A NEMATODE FEEDING MITE, *TYROPHAGUS PUTRESCENTIAE* (SARCOPTIFORMIS : ACARIDAE)

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There are few reports confirming nematodes as the diet of soil mites. Linford and Oliviera (1938) observed mites feeding on root knot nematodes. Murphy and Doncaster (1957) reported injury of *Heterodera* cysts by a mite. The most definite association came from the work of Rodriguez *et al.* (1962) who observed that when given equal choice, the adult mite *Macrocheles muscae-domesticae* preferred house fly eggs over nematodes while proto- and deutonymph under same conditions preferred nematodes. An oribatid mite *Pergalumna* sp., fed upon *Pelodera lambdiense* and *Tylenchorhynchus martini* in large numbers (Rockett & Woodring, 1965). Muraoka and Ishibishi (1976) described feeding by many species of mites which were identified as nematode predators. Recently, Imbriani and Mankau (1983) observed feeding of a neostigmatid mite, *Lasioseius scapulatus* on *Aphelenchus avenae* and *Cephalobus* sp.

In the present work observations were made on the predatory behaviour of *Tyrophagus putrescentiae* (Sarcoptiformis : Acridae) using nematodes as prey.

Materials and methods

Prey catching and feeding mechanisms were studied in culture dishes and special observation chambers. A plastic ring (1 cm high; 2 cm diam.) glued to a coverslip at one end, was fixed in the middle of a metallic slide. The chamber, thus formed, was filled with 1 % water agar. The mites and prey nematodes were then inoculated and the ring was sealed with another coverslip to prevent air drying and escape of mites. Predation was observed on *Rhabditis* sp., *Cephalobus* sp., *Hirschmanniella oryzae* and *Tylenchorhynchus mashhoodi.* The rate of predation by *T. putrescentiae* was determined by using five adult mites against 50 individuals of prey. The effect of prey density on the rate of predation by *T. putrescentiae* was observed by placing 25, 50, 75, 100, 125, 150, 175 and 200 individuals of *H. oryzae* separately with five predators. The number of individuals killed or consumed by the mites was recorded after 24 h. All experiments were carried out at 28 ± 2 °C and replicated five times.

Predatory behaviour

T. putrescentiae feed on nematodes and other microorganisms in culture dishes. During routine observations the cultures of saprophagous species of nematodes viz., *Acrobeloides, Cephalobus, Rhabditis, Panagrellus* and predaceous nematodes viz., *Mononchus*

aquaticus, Mononchoides fortidens, M. longicaudatus, Dorylaimus stagnalis, Aquatides thornei were all found to be contaminated and consumed by *T. putrescentiae*. It restricted multiplication and reproduction of nematodes in culture dishes and as a result of predation brought down their population at a low level.

T. putrescentiae could hold its prey using its palp (used to identify prey organisms and other objects) and legs as soon as the prey came in contact. The legs are generally used for holding and wounding the prey. Chelicerae are the main killing and feeding organ, also used for grasping and crushing the prey. The ingestion of prey contents was intermittent (two or three feeding bouts) with short periods of resting activity at regular intervals. Mites also consumed its own faecal matter while moving randomly generally in absence of prey nematodes. No cannibalistic tendency was observed in *T. putrescentiae*. The nymphal stages of *T. putrescentiae* fed mostly on dead nematodes, their remains or upon the agar containing bacterial and fungal growth. *T. putrescentiae* killed *Rhabditis* sp. and *H. oryzae* most while *Cephalobus* sp. the least (Table 1). Maximum predation occurred in the population of 200 prey individuals which was double the number of prey killed when 25 individuals of *H. oryzae* were used as prey (Table 2).

Table 1. Rate of predation by *Tyrophagus putrescentiae* upon different prey nematodes.

Prey species	No. of prey killed
Rhabditis sp.	29-33 (34 ± 1.6)
Cephalobus sp.	21-27 (24 ± 2.4)
Hirschmanniella oryzae	28-34 (30 ± 2.6)
Tylenchorhynchus mashhoodi	24-31 (27 ± 2.5)

Table 2. Effect of prey density *(Hirschmanniella oryzae)* on the rate of predation by *Tyrophagus putrescentiae*.

Prey number	No. of prey killed	%
25	6-14 (10 ± 3.0)	40
50	23-29 (26 ± 2.0)	52
75	39-43 (41 ± 1.9)	55
100	58-62 (61 ± 3.0)	61
125	82-88 (85 ± 2.8)	68
150	108-113 (109 ± 2.3)	73
175	131-136 (133 ± 2.6)	76
200	158-164 (161 ± 2.3)	81

All figures are nearest to whole numbers.

Conclusions

Observations on *T. putrescentiae* suggest its predaceous nature. These predatory mites appeared to possess greater predatory potentials mainly because of their ability to kill variety of nematodes in large numbers. *T. putrescentiae* fed most upon *Rhabditis* sp. and *H. oryzae*. Besides, mites also consumed bacterial and fungal populations grown over the agar. Increased predation by *T. putrescentiae* with increasing number of *H. oryzae* suggests density dependant predation as is the case with many predaceous nematodes (Bilgrami *et al.*, 1984; 1985; Bilgrami & Jairajpuri, 1990). The coprophagous behaviour of *T. putrescentiae* may be an added advantage as it could avoid intraspecific interactions (cannibalism).

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