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STUDIES ON THE BIOLOGY OF *HETERODERA CAJANI* IN THREE CULTIVARS OF *SESAMUM INDICUM*

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The life cycle of the cyst nematode *Heterodera cajani* was studied in three cultivars of *Sesamum*. The time taken in the completion of one generation of nematode in TC-25, UT-43 and T-13 was twenty, twentythree and twentyseven days respectively. On the basis of per cent penetration of larvae in the roots and the number of cyst formed, the TC-25, UT-43 and T-13 cultivar was graded as susceptible, moderately resistant and resistant against *Heterodera cajani* respectively. Maximum per cent penetration of larvae and cyst formation was observed in TC-25 and least in the T-13. Morphometrical measurements of different stages of the life cycle also support the varied nature of nematode against these cultivars.

Key words: *Sesamum*, *Heterodera cajani*, biology, morphometrical measurements.

Sesamum is an important oil seed crop widely grown in Rajasthan, India. This is one of the favourable host of cyst nematode, *Heterodera cajani* (Verma *et al.*, 1975). The life cycle of this nematode has been studied by number of worker's on different host (Koshy *et al.*, 1971; Gupta *et al.*, 1973; Yadav *et al.*, 1988). However there is no systematic and time bound information on the life cycle of nematode on *Sesamum*. The present investigation was undertaken to study the life cycle of *Heterodera cajani* on three different cultivars of *Sesamum indicum*.

MATERIALS AND METHODS

Seeds of three different cultivars of *Sesamum indicum* TC-25, UT-43 and T-13 were sown in 10cm diam. plastic pots. Ten days old seedling were thinned to one per pot. Each plant was inoculated with hundred freshly hatched second stage juvenile. *Heterodera cajani* cyst collected from the heavily infested *Sesamum* plants were incubated at 29±2°C for juvenile collection. Plants were carefully uprooted daily up to emergence of second stage juvenile in next generation. This was studied in months of August-September. Root samples were washed carefully in running water, stained in 0.1 per cent acid fuchsin for two minutes and left in lactophenol for several hours. Temporary mounts were prepared in lactophenol and observed with a stereoscopic microscope.

Different developmental stages of life cycle of nematode from the second stage juvenile to the next generation larvae were observed. Time taken in all the other moults was also observed (Table-1).

Table 1: Duration in days to complete life cycle of *Heterodera cajani* in susceptible and resistant cultivar of *Sesamum indicum*.

Penetration & development	Days after inoculation		
	Susceptible cv. TC-25	Moderate resistant UT-43	Resistant cv. T-13
Penetration time	24 hrs.	24 hrs.	24 hrs.
Per cent penetration	73 to 80%	42 to 50%	25 to 30%
Sedentary second stage larvae	3	3	4
Third stage	6	6	7
Third stage male	9	10	11
Third stage female	10	11	12
Fourth stage male	12	12	14
Fourth stage female	13	14	16
Adult male	14	15	17
Adult female	15	17	19
Deposition of eggs in eggsac	17	20	23
Emergence of second generation larvae	20	23	27
Bright yellow cyst	33	35	37
Brown cyst	43	45	47

Observations are mean of ten replicates

Morphometrical measurements of different stages of life cycle were also taken in all the three cultivars. (Table 2).

RESULTS AND DISCUSSION

The second stage juvenile of *Heterodera cajani* penetrated in the roots of *Sesamum* within twentyfour hours after inoculation in the three cultivars of *Sesamum*. There was great reduction in per cent penetration in resistant cultivar T-13 as compared to other cultivars. Second stage juvenile after penetration resided in the stelar zone and modified the host tissues. Giant cell formation was noted in the vascular parenchyma after

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Table 2: Measurements of different developmental stages of *Heterodera cajani* in *Sesamum indicum* varieties TC-25, UT-43 and T-13.

Stage	Length x Width (µ)		
	Susceptible TC-25	Moderate Resistant UT-43	Resistant T-13
Second stage infective larvae	432-500 (466)x17-27 (22)	432-500 (466)x17 (22)	432-500 (466)x17-27 (22)
Third stagemale	333-366.3 3(349.6)x50-66 (58)	326.3-356.3 (341.3)x47-60 (53.5)	309.6-333 (321.3)x40-50 (45)
Third stage female	333-336.3 (349.6)x50.83 (66.5)	326-356.3 (341.3)x50-80 (65)	309.6-333 (321.3)x50-67 (58.5)
Fourth stage male	316-349 (332.5)x67.83 (75)	310.340 (325)x65-80 (72.5)	303-336 (319.5)x60-77 (68.5)
Fourth stage female	366-433 (399.5)x133-167 (150)	359-400 (379.5)x127-147 (137)	350-383 (366.5)x117-150 (133.5)
Adult male	833-1298 (1065.5)x27-33 (30)	816.9-1282 (1049.4)x25-32 (28.5)	799.1265 (1032)x23-27 (25)
Cyst	666-799 (732.5)x433-566 (499.5)	632-732.6 (682.3)x416-499 (457.5)	583-700(641.5)x399-466 (432.5)
Egg	103.2-133 (118.1)x50-67 (58.5)	99.9-116.5 (108.2)x47-63 (55)	96.6-113.2(104.9)x43.2-2-63.2 (53.2)

(Observations are mean of ten replicates)

larvae became sedentary. Further moulting was observed in all the three cultivars. There was delayed moulting in the resistant cultivar as compared to other two cultivars (Table 1). Third stage juvenile became shorter and stouter having a typical convex conoid tail tip. Differentiation of sexes was also noted after this stage. More males were noted in roots of cultivar T-13. After fourth moulting, adult male and female were formed. In susceptible cultivar TC-25, mature females were globose and healthy and their number was also higher as compared with less developed females of T-13. The tail end of the adult female or white cyst was out side the root tissue. The posterior part had a rounded egg sac of thin transparent membrane after the seventeenth day, twentieth day and twentythird day in TC-25, UT-43 and T-13 (Table 1). Egg laying time was variable in three cultivars. More eggs were observed in egg sacs as compared to the cyst. Emergence of second generation larvae was different in three cultivars (Table 1). White cyst turned bright yellow and ultimately brown in colour on maturation. These were lemon shaped bodies with distinct neck and vulval cone. Vulval cone was ambifenestrate. Distinct bullae was developed at this stage. These cysts were dead females which protected the egg and larvae inside it. These perennating bodies also protected the contents during unfavourable conditions.

Thus *H. cajani* completed one generation in twenty, three and twentysix days in TC-25, UT-43 and T-13 cultivars of *Sesamum* respectively. Completion of one life cycle on *Sesamum* in twenty three days was also observed earlier (Yadav *et al.*, 1988). *Heterodera cajani* completed its life cycle in sixteen days at 29° C on Pigeon pea (Koshy *et al.*, 1971) and in seventeen days on Cowpea (Gupta *et al.*, 1973).

Sesamum takes about three months for maturation of the crop. *H. cajani* repeates life cycle four to five times in one season on this host. Large number of eggs were produced in one season leading to heavy nematode population built up in the soil. This caused further damage to the host plant.

Morphometrical measurements showed reduction in size of different stages of life cycle in resistant cultivar than that of moderate resistant and susceptible cultivars (Table 2). This also supported the resistant nature of the cultivar. In the above mentioned three cultivars of *Sesamum*, maximum cyst size was observed in susceptible cultivar (Table 2). Similar findings were also observed in resistant and susceptible cultivars of *Trigonella* (Sharma *et al.*, 1992) against *Meloidogyne incognita*.

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