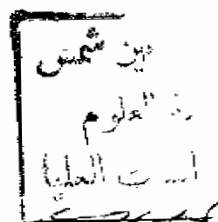


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**BIOLOGICAL AND TOXICOLOGICAL
STUDIES ON
CATANTOPS AXILLARIS (THUNBERG)**

THESIS

Submitted in Partial Fulfilment of the
Requirements for the Award of the Degree of
MASTER OF SCIENCE



By

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ACKNOWLEDGMENTS

The author wishes to express her sincere thanks to Prof. Dr. Soad A. El-Sayed for suggesting the subject of this study, for her serious help and for reading and correcting the manuscript. Thanks are also due to Prof. Dr. R. Abdou and to Dr. Zenab Afifi for their valuable help and guidance.

The author is also indebted with thanks to Dr. Akila El-Shafei for her direct supervision of the work, for her kind encouragement and guidance during the preparation of the work.

To the staff members of the Entomology department thanks are due for the various help they offered throughout this work.

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INTRODUCTION

As is well known, locusts and grasshoppers stand first and foremost as pests of great economic importance, and have always stimulated intensive research. Their biology has received a good deal of attention, and their breeding in the laboratory has been dealt with by several authors. A review of available information on structure, physiology and development of the Acrididae group has been published by Uvarov (1966) in his book grasshoppers and Locusts.

African grasshopper, Catantops axillaris (Orthoptera, Acrididae), is well encountered in EL-Wahat El-Baharia. It was not subjected to any detailed study in Egypt, and knowledge available about it is fragmentary. Detailed study of its general biology, egg-stage, nymphal stage and adult stage, has been undertaken in this work, in an attempt to render available some basic information which might be of value from the practical stand-point.

On the other hand, work deals with the study of the susceptibility of the 3rd nymphal instar to some insecticides from different groups including: chlorinated hydrocarbons, organophosphorus and pyrethroids. The main idea, however, was to find out a base-line information hoping for better control measures.

LITERATURE REVIEW

a- On the Biology

Criddle, N. (1930) recorded the life history of the cow grasshopper (Chrysochraon abdominalis Thom.) in Manitoba. C. abdominalis female adult placing its eggs in the ground, such as animal dung or decaying wood. At least 100 eggs are laid by each female during her natural life. C. abdominalis had four nymphal instars.

Burnett, G.F. (1951) made some observations on the life history of the red-locust Nomadcris septemfasciata (Serv.) in the solitary phase. Caged locusts gave a mean fecundity of 183 eggs contained in 2.4 pods as a maximum figure. Solitaria locusts were found to pass through seven instead of six nymphal instars as do gregaria. The author examined the eye-stripes and the number of antennal segments of each instar and adults. The shape of the eye is correlated with the number of stripes.

Albrecht, F.O. (1953) discussed the breeding of the red locust in captivity. The period from the first hatching to the appearance of the first adult was 98 days. The relative humidity in the cage varied from 70 % to 90 % and temperature from 27°C to 39°C. Egg laying started approximately three months after appearance of the first adults.

Antonioniou, A. and Hunter-Jones, P. (1956) investigating the life history, fecundity and fertility of the grasshopper, Eyprepocnemis capitata Miller under controlled laboratory conditions. They reared both nymphs and adults in crowded and isolated conditions. The number of nymphal instars was six for males and seven for females, although considerable variation occurred. The length of nymphal life for males and females reared in isolation was 52 and 62.5 days, respectively; at 28°C, nymphs reared in crowds needed three or four days longer.

Khalifa, A. (1956) examined the egg-pods of some Egyptian grasshoppers and the preference of females for different moisture contents. The egg-pods of seven species of Egyptian Acrididae are described. In Aiolopus thalassinus and A. savignyi, the average length of the egg-pod is 3.7 cm, and the average number of eggs in the egg-pod was 21.7 and 28 eggs, respectively. In Acrotylus insubricus the average length of the pod is 3.9 cm. The average number of eggs in the egg pod was 14.8 eggs. In Calephorous venustus the pod is about 2.5 cm long. The average number of eggs in the egg-pod

was 11.1 eggs. In Chrotogonus lugubris the average length of the egg-pod is 4.6 cm. The average number of eggs in the egg-pod was 36 eggs. In Pyrgomorpha conica the pod is about 4.2 cm long. The average number of eggs in the egg pod was 42.2 eggs. In Euprepocnemis plorans the pod is 5-6 cm long. The average number of eggs in the egg-pod was 49.1 eggs. Experiments were carried out to study the preference of each species for definite range of soil moisture. In Aiolopus savignyi and A. thalassinus the greatest number of egg-pods were laid in the moist soil. But Acrotylus insubrics and Chrotogonus lugubris do not seem to have definite preference for any degree of soil moisture. Egg-pods were indiscriminately deposited in soils of different moisture content.

Hafez, M. and Ibrahim, M.M. (1958a) gave details of the egg and nymphal stages of Acrida pellucida Klug, in Egypt. The diameter of the egg-pod and the egg was examined. The average number of egg in a pod was 66.9 eggs. Under controlled conditions, at 30°C, the average incubation period was 36.4 days. Males generally passed through six nymphal stages and females through seven. Each sex may acquire an additional moult.

Hafez, M. and Ibrahim, M.M. (1958b) referred to the ecology and biology of Acrida pellucida Klug, in Egypt. The average longevity of male and female adults under fluctuating humidity (40 -85%) and 30°C was 73.4 and 66.5 days, respectively. Sexual maturation of Acrida was attained without any change in the body coloration. The average number of eggs laid by a single female was 416 eggs. Moist sand and alluvial soil were the highly preferred ground for oviposition in captivity. Food preference test was made for 14 Egyptian crops, including clover, wheat and maize. They were all eaten normally. The nymphs reached the adult stage, though the stages were somewhat longer specially on maize diet, and the adults attained sexual maturity. The fecundity of those bred on clover was higher than those bred on other plants.

Pickford, R. (1958) pointed out the reproductive potential of Melanoplus bilituratus (Wlk.) reared on different food plants in the laboratory. The reproductive capacity was affected by the type of food. The graminaceous plants, like wheat, were the less favourable. The number of adults per cage, varying from 7 to 58 , appeared to have no effect on the number of egg-pods laid.

Hunter-Jones, P. and Ward, V.K. (1959) indicated to the life history of grasshopper, Gastrimargus africanus Saussure under controlled laboratory conditions. They reared nymphs and adults in crowded and isolated conditions. The number of nymphal instars was five for males and females. The total average length of nymphal life was 40.8 days in both sexes at 28°C. The pre-oviposition period average about 19.2 days. Female laid at the rate of about two egg-pods per week for crowded and isolated conditions. The mean number of eggs per pod was 57.1 eggs for isolating, and 52.7 eggs for crowding females.

Hafez, M. and Ibrahim, M.M. (1962a) studied the biology of the immature forms of the grasshopper, Aiolopus thalassinus F. in Egypt. The incubation period of Aiolopus eggs was affected by temperature. At 30°C, the average period was 16.7±0.3 days. Both sexes had five nymphal instars. The duration of nymphal life average about 28.5 days, at 30°C and fluctuating relative humidity (40-85 %).

Hafez, M. and Ibrahim, M.M. (1962b) described the ecology and biology of the grasshopper, Aiolopus thalassinus F. in Egypt. The average longevity of both male

and female at 30°C and uncontrolled relative humidity was 70.7 ± 2.5 and 63.2 ± 2.3 days, respectively. Adults attained sexual maturation without any change in their coloration. At 30°C, the pre-oviposition period was on average 10.1 days. Females avoided the dry soil and heavy soil but laid its egg in moist soil. The number of pods laid by a female varied between one to 15 pods. Food preference of Aiolopus was tested. Wheat and clover were readily accepted and formed suitable diets for all stages of this grasshoppers, with slight differences in the duration of stages. Hoppers fed on maize were able to reach the adult stage, but the death rate was high and the stages were already longer. Adults fed normally on this diet and lived long (average of a month) but no oviposition occurred.

Hafez, M. and Ibrahim, M.M. (1964a) reviewed the biology of the immature forms of the desert grasshopper, Sphingonotus carinatus (Sauss.) in Egypt. The average incubation period at 30°C was 23.6 ± 1.1 days. The nymphal life of Sphingonotus has five nymphal instars. The average total duration of the nymphal life was 40.5 days. Cannibalism during the nymphal development was pronounced.

Hafez, M. and Ibrahim, M.M. (1964b) gave a thorough report on the ecology and biology of the desert grass-hopper, Sphingonotus carinatus (Sauss.) in Egypt. Individuals fed upon a pure diet of maize were short-lived (up to 20 days). Hoppers generally failed to develop and the female laid no or only one egg-pod. The average longevity of male and female was 47.5 ± 2.8 and 44.3 ± 2.8 days, respectively at 35°C and fluctuated relative humidity. Sexual maturation were took place without changing in coloration. Dry sand was the only ground chosen for oviposition by Sphingonotus females. The average number of pods for a single female was 3.2 pods. The average number of eggs in an egg-pod was 9.2 eggs per pod.

Edwards, R.L. and Epp, H.T. (1965) studied the influence of soil moisture and soil type on the oviposition behaviour of the migratory grasshopper, Melanoplus sanguinipes (Fabr.). Three different soils (sand, loam and clay) - at each of three moisture levels (saturated, intermediate and dry) were offered to female Melanoplus as oviposition sites. When given a free choice the female preferred moist sand to all other oviposition sites and avoided soil that was completely dry. When no moist soil was available, coarse dry soil was preferred to fine dry soil, but the oviposition rate was

reduced. The female would probe and dig at random into any of the soil offered but would withhold their eggs temporarily if the subsurface soil was not moist.

Ibrahim, M.M. (1965) made further investigations into the biology of Aiolopus thalassinus F. in out-of-door cage (in field cages). Hoppers passing through an extra moult (i.e. six stages were more numerous during the cold season and among female ones). The adults were reared in isolated conditions (1 male to 1 female). The life span of adult was shorter in summer and considerably expanded in winter. Sexual maturation was also retarded.

Kaufmann, T. (1965) made some observations on aggregation, migration and feeding habits of Zonocerus varie-
gatus in Ghana (Orthoptera: Acrididae). The nymphal and the adult stages covering approximately 7 months. Females become sexually mature and mating occurred about 40 days after emergence. Females produced 2 - 4 egg-pods each, averaging 37 eggs per pod. A diet of gramineae alone produced sterile females, although the males were fertile.