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Effect of Bird Predation and Egg Parasitism on Castor Semilooper *Achaea janata* Linn. (Lepidoptera : Noctuidae) in Gujarat

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ABSTRACT

The castor semilooper, *Achaea janata* Linn. appeared in epidemic form during September - October, 1985. A total of eighteen species of birds were recorded feeding on the *A. janata* larvae. About 300 Rosy Pastors, *Sturnus roseus* fed on *A. janata* for 8 days. Due to the heavy bird predation on large size larvae, pupal count was reduced. Egg parasitism by *Trichogramma chilonis* Ishii and *Telenomous* sp. progressively increased from 50.0 to 92.2 per cent. Despite heavy egg parasitism, larval density reached as high as 8.91 per plant. Heavy predation by birds and higher egg parasitism had failed to control the population of *A. janata* in epidemic situation.

KEY WORDS : *Achaea janata, Trichogramma chilonis*, egg parasitism, *Sturnus roseus*, bird predation

A number of parasitoids have been reported on the eggs and larvae of castor semilooper, *Achaea janata* Linn. (Khan, 1947; Patel and Yadav, 1979). Raj and Jayaramaiah (1978) have reported predatory activity of some bird species on *A. janata* in Maharashtra. A severe outbreak of *A. janata* was observed in about 3 hectares of castor (*Ricinus communis*) in the Antroli village of Gujarat State in September, 1985. Attempts were made to estimate the impact of natural enemies on the population density of *A. janata*.

MATERIALS AND METHODS

Observations were recorded on the population density of castor semilooper and its mortality factors in about 3 hectares area of castor field between September 25 to October 29, 1985. The number of larvae and pupae present on 155 - 294 randomly selected plants were recorded. The plant height was 1.0 to 1.5 meters. Various species of birds preying on the pest were recorded and their approximate numbers on each day of observation was determined. The bird count was made by considering the maximum number of birds observed at a time during the 4 to 5 h period of observation in the morning time.

On October 3, a small area of the field (5 x 3 x 2 m) covering 27 plants was covered by a plastic net (mesh size 2.0 cm) to prevent entry of predatory birds. In this enclosure, the population trend of *A. janata* in the absence of avian predators was recorded. The eggs were periodically collected from the field and kept in individual glass vials to record egg parasitism.

RESULTS AND DISCUSSION

On September 25, 18 species of birds were found feeding on *A. janata* in castor field and the larval population density was 4.57 per plant. The Rosy Pastor *Sturnus roseus* (Linnaeus), a migratory species was the major predator of *A. janata* and it visited the field in large flocks of about 300. The Rosy Pastors with the other birds remained around the field throughout the day, resting periodically on the bordering trees.

At night they roosted on an Eucalyptus plantation, approximately 3 km away from the study field. They actively searched for the larvae during morning and evening hours. The flock of Rosy Pastors which chiefly consisted of juveniles, searched for the larvae by walking on the ground between the rows. On sighting a larvae on the lower surface of the leaf, the bird jumped with a short flight and returned to the ground with a prey in its beak. All the species of Myna, Hoopoe, Pipits and Cattle Egret employed the same technique to capture larvae. They occasionally perched on the plant and climbed up vertically in search of larvae resting on the lower surface of the leaves. The Western Swallow was seen only once taking small larvae from a plant. The common Crows were observed during the early morning hours. The Golden Oriol, Large Cuckoo Shrike and Grey Shrike were observed during later dates feeding occasionally on larvae. The large Grey Babbler *Turdoides striatus* and Common Babbler *T. caudatus* also visited the field but their predation on *A. janata* could not be confirmed. Raj and Jayaramaiah (1978) have also reported predation of *A. janata* by *Dicrurus adsimilis*, *D. ater*, *Acridotheres tristis*, *Corvus splendens* and *C.macrorhynchos*. The competitive forces which maintain habitat separation among species break down during population outbreak of insect prey (Anderson, 1978). Similar trend was observed in this study where eighteen species of birds fed on a common prey.

It could be clearly seen that birds eat away a large number of larvae and pupae. As seen in Table 1, despite high larval count, the pupal count of the pest was always very low (0.03 to 0.15 pupae / plant) indicating predation of grownup larvae and pupae by birds. The proportion of different size classes of the larvae during the initial period was small < medium < large. Instead of the normal decreasing trend, an increasing trend was seen. This trend clearly indicated that the biocontrol agents had virtually failed to check the population growth. The birds' preference for the large size larvae is well evident from the data. The proportion of pupae was always meagre compared to the proportion of large size larvae, indicating operation of mortality factors between these two stages. The impact of predation on the rate of pupation was further confirmed by netting a small area (covering 27 plants of 1.5 m height) and allowing the pest to develop in absence of predatory birds. It was found that in absence of avian predators, the pupation rate was much higher (0.44 to 0.56 pupae / plant). Moreover, the impact of other natural enemies on large size larvae was negligible (98.4%, pupation : n = 193) except for the record of a tachinid, granulosis virus, rickettsia - like organisms and a chrysopid on the larvae of *A. janata*.

It was observed that the bird number was very high on September 25 and October 1 (377 and 442 respectively) when the larval population was also very high (4.57 and 8.91 larvae / plant). The birds almost disappeared by October 15, when the larval count was 0.44 per plant. Inspite of predatory activity of birds, the larval density of *A. janata* increased indicating that predation pressure (and other mortality factors, if any) was not sufficient enough to check the epidemic out break of the pest. Several studies have shown that the birds played a very important role in reducing low density population of insect pest but failed to do so when density reached epidemic situation (Anderson, 1978).

Egg parasitism

The eggs were generally parasitised by *Trichogramma chilonis* Ishii and also by *Telenomus* sp. It is clear from the data that the initial egg parasitism (50.0%) could not keep the pest population under check. However, the rate of parasitism progressively increased (maximum 92.22%) over fifteen days period. Patel and Yadav (1979) recorded as high as 100.0% and 63.3% egg parasitism by *T. chilonis* and *T. achaea* Nagaraja and Nagarkatti the former being dominant and scelionids (*Telenomous* sp. and *Trissolcus* sp., from the same area. They also reported the dominance of Trichogrammatids over Scelionids. The eggs of *A. janata* were parasitised by *Telenomus* sp. to the tune of 6.93% on October 10. Initial low rate of egg parasitism by *Trichogramma* (50.0%) had failed to check the population of *A. janata*, inspite of the fact that egg density was only 1.4 per plant. Progressively, the egg parasitism increased to 92.22%; however, the egg density had also gone up to 19.11 per plant (n = 18). It is clear that heavy rate of egg parasitism also failed to check the epidemic outbreak of *A. janata*.

It could be concluded that the birds were opportunists and were attracted to the localised high pest density. They fed upon a sizeable population of the larvae of *A. janata*. However, it was not sufficient enough to check the epidemic outbreak. Similarly heavy rate of egg parasitism also failed to control the epidemic outbreak of *A. janata*.

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TABLE 1 : Effect of bird predation and egg parasitism on *A. janata*

Details	Date of observation (1985)					
	25th Sep.	1st Oct.	3rd Oct.	10th Oct.	15th Oct.	29th Oct
Total population of birds	377	442	424	49	26	19
Larval population in open field [1]	4.57	8.91	2.70	1.88	0.44	2.93
Larval population in netted field	--	--	1.99	1.74	2.22	--
Pupal population in open field	0.10	0.07	0.03	0.19	0.04	0.06
Pupal population in netted field	--	--	0.00	0.44	0.56	--
Egg parasitism in % [2]	--	50.00 (230)	66.66 (108)	87.12 (101)	92.22 (385)	--

1 Larval and pupal population is counted per plant.
2. Figures in parenthesis indicate number of eggs examined.

TABLE 2 : Population of different bird species preying upon *A. janata* at Antroli during 1985

Bird species	Number of birds on					
	September	October				
	25th	1st	3rd	10th	15th	29th
Rosy Pastor *Sturnus roseus*	300	300	300	25	0	0
Indian Myna *Acridotheres tristis*	10	10	12	4	2	0
Bank Myna *Acridotheres ginginianus*	15	20	20	5	5	0
Brahminy Myna *Sturnus pagodarum*	5	7	5	0	0	0
Hoopoe *Upupa epops*	10	27	25	5	2	2
Kashmir Roller *Coracias garrulus*	3	6	4	2	2	2
Northern Roller *Coracias benghalensis*	2	3	2	1	2	2
Black Drongo *Dicrurus adsimilis*	4	6	4	1	3	3
Pipits *Anthus spp.*	20	20	30	0	3	5
Redvented Bulbul *Pycnonotus cafer*	3	2	4	2	0	0
Cattle Egret *Bubulcus ibis*	0	1	0	0	0	0
House Crow *Corvus splendens*	5	10	15	0	0	0
Western Swallow *Hirundo rustica*	0	20	0	0	0	0
Collard Bush Chat *Saxicola torquata*	0	0	1	1	1	1
Pied Chat *Oenanthe picata*	0	0	1	1	1	1
Golden Oriol *Oriolus oriolus*	0	0	0	2	3	0
Large Cuckoo *Shrike Coracina novaehollandiae*	0	0	0	0	0	2
Grey Shrike *Lanius excubitor*	0	0	1	0	0	1

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