RETARDED EFFECT OF *BACILLUS THURINGIENSIS* BERLINER ON THE FECUNDITY OF *ANAGASTA KUEHNIELLA* (Zell)

BY

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The retarded effect of continuous larval treatment with *Bacillus thuringiensis* var. *thuringiensis* BERLINER on the biological potency of adult *Anagasta kuehniella* (Zell) throughout successive generations was studied under controlled laboratory conditions. The results revealed a marked decrease in adult emergence and prolongation in the generation period that are directly proportional to concentration, but a negligible effect on the sex ratio. A significant reduction in the fecundity of the F₁-moths was only observed with the highest concentration used.

A review of the available data on the role of microbial disease in insect control reveals that most previous studies have mainly dealt with the immediate effect of the pathogens on treated individuals. In the cases where the pathogen affects immature forms, the larval mortality means a reduction in adult emergence. This indirect pathogenic effect was recorded in some insects due to treatment with *Bacillus thuringiensis* var. *thuringiensis* BERLINER, e.g. *Plodia interpunctella* HBN. (Kantack, 1959), *Lucilia sericata* MEIGEN and *Musca domestica* L. (Greenwood, 1964), and *Aedes stimulans* WALKER (Shaikh & Morrison, 1966). Delayment of adult emergence due to larval treatment with the same pathogen was observed in *Anagasta kuehniella* (Zell) by Jacobs (1951).

The study of the retarded effect of pathogens on the survivors in subsequent stages has only recently drawn the attention of some investigators. Most important among the aspects of study in this connection is that concerning the effect on fecundity of the adults. Such an effect was studied by Weber & Jasić (1961) in *Bombyx mori* L. due to larval treatment with *Nosema bombycis* NAGELI, which caused a reduction in oviposition that depended on the dose used and on the larval instar in which infection began. Low reproductive capacity was also recorded by Greenwood (1964) in *M. domestica* and *L. sericata* as a result of larval infection with *B. thuringiensis*. Yamvrias (1962) reported on the appearance of females with reduced
numbers of ovocytes due to ingestion of sublethal doses of *B. thuringiensis* throughout the whole larval stage of *A. kuehniella*.

Such studies are of particular importance as they help in evaluating the general reduction in the biological potency of diseased insects. When the study is extended to the progeny of treated individuals, the results are expected to throw light on certain important problems such as the development of resistance and inheritance of latent infection.

In the present study most attention has been focused on the retarded effect of *B. thuringiensis* on the fecundity of its original host, *A. kuehniella*, with the aim of properly evaluating the potentialities of one of the most effective bacterial entomopathogens in the microbial control of this pest.

1. Material and methods

Samples of infested flour were collected from a mill in Ancient Cairo. Healthy larvae of *A. kuehniella* were selected and reared on heat-sterilized whole meal flour at 25 °C and about 55 % R.H., the conditions under which the experiments were undertaken. The progeny of the emerging adults were reared under the same conditions to give the "parent moths" with which the experiments began. Hundred virgin females (20 for the control and 20 for each of the four treatments) were confined, each with a newly emerged male, in a separate glass jar provided with about 400 g of the diet to be tested. Immediately after copulation the males were removed and the few unmated females were excluded. The diet was renewed weekly for the growing larvae till the last week of their development, when the jars were observed twice daily. Preliminary experiments showed that the adult emergence would begin on the fifth week in the control group and on the sixth, seventh, eighth and ninth week in the treated groups respectively. In the appropriate time the emerging male and female moths from each jar were counted every week till emergence ceased completely.

To study the fecundity in succeeding generations, 20 virgin females were selected from each group and confined, each with a newly emerged male, in a separate vial with a double-layered cover of muslin cloth from inside and tissue paper from outside for oviposition. The vials were provided with strips of creased muslin which served as an additional site for oviposition. Immediately after copulation the males were removed and then the deposited eggs in each vial were counted daily and incubated at 25 °C and about 70 R.H., after transferring the female to a new vial for further oviposition. The few noncopulated females in each group were excluded. The