Plant vigor was calculated as average plant growth criteria at each age. Plant vigor (%) was calculated for every plant age as the percentage plant growth potential. Difference among treatments were

calculated according to Duncan's Multiple Range Test ($P \leq 0.05$).

Results

Data in Table 1 indicated the influence of date palm age on reproduction and development of root-knot nematode, *Meloidogyne incognita* and subsequently on plant growth criteria. There was a positive relationship between plant ages and final nematode population in soil and roots. In other words, older seedlings of 4, 3 and 2 month old supported significant ($P \leq 0.05$) higher final nematode population (1896, 1843 and 962 individuals/pot, respectively) than those of 0 and 1 month old seedlings 638 and 373 individuals, respectively. The number of galls and egg-masses on roots and number of juveniles in soil behaved the same trend. However, older plants were categorized less affected by root-knot nematode in relation to their plant growth vigor than younger plants that were rated as moderately affected by root-knot nematode (Table 2).

Table 1. Population density of root-knot nematode, *Meloidogyne incognita* as affected by date palm seedling ages.

Plant age (month)	No. of galls	No. of egg-masses	No. of J_2 in soil	Final nematode population
4	71 a	26 a	1870 a	1896 a
3	44 b	18 b	1825 a	1843 a
2	22 c	10 b	943 b	962 b
1	11 d	5 c	633 bc	638 bc
0	11 d	6 c	367 c	373 c

Values with the same letter(s) are not significantly different.

Table 2. Different host reaction of five date palm ages to *Meloidogyne incognita* under screen house conditions.

Plant age	Plant vigor	Plant vigor (%)	Host reaction
4	29.3 a	100	Less affected
3	28.5 a	97.3	Less affected
2	27.2 a	92.8	Less affected
1	22.5 ab	76.8	Moderately affected
0	18.5 b	63.1	Moderately affected

-Values with the same letter(s) are not significantly different.

-Plant vigor was calculated as average plant growth criteria at each age 0-50% plant vigor = Highly affected, 51-80% = Moderately affected and 81-100% = Less affected.

Discussion

One of the most effective factors is the host age which influence on the nematode behaviour and reproduction. Date palm seedling age was used as an influential factor on development, reproduction and virulence of root-knot nematode, *M. incognita*. The obtained results showed a positive relationship between the plant age and the nematode final population i.e., nematode final populations on the 4, 3 and 2 were higher than those on 0 and 1 month old seedlings. These findings did not agree with previous studies conducted by several workers on other nematode species on different plants in regard to the host age (Fawole & Mai, 1979; Griffin, 1981; Olthof, 1983; Shamim & Israr, 1989; Youssef & Bary, 1992; Eapen, 1992; Ismail & Kheir, 2014) as they reported that the nematode population decreased with increasing of plant age. In this study, the lower nematode population on younger date palm seedlings may be due either to their slower, delayed root proliferation and elongation or shortage of food supply required for feeding nematodes especially in 0-month old seedlings than those of older ones. The amount of damage occurred in younger date palm seedlings were more evident. These results suggested that the younger plants seemed a physiological maturation processes before expressing full resistance against

nematode. It was acceptable that root exudated responsible for nematode attraction (Ismail & Hasabo, 1995; Haroon *et al*., 2009). Tissue maturation and senescence two important factors influenced the susceptibility of a plant to pathogens (Bruehl, 1987). Weiser (1985) reported that actively elongated roots were more attractive to nematode juveniles than roots of slow growth.

Conclusion

It is concluded that younger date palm seedlings seemed root tissue maturation before expressing full resistance against root-knot nematode.

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