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EFFECT OF DIFFERENT PLANTS ON THE MORPHOMETRICS OF FEMALES OF ROOT-KNOT NEMATODE, *MELOIDOGYNE INCOGNITA*

by
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The influence of the host plant on morphometric and allometric characters has been reported for several nematodes species such as *Ditylenchus destructor* (Goodey, 1952), *Paratylenchus nanus* (Fisher, 1965), *Trichodorus christiei* (Bird and Mai, 1965), *Heterodera glycines* (Golden and Epps, 1965), *H. rostochiensis* (Trudgill and Parrot, 1970) and *Aphelenchoides fragariae* (B'Chir, 1977). Variation due to the host on morphometrics of *Meloidogyne incognita* (Kofoid *et* White) Chitw. and *Meloidogyne incognita acrita* Chitw. have been studied by Sasser (1972), Michell (1973) and Davide (1980). It has commonly been observed that a local population of *M. incognita* collected from different hosts exhibited variation in morphometric and allometric characters; it was not clear whether these differences were due to the existence of different biotypes or to variability induced by the hosts. Thus it is important to ascertain the extent of variation that can occur when a single egg mass population collected from one host is reared on different hosts under similar environmental conditions. This has been studied in *M. incognita* as reported here.

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Materials and Methods

Seedlings of plants listed in Table I were raised in 8 cm clay pots containing sterilised soil: sand (3:1). Second stage larvae for inoculation were obtained from stock cultures of *M. incognita* maintained in the glasshouse and obtained from a single egg mass isolated from *Artemisia* sp. Each seedling was inoculated with 1,000 freshly hatched larvae. There were 5 replicates for each of the plant species. After 50 days the roots were washed and root-knot infection assessed according to the index:

0 = No infection; 1 = Infection but larvae did not mature into adult females; 2 = 50-100 galls; 3 = 101-150 galls; 4 = 151-200 galls; 5 = > 200 galls.

Nematodes were extracted from roots by comminuting them in a Waring blender and from soil by Cobb's sieving and decanting technique (Southey, 1970). Roots of plants containing females were fixed in 0.1% cotton blue lactophenol and the nematodes were mounted in lactophenol. Measurements were made of several characters of females and of perineal patterns. The data so obtained were subjected to statistical analysis.

Results and Discussion

Rearing of the single egg mass population on different plant types (Table I) resulted in changes in several morphobetric and allometric characters. Females of *M. incognita* from the original population on *Artemisia* were characterised by a protuberance in the vulval region and this character persisted after culturing on other hosts. Females raised on other hosts were smaller than those from *Artemisia*, except for those from French bean (*Phaseolus vulgaris* L.) cv. Royal Red and cowpea [*Vigna sinensis* (Torner) Savi] cv. Russian Jaint. The values of the characters examined, except width of vulva and vulval anal distance, were somewhat higher than reported by Chitwood (1949) and Whitehead (1968).

The size of females correlated with the suitability of host. Thus with a root-knot index 2 the mean body size was 600 x 400 μm, when 3 was 685 x 429 μm, when 4 the size ranged from 700 x 420 to 723 x 466 μm, and when 5 ranged from 734 x 461 to 766 x 493 μm.

Body length was significantly reduced in *Lycopersicon pimpi-*

Table I - *Morphometric variation in the females of* Meloidogyne incognita *from different host plants.*

Host Variety	Root-knot Index	Body length	Body width	Neck length	Neck width	Stylet length (µm)	Dorsal arch	Ventral arch	Vulval width	Vulval anal distance
L. pimpinellifolium (red fruit)	2	600±29 (4.39)	429±20 (4.65)	217±28 (12.74)	104±12 (11.53)	16±0.4 (2.74)	53±3.0 (5.58)	31±1.6 (5.18)	23±0.9 (4.04)	17±0.7 (4.3)
L. pimpinellifolium (yellow fruit)	3	685±42 (6.07)	400±32 (7.88)	225±24 (10.79)	99±10 (10.03)	16±0.7 (4.35)	53±3.3 (6.15)	33±1.1 (3.3)	21±1.1 (5.81)	17±0.8 (5.0)
L. esculentum cv. Meeruti	4	708±53 (7.25)	440±32 (7.55)	253±38 (14.89)	104±9 (8.75)	17±0.2 (1.46)	53±1.9 (3.73)	30±1.3 (4.27)	24±1.5 (6.38)	18±0.4 (2.22)
Kalainpur set I	4	709±38 (5.46)	420±27 (6.32)	240±28 (11.48)	100±13 (12.72)	16±0.24 (1.50)	61±2.9 (4.81)	34±2.3 (6.25)	22±1.6 (7.01)	18±0.6 (3.40)
Kalainpur set II	4	706±45 (4.35)	423±28 (6.56)	247±17 (7.08)	95±10 (10.77)	17±0.4 (2.48)	60±3.8 (6.37)	33±2.3 (6.86)	23±1.2 (5.42)	17±1.0 (5.75)
Kalainpur set 2	4	700±21 (2.95)	446±34 (7.53)	243±20 (8.32)	95±8 (8.49)	17±0.5 (2.79)	59±3.7 (6.3)	35±2.6 (7.4)	24±1.7 (6.90)	17±0.8 (4.65)
Kalainpur set 3	4	710±29 (4.11)	466±31 (6.61)	223±25 (11.04)	100±11 (10.6)	17±0.4 (2.14)	60±3.7 (6.2)	36±2.6 (7.2)	24±1.5 (5.98)	17±0.8 (4.67)
Pusa Ruby	4	717±44 (6.17)	443±30 (6.68)	239±30 (12.44)	101±9 (8.62)	17±0.4 (2.47)	60±2.1 (3.4)	35±2.3 (6.59)	24±0.89 (3.73)	18±1.1 (5.8)
Medicago-sativa	4	723±40 (5.51)	454±33 (7.23)	247±29 (11.77)	103±11 (10.7)	17±0.4 (2.06)	62±2.9 (4.70)	35±1.9 (5.3)	23±1.1 (4.8)	18±0.9 (5.05)
French bean cv. Royal Red	5	734±36 (4.98)	462±34 (7.3)	252±32 (10.79)	103±10 (9.66)	17±0.4 (2.57)	64±1.98 (3.10)	38±2.6 (6.81)	24±1.1 (4.85)	18±1.0 (5.59)
Cowpea cv. Russian Jaint	5	766±42 (5.51)	493±21 (4.2)	253±30 (10.84)	103±12 (12.02)	17±0.4 (2.36)	67±2.2 (3.3)	39±2.3 (5.80)	24±1.2 (5.11)	18±1.1 (5.82)
Artemisia (original inoculum)	4	725	420	235	99	17	62	33	23	18
L.S.D. at 5% level		30.23	28.49	17.89	9.98	1.30	3.48	3.08	1.60	1.45

N.B.: Each figure is a mean of 50 females: figures in parenthesis indicate C.V.

No mature females developed in the roots of *Amaranthus caudatus* cv. SL. No. 25 and French bean cv. Brown Beauty and there was no penetration in the roots of *Tagetes erecta, T. minuta, T. patula* and *Crotolaria juncea.*

nellifolium (Jusl.) Mill. but increased in French bean cv. Royal Red and cowpea cv. Russian Jaint. Similarly body width increased significantly in tomato *L. esculentum* Mill. cv. Kalainpur set 3, French bean cv. Royal red, and cowpea cv. Russian Jaint, However neck length, neck width, stylet length of females, vulval width and vulval anal distance of perineal pattern did not differ significantly.

In this study high C. V. values have been obtained for neck length and width and least for stylet length. It can thus be concluded that measurements of different morphometric characters differ in females obtained from different plants when inoculated with single egg mass population. These results support the findings of Tacconi (1969), Pogosyan and Karpetyan (1976), Grulton *et al.* (1976) and Davide (1980) who also reported that host plants induced variation in morphometrics of females of root-knot nematode and also that females in resistant-tolerant hosts were smaller in size.

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SUMMARY

Seventeen plants, belonging to seven genera, were inoculated with single egg mass populations of *Meloidogyne incognita* in order to determine the extent of variation in the female characters. Females developing on roots of almost all the plants exhibited significant variation in morphometric and allometric characters except on *Crotolaria* sp., *Tagetes* sp., *Amaranthus caudatus* cvs., SL. No. 25 and French bean cv. Brown Beauty where the development of females was inhibited.

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