Effects of Sowing Dates on Variability of Perineal-Pattern of Meloidogyne Incognita

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Abstract: ***In the present investigation effect of sowing dates was study on the morphometric of perineal pattern. Seedlings of tomato cv. Marglobe were inoculated with single egg mass population of Meloidogyne incognita in the first week of every month from January to December. It was found that various morphometric characters of the female studied were high when plants were inoculated during September and October; intermediate in March, April, July and August and low in the remaining months with no development of mature females in December and January. This variation may be due to temperature prevailing in these months. Out of several characters studied, dorsal and ventral arch, lines of right and left side of the pattern were highly variable. However, vulval width, vulval and distance and B/A rato remain unaffected.***

Keywords: Meloidogyne incognita, sowing data, Morphotrics, Perineal pattern.

1. Introduction

Plant nematodes attack a variety of crops including vegetables takeing a very toll of agricultural produce every year (Anon [1]; Swarup and Seshadri [2]). Plant parasitic nematodes are a serious threat for crop production causing an estimated worldwide loss of U.S $125 billion (Chitwood [3]). Okra, Tomato and Brinjal crop suffered considerable yield losses due to Meloidogyne incognita intestation at the rate of 3-4 larvae/gram soil under field conditions. Reduction in the yield of tomato (*Lycopersicon esculentum*) ranging from 28% to 75% has been reported by various researchers (Ibrahim et.al. [4]; Rajendram et.al. [5]).

For most of the species of root-knot nematodes, relatively higher temperature is required for hatching (Santo & Belander [6], Meon [7]). Various characters of Meloidogyne incognita studied show that different temperature play important role in the Morphometrics of females of M. incognita (Shahab et.al. [8]). Regarding perineal pattern Allen in 1952 reported variation in the perineal pattern in a single egg mass population of *Meloidogyne incognita.* Dropkin [9] pointed out that variation in perineal pattern in single larval females of *M. incognita* var. *acrita* was less marked than in the population of mixed ancestory and concluded that cuticular pattern offered quite stable characters for identification. Triantaphyllou and Sasser [10] and Hirschmann [11] observed considerable variability in cuticular pattern in *M. incognita*. In view of contradictory reports regarding the validity of posterior cuticular pattern for species identification it was considered necessary to study the effect of sowing dates on the variability of perineal pattern of *M. incognita.*

2. Materials and Methods

Seedlings of tomato cultivar Marglobe were transplanted in autoclaved soil and inoculated with 1000±10 freshly hatched larvae of *M. incognita* in the first week of every month from January to December. The females from the infested roots were dissected and mounted in warm lactophenol (Southey [12]). For posterior cuticular pattern egg-laying females if possible were selected. The posterior end of the female was cut off and the piece of cuticle cleaned from adhering soft parts, trimmed down to the area showing the pattern and mounted in clear lactophenol. The following characters of the perineal patterns were taken into consideration for studying the morphometrics:

- Length of dorsal arch
- Length of ventral arch
- Lines on left side of the pattern
- Lines of right side of the pattern
- Vulval width (A)
- Vulval and distance (B)
- Ratio B/A

The data were subjected to statistical analysis wherever, desired.

3. Results and Discussion

Low values of measurements were observed for dorsal arch, ventral arch, lines on right and left side of perineal pattern in months having extremely low and high temperature and higher values during the months with favorable temperature. There was no formation of mature females at low temperature prevailing in the month December and January (Table 1 and Fig. 1 & 2).

Table 1: Effect of inoculating seedlings of tomato in different month of the year with single egg mass population of *Meloidogyne incognita* on the morphomatrics of perineal pattern

Treatments months of inoculum	*Dorsal arch*	*Ventral arch*	*No. of lines left side of pattern*	*No. of line on right side of pattern*	*Vulval width (A)*	*Vulval and distance (B)*	*B/A*
January	-	-	-	-	-	-	-
February	55.55–63.80 59.86 ± 3.04 (5.09)	33.00–39.60 35.58 ± 2.17 (6.15)	12.00–16.00 13.90 ± 2.53 (18.25)	12.00–15.00 13.60 ± 1.20 (8.82)	19.80–24.60 21.59 ± 1.46 (6.80)	15.40–18.70 17.05 ± 0.87 (5.14)	0.75–0.81 0.785 ± 0.10 (13.67)
March	63.10–70.60 66.24 ± 2.20 (3.32)	36.80–45.10 40.58 ± 2.33 (5.76)	12.00–17.00 14.90 ± 1.44 (9.70	13.00–17.00 15.00 ± 1.26 (8.43)	19.80–24.85 22.03 ± 1.69 (7.70)	15.80–18.60 16.78 ± 1.02 (6.10)	0.71–0.85 0.80 ± 0.05 (7.24)
April	63.70–70.60 66.62 ± 2.40 (3.61)	36.00–45.70 40.67 ± 2.65 (6.52)	12.00–18.00 15.20 ± 1.93 (12.75)	13.00–17.00 15.10 ±1.30 (8.60)	19.80–24.42 22.62 ± 1.56 (6.94)	15.80–19.10 17.89 ±1.24 (6.93	0.75–0.81 0.78 ± 0.08 (10.35)
May	57.10–68.20 62.62 ± 4.35 (6.94)	35.00–37.40 36.35 ± 0.84 (2.32)	12.00–15.00 13.20 ± 0.87 (6.60)	12.00–15.00 13.30 ± 1.10 (8.27)	19.80–24.80 21.98 ±1.64 (7.47)	15.40–17.80 16.31 ± 0.95 (5.83)	0.71–0.77 0.73 ± 0.10 (14.08)
June	60.50–67.40 63.45 ± 2.68 (4.23)	33.00–38.50 32.82 ± 2.00 (5.60)	12.00–15.00 13.40 ± 0.90 (6.83)	12.00–15.00 13.10 ± 1.04 (7.96)	20.80–25.80 22.60±1.47 (6.52	16.40–18.60 17.69 ± 0.59 (3.37)	0.69–0.84 0.76 ± 0.06 (8.52)
July	57.00–69.40 63.95 ± 3.48 (5.44)	35.00–41.80 38.77 ± 2.98 (7.70)	12.00–15.00 13.50 ± 1.02 (7.59)	12.00–16.00 14.00 ± 1.09 (7.82)	20.60–25.30 22.19±1.71 (7.75)	15.60–17.90 16.68 ± 0.71 (4.29)	0.70–0.79 0.74 ± 1.11 (15.04)
August	62.80–72.00 66.13 ± 2.87 (4.34)	35.80–44.60 38.85 ± 2.95 (7.55)	12.00–16.00 14.40 ± 1.35 (9.41)	12.00–16.00 14.00 ± 1.09 (7.82)	19.80–23.75 21.55±1.35 (6.29)	14.80–18.60 16.24 ± 1.20 (7.40)	0.70–0.80 0.74 ± 0.10 (14.64)
September	63.00–70.60 66.59 ± 2.40	37.80–46.80 42.78 ± 2.74 (6.43)	12.00–17.00 15.20 ± 1.46 (9.66)	14.00–17.00 15.20 ± 0.97 (6.44)	20.80–25.30 22.41±1.67 (7.47)	15.80–18.40 16.92 ± 0.82 (4.90)	0.71–0.80 0.75 ± 0.08 (10.66)
October	62.70–70.20 67.25 ± 3.23 (4.81)	38.60–48.60 43.43 ± 3.15 (7.26)	14.00–17.00 15.70 ± 1.10 (7.00)	13.00–17.00 15.40 ± 1.20 (7.79)	19.80–24.53 22.57±1.68 (2.47)	15.00–18.08 16.59 ± 7.00 (6.05)	0.69–0.75 0.73 ± 0.04 (5.820)
November	55.80–63.90 60.30 ± 3.03 (4.79)	33.0–37.40 34.71 ± 1.83 (5.29)	12.00–16.00 13.40 ± 1.02 (7.61)	13.00–16.00 13.20 ± 1.16 (8.83)	20.35–24.53 22.17±1.39 (6.28)	15.80–17.20 16.39 ± 0.49 (3.04)	0.69–0.77 0.73 ± 0.08 (12.26)
December	-	-	-	-	-	-	-
LSD at 5% level	2.85*	2.63*	1.20*	1.28*	2.06	1.9	0.1

Each figure is a mean of two hundred female.
Figure in parentheses indicate C.V. (Coefficient of variation)
* Data significant± Standard deviation

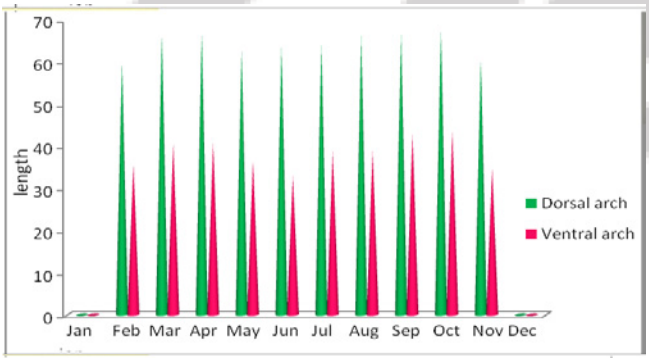

Figure 1: Effect of inoculating seedlings of tomato in different months of the year with single egg mass population of *Meloidogyne incognita* on the dorsal and ventral arch length.

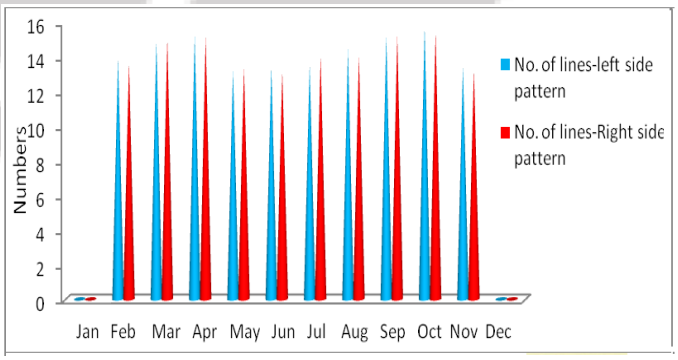

Figure 2: Effect of inoculating seedlings of tomato in different months of the year with single egg mass population of *Meloidogyne incognita* on the number of lines left and right side of the pattern

This is in agreement with the finding of Evan & Franco [13] who reported large size of the females at high (optimal) temperatures. However, vulval width, vulval anal distance and B/A ratio remain unaffected (Fig. 3).

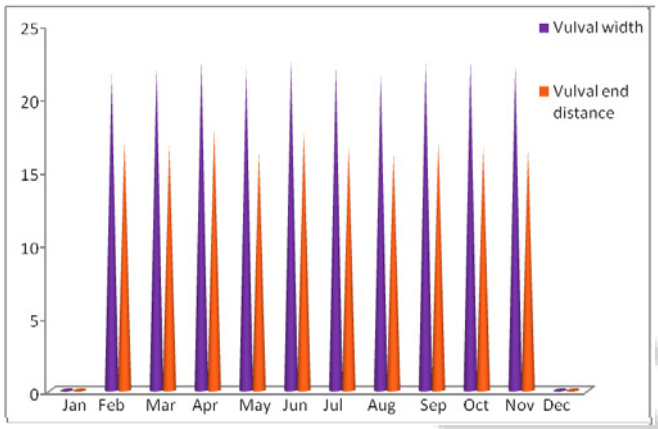

Figure 3: Effect of inoculating seedlings of tomato in different months of the year with single egg mass population of *Meloidogyne incognita* on the Vulval width and Vulval end distance

As clear from Table 1 high value of C.V. were obtained for lines on left and right side of the pattern indicating that these characters are highly variable and thus their reliability as taxonomic character is doubted (Pant [14]). However vulval width and vulval anal distance were least variable, such value with low C. V. is therefore, of more diagnostic value (Shahab et al., [15]). It can therefore, be concluded that different characters to be used for diagnosis of species should be examined in the light of the environment (ecological setting) in which the nematodes is multiplying. Adverse conditions would give low value and low ranges of different morphometric characters and may thus lead a taxonomist to arrive at a wrong conclusion.

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