THE CONSEQUENCES OF EGG CANNIBALISM
IN ADALIA BIPUNCTATA [COLEOPTERA: COCCINELLIDAE]

BY

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When eggs of Adalia bipunctata L. are offered to larvae of their own species, these larvae are able to develop to adults. Reducing the daily egg supply results in decreased larval survival and pupal weight and especially fecundity of the adult females. The duration of larval development is significantly increased, the longevity of adults is shortened.

Cannibalism on eggs is of wide occurrence in the predacious Coccinellidae. Clausen (1916) observed that the hatching of the larvae was sometimes protracted in egg batches of Hippodamia convergens Guerin and that the first larva to hatch attacked the unhatched eggs. Hawkes (1920) recorded a similar behaviour in Adalia bipunctata L. and found that about a quarter of the larvae were destroyed before dispersal.

Banks (1956) and Hagen (1962) observed that A. bipunctata larvae remained clustered together on the empty egg shell for 12-24 hours, in this way cannibalism is favoured.

The importance of this kind of cannibalism for the coccinellid population is not quite clear. Banks (1956), Dixon (1959) and Brown (1972) stated that the larvae by feeding on eggs are able to make a more prolonged search for aphid food. Dixon (1959) recorded that the loss of unhatched eggs of Adalia decempunctata L. by cannibalism was of little consequence since most of these eggs were not viable. Koide (1962) succeeded in obtaining complete larval development of Coccinella septempunctata by feeding on an exclusive diet of eggs of their own species.

The present investigation was carried out to ascertain whether the eggs of A. bipunctata can be a full diet for larvae and adults of this species. Using eggs, known quantities of food could be offered

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to the larvae and the influence of different food quantities on the adult life could be investigated.

Materials and methods

*A. bipunctata* was collected in the field and was reared for some generations at 25-26°C, with a 16 hours photoperiod, larvae and adults were fed on aphids (*Myzus persicae* Sulz.) from a stock colony on Brussels sprouts. Adult females were taken from this colony to oviposit among aphid colonies within glass jars and the eggs were incubated at 25-26°C and 75% relative humidity until the larvae hatched. These were then reared separately in glass tubes. They were given daily a known number of eggs or aphids. The daily consumption, survival, duration of the instars and the pupal weight were recorded. The life span of the adults fed on eggs and on aphids was also compared.

Experiments and results

Influence of egg supply on larval survival and food consumption

Each larva was supplied daily with 5, 10, 15, 20, or 40 newly laid eggs respectively in glass tubes 5 x 1.5 cm and the larval development was observed. Ten replicates were used in each experiment.

The results (table 1) show that the survival of larvae increased with increasing number of eggs offered (P < 0.05). The larvae which were offered 5 eggs daily failed to produce adults but all larvae on 20 eggs per day reached adulthood.

The total number of eggs consumed increased significantly with increasing number of eggs offered. There was also a marked difference in the food consumption between the larvae offered 20 and 40 eggs although there was no difference in survival. Food consumption increased with each instar, especially the fourth. The latter instar was most voracious because of an increase in both the daily consumption and the number of feeding days. Normally, the larvae had four instars, but when 10 eggs were offered daily, 4 out of 20 larvae underwent a fifth instar. In doing so, however, their overall egg consumption was similar to that of normal larvae and they pupated and produced adults normally.

Effect of egg supply on larval duration and pupal weight

Table 2 shows that the number of eggs offered daily influenced the duration of larval development which increased considerably with decreasing egg numbers. The less-well supplied larvae thus fed over a longer time and the total number of eggs consumed did