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Observations of Predators of European Corn Borer Eggs

By RICHARD C. FROESCHNER

It is generally agreed that the proportion of European corn borer eggs which hatch and reach the adult stage is very small. The mortality often reaches 80 to 95 percent, which means that somewhere during the life cycle there are high losses. Relatively little specific information on the causes of this mortality occurs in literature.

Field work during the 1949 season presented an opportunity to obtain notes on the fate of individual corn borer egg masses. Since it was not always possible to tell whether a given egg mass had been hatched or eaten, it is possible that many more masses were recorded as hatched which actually had been destroyed by predators. Even so, about one-third of the egg masses checked daily had been eaten, at least in part. Of the 447 masses checked daily, 152 showed positive evidence of predation and in 51 cases the predator was actually seen at work. The results are tabulated in Table 1.

Table 1

Summary of predatory activity on first brood egg masses of the European corn borer in four observation fields. Ames, Iowa, 1949

Total masses found	Masses showing predation	Predators observed feeding					
		Orius insidiosus		Chrysopa (larvae)		Ceratomegilla	Mites
		adults	nymphs	plorabunda	oculata	fuscilabris	
447	152 (34.2%)	8	21	15	1	1	5

A more complete account of the detailed observations is given below.

NEUROPTERA: Chrysopidae. Judging from the number of adults present in the fields, *Chrysopa oculata* (Say) larvae should have been of at least equal importance to those of *Chrysopa plorabunda* Fitch. Actually only one *oculata* larva was seen feeding as against fifteen *plorabunda*; yet the number of individuals of the two species running actively over the leaves was almost the same. However, limited observations indicated that their habits in relation to the European corn borer were about identical. The larvae of both species normally run in a quick, irregular course over a leaf in search of food. They did not run completely over an egg mass unless it was small (2-6 eggs), and even in those cases quickly returned to the eggs.

Once the eggs were found the *Chrysopa* larva wasted little time

in attacking them. In normal feeding the head was tipped side-wise and the tip of the higher mandible was pressed firmly against the egg shell. Pressure was brought to bear (a hand lens enables one to see the shell being dented) until the tip of the mandible broke through. The head was then levelled out and the other mandible inserted in a pincer-like movement. If the mandible entered an egg other than the one under attack it was quickly removed and reinserted, after a change of body position. With both mandibles in the same egg the head began a characteristic motion in which the mandibles were alternately moved forward and backward. This movement probably represents the "sliding back and forth of the maxillae in the grooves of the mandibles" which is reported by Smith as a part of the feeding motion of these insects.

Most of the attacks observed were on white eggs, but the "black head" stage was not neglected. In one instance a hatching caterpillar was impaled and sucked until only the hard head capsule was visible to the unaided eye. The time needed to empty an egg was very short. A fully grown chrysopid larva was seen to completely consume a moderate sized egg mass (25-30 eggs) in slightly less than eight minutes. Little time was lost during feeding. As soon as one egg was emptied both mandibles were withdrawn, the insect advanced a short distance and feeding began again. Before leaving the eaten mass the larva took one quick trip over it as though looking for an egg that might have been missed. Although no experiments were made to determine how many eggs an individual could eat, the first two larval instars (there are only three larval instars) would stop eating after consuming only part of a mass, while the third instar would finish one large mass and begin on another. The adults were not observed to feed on any stage of the European corn borer.

Although distinctly outnumbered by the next predator to be considered here, the *Chrysopa* larvae are probably of much greater importance as a predator because of their large size and greater feeding capacity.

HEMIPTERA: Anthocoridae. Our present information indicates that all members of this family are probably predaceous. The very common local species, *Orius insidiosus* (Say), is no exception. For its size (an adult is only slightly longer than the diameter of an European corn borer egg) *O. insidiosus* is as voracious a predator as one could imagine. It also has the added attribute of being one of the most abundant insects observed in the corn fields.

The method of feeding varies somewhat in *insidiosus*. In normal feeding the food was approached with the beak carried horizontally forward and simply thrust into an egg or larva. Whether the prey was egg or larva, the *insidiosus* adult or nymph stood quietly with its feeding apparatus inserted until available juices satisfied its hunger or were exhausted. Then the beak was quickly withdrawn. If this predator approached the egg mass in the same direction as the overlap the insertion was usually made in the top surface of an egg; if the approach was against the overlap the insertion was frequently made into the lower surface. My limited observations indicate that *Orius insidiosus* is quite an important predator of the European corn borer, but its small size limits the feeding capacity of an individual. However, this limitation is in part off-set by the greater numbers which are present.

COLEOPTERA: Coccinellidae. The only larvae found in numbers in any of these four fields were of *Ceratomegilla fuscilabris* (Mulsant). They were far less abundant than either of the two groups mentioned above, and only one was observed in the act of feeding on European corn borer eggs. However, with its chewing mouthparts it had a distinct advantage over the others in eating eggs. It simply walked up to a mass of eggs and chewed off the entire group except for the small part of the shell glued to the leaf. During the first brood oviposition period, this species and another lady-beetle, *Hippodamia tibialis* (Say), were very common in some fields. It was comparatively easy to find a dozen specimens feeding on European corn borer egg masses in those fields. However, during the second brood oviposition period they were of minor importance in the four fields studied.

ORTHOPTERA: Acrididae. Grasshoppers are not normally considered as predaceous insects, but their habit of feeding is such that in consuming leaf material they also take in small objects on its surface. This was observed happening to eggs of the European corn borer in the four check fields. The several species of *Melanoplus* which were common in corn fields consumed many square inches of leaf surface and in so doing actually ate egg masses either partly or completely.

ACARINA: unidentified mite. This large red mite was fairly common in some fields but apparently absent from others. The few specimens observed while feeding apparently could not consume more than a few eggs at a time because they consistently moved away from partly eaten egg masses.

SUMMARY

Limited observations show that the predators of the eggs of the European corn borer are of considerable importance in bringing about high mortality of the European corn borer in the egg stage. Apparently the most effective of the five observed predators were the larvae of the lace-wing, *Chrysopa plorabunda* Fitch and the smaller but more numerous flower-bug, *Orius insidiosus* (Say). The others noted during these observations appeared to be of only minor importance. Ants, which have been noted to exert considerable predatory activity in Europe, were not seen to affect either the larvae or the eggs of the European corn borer in Iowa.

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