

T I T L E

"STUDIES ON THE BIOLOGY AND NATURAL ENEMIES OF THE
CABBAGE APHID *BREVICORYNE BRASSICAE* L. (HEMIPTERA:
APHIDIDAE) ON BRASSICA IN KENYA".

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ABSTRACT

Brassica, the most economically important group of the cruciferae is mainly grown in Kenya as vegetable for human consumption. A vegetable oil Industry based on Brassica crops has also been started in this country. However, the yield of these crops is greatly hampered by insect pests which include the cabbage aphid *Brevicoryne brassicae* L. Insecticides have been used with varying success, in order to minimise crop losses due to the pest.

Incidentally, little information is available on this insect and its importance, and factors controlling its population numbers are not well known. The major objective of this study was, therefore, to investigate the life history of the insect and the role of its natural control agents including rainfall, temperature, parasites and predators.

The stages and rates of development and reproduction of *B. brassicae* were studied under two temperature regimes. These were fairly constant temperatures of $21 \pm 1^{\circ}\text{C}$ and fluctuating field temperatures

between a minimum of $13.1 \pm 2.1^{\circ}\text{C}$ and a maximum of 24.7 ± 2.9 .

Populations of *B. brassicae* on Brassica crops were studied in three areas around Nairobi. The aphid numbers were obtained by collecting fortnightly samples from selected Kale fields in the three experimental sites from January to December 1979. Weather records were also kept during the same period.

Parasitism of *B. brassicae* was at the same time assessed in the aphid samples, the species and number of predatory insects were also recorded during the period of the survey.

There were four nymphal instars of *B. brassicae*. The rates of aphid development were found to be temperature dependent. The development of the various nymphal instars was faster at fairly constant temperatures of $21 \pm 1^{\circ}\text{C}$ compared to the fluctuating temperatures of $13.1 \pm 2.1^{\circ}\text{C}$ to $24.7 \pm 2.9^{\circ}\text{C}$. Reproductive rates and number of aphid nymphs were also highest at fairly constant temperatures.

Aphid populations coincided with the rainfall pattern both showing two peaks. During the period from March to May, as rainfall reached a peak, aphid numbers started to decline considerably. On the other hand, during the dry months, i.e. June to October, aphid populations built up fairly quickly and reached a maximum by the middle of the dry season (in August). However, by the time the second rains set in during November the aphid numbers started declining. However, temperatures alone could not be related to aphid numbers during the period of study.

The only primary parasite observed in this study was *Diaeretiella rapae* (M'cintosh). Under controlled laboratory conditions, *D. rapae* was able to wipe out an aphid population in 10 days. High levels of parasitism by *D. rapae* of 76.1% of *B. brassicae* was recorded in the field during the peak of the aphid population. But the primary parasite was in turn hyperparasitised by the charapidae *Alloxysta brassicae* and the Pteromaridae *Asaphes* sp. These two hyperparasites accounted for up to 30% parasitism of *D. rapae*. Hyperparasites, therefore, lowered the effectiveness of *D. rapae*

as a parasite of the cabbage aphid,

Several predators were also recorded during this study. The major groups were: Anthocoridae, Chrysopidae, Coccinellidae and Syrphidae; and the most important predator species were *Melanostoma annulipes* (Syrphidae) and *Adalia variagata* (Coccinellidae). Under controlled conditions, *M. annulipes* effectively reduced aphid numbers. However, in the field, high numbers of the predators were only recorded during the period when aphid numbers were high. Nevertheless, the predators reached a peak in November, when aphid numbers were already declining.

Rainfall was a significant factor in suppression of aphid numbers during the first part of the year, and parasites like the predators also appeared to have played a significant role in the aphid population decline during the later part of the year, when aphid numbers had grown considerably.

The natural enemies of *B. brassicae* have a great potential in the biological control of the pest and could therefore be used in an integrated

control programme to minimise crop losses of
Brassica in Kenya.