An Experimental Study of the Mortality Factors of Larval Musca autumnalis DeGeer

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AN EXPERIMENTAL STUDY OF THE MORTALITY FACTORS OF LARVAL *MUSCA AUTUMNALIS* DeGEER[1]

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INTRODUCTION

The Approach

The experimental approach to problems in insect population dynamics in the field has long been used but seldom has its full potential been exploited. Fuller (1934), in a now classic paper, reports on results of field manipulations of densities of blowfly larvae and available food, showing the importance of competition and predation. Additional mortality factors such as temperature, later shown to be of importance (Waterhouse, 1947), were not considered. Other attempts at constructing complete budgets of population mortality have been made since. One of the most notable is the work on the chrysomelid *Phytodecta olivacea* (Richards and Waloff, 1961). Those factors which could be measured directly from the populations, such as parasitism and egg inviability, were carefully studied. Only predation mortality was estimated independently using serological techniques. Although predation turned out to be the main factor contributing to mortality, competition and specific environmental factors could not be isolated and hence their importance remained unevaluated.

The studies of the mortality patterns of the cabbage aphid, *Brevicoryne brassicae* (Hughes, 1963) and the cabbage root fly, *Erioschia brassicae* (Hughes and Mitchell, 1960), are representative of other studies which used the correlative approach. Life tables were obtained and field population data were manipulated providing a partitioning of observed mortality into various components.

Probably the most ambitious effort at developing predictive schemes rather than merely descriptive models is the Canadian work on forest lepidoptera (Morris, 1963a, b; Embree, 1965).

Life tables were used extensively to evaluate overall mortality along with experimental evaluation of some of the mortality factors. Field populations were also examined using the key factor approach (Varley and Gradwell, 1960; Morris, 1963b). This approach is a form of logarithmic multiple regression which can be used to evaluate the contribution of mortality at each age interval to population change. Unfortunately, important mortality factors were evaluated using correlational techniques which inherently fail to provide a causal basis for conclusions. Further the large error in sampling budworm populations in particular and field populations in general, and the lack of accounting for all probable potential mortality factors are such that failure to find evidence for the

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