

EVALUATION AND AUGMENTATION OF BIOLOGICAL CONTROL
AGENTS TO REPLACE OR SUPPLEMENT THE USE OF PESTICIDES

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Objectives:

- A. To assess the influence of environmental factors, both natural and artificial, on the effectiveness of parasites, predators, and pathogens in suppressing pests.
- B. To determine the differential effects of selected insecticides on the internal parasites of lepidopterous larvae.

Summary of Progress:

The influence of temperature on the biology of the parasite, Exorista mella (Walker), was studied in the laboratory. Adult longevity was greatest at 50°F, with a gradual decline as temperatures were increased to the other extreme, 95°F. The same temperature/longevity relationship existed with regard to the reproductive life of the female. In general, the reproductive life of the female at each temperature was much less than total adult longevity. Although no definite trend was established, the time from pairing males and females to first egg depositions was greater at the lower temperatures. Practically all females produced eggs regardless of the temperature; however, many produced nonviable eggs. The greatest mean number of eggs produced per female held at constant temperatures was obtained at 77°F, declining as temperatures were altered in either direction. However, significantly more eggs were produced per female where they were held in the open laboratory with the temperature fluctuating from approximately 74° to 78°F. The number of females which produced puparia was considerably less than the total number of egg-laying females. The highest ratios of puparia-producing females to egg-laying females were found at the 77°, 74-78°, and 81°F temperature studies.

The relationship of the size of the host, Estigmene acrea (Drury), to the success of the parasite, Exorista mella, was studied in the laboratory at 77°F. Data from hosts ranging in size from 50 to over 1200 mg--which were parasitized by Exorista females known to have produced viable eggs--indicate that salt-marsh caterpillars which are 200 mg or smaller, are poor hosts. This was further confirmed by results obtained where parasite larvae were actually observed entering the host. The greatest mortality of the parasite puparia occurred where hosts were 50 mg in size when parasitized; the least occurred where hosts were 1200 mg or larger in size. The developmental time of Exorista mella was longest in the 50 mg hosts and shortest in hosts which were 1200 mg in size when parasitization occurred.

Preliminary tests where topical applications of Sevin were made to parasitized hosts have failed to indicate a clear-cut differential effect of the insecticide on either the host or parasite. However, there is some indication that the number of parasites per parasitized host is reduced as the dosage level of insecticide is increased.

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