SOME FACTORS AFFECTING THE MOVEMENT, ACTIVITY AND AGGREGATION OF FIELD CRICKETS (*GRYLLUS BIMACULATUS DE GEER*)

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INTRODUCTION

Interactions between the adult crickets of three species and the effect of crowding on their aggressive behaviour was studied by Alexander (1961). The field cricket is widely distributed in Khuzestan, province of southern Iran. In early spring, when extensive breeding takes place, their number increase considerably and to some extent they damage the crops. The effects of crowding, food and humidity were studied on their movement and activity in the laboratory at the Anti-Locust Research Center, London.

METHODS

Crickets were reared at 26∓1° C. in cylindrical plastic cages, 40 cm. height and 20 cm. in diameter. They were fed fresh grass, cabbage and bran with yeast. The humidity inside the cage was highest just after feeding but mostly remained around 70%. Apparatus which was used for testing the movement activity and aggregation of this insect is shown in figure 1 and 2. Their movement was directly measured by tracing their paths onto a scaled diagram of the cage.

EXPERIMENTS

1 - Movement activity in cages with medium density. The movement activity of ten individuals was measured at the density of 30 nymphs per cage and when they were at the middle third, fourth and fifth instar nymphal periods. There was no significant difference between the movement of nymphs at these stages and their resultant adults also did not show any difference in activity until 24 days after emergene, when their activity was reduced significantly.

2 - **Movement activity of isolated insects.** There was no significant difference between the movement of isolated first and second instar nymphs when compared with those which were under very crowded conditions. Isolated nymphs produced adult males which moved significantly less than adults obtained from crowded cages ($P < 0.01$).

3 - Movement activity in cages with high density. At the density of 200 nymphs per cage crickets were found to develop at different rates 42-52 days old nymphs were divided into t ree size groups of 5-10, 10-15 and 15-20 milimeter. The number of moving nymphs was registered for each size group in 20 replicated experiment in which readings were taken at 15 minute intervals. Analyses of variance showd that 5-10 mm. insects moved significantly more than the others ($P < 0.05$). Individual tests on the resultant adult males showed they were more active than the females and the nymphs from which they came ($P < 0.01$).

4 - Starvation effects on movement activity. Starved early fifth instar nymphs can survive to adults by feeding on other nymphs (table, 1). Starvation increased the movement activity for a short period but later had a reverse effect. Starved nymphs of 5-10 mm. in length were more active than larger nymphs (table, 2).

5 - Aggregation in isolated and crowded nymphs. In two separate tests on nymphs reared in isolation or in group, the number of individuals per cage division were counted after they had settled down in the arena shown in figure 1. Ten readings at 30 minute intervals showed that there was a slight tendency for crowded nymphs to stay together more than those reared in isolation (table, 3).

6 - Attraction to food, light and humidity. thirty nymphs were put into the central cage of figure 2 under the light. Side cages were either empty or contained dry food, wet or dry filter paper. Nymphs were first attracted to the dry food and then to the wet filter paper for resting. The illuminated cages without refuge and dry papers were less attractive to the insect (figure 3).

RESULTS AND DISCUSSION

The movement activity of field crickets reared under medium conditions of crowding was similar for third, fourth and fifth instar nymphs. The activity of their resultant adults decreases only a few days before their death. Isolation had no effect on the movement activity of the first two instars. Nymphs isolated at the fifth instar produced adults which were less active. Overcrowded nymphs of the same age showed an increasing variability in the rate of their development as they become older. Those of smallest size were more active than larger nymphs. Starvation at first increased the movement activity but later had an opposite effect.

Crowding has similar effects on locust in the field and in the laboratory (Uvarov, 1966); it is mainly responsible for higher activity and marching of swarm locusts (Ellis, 1953, 1964). My observation suggest that; in favourable ecological conditions extensive breeding occur within the communities of field crickets. In Ahwaz province these insects increase rapidly in March. They live in communities at the edge of fields near the irrigation ditches. As soon as the population in each community increases, smaller individuals show a higher movement ability. Since in a highly populated community there is more competition for food and space these smaller individuals move to new localities. This process can repeat itself and ultimately, as a result of dispersion the crickets inflict a considerable amount of damage to crops in outbreeak years.

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REFERENCES

ALEXACDER R, D. 1961. Aggressiveness, territority, and sexual behavior in field crickets (Orthoptera; Gryllidae).- *Behaviour* **17**: 130-223.

ELLIS, P. E. 1953. Social aggregation and gregarious behaviour in hoppers of *Locusta migratoria migratorioides* (R. & F.).- *Behaviour* **5**: 225-260.

ELLIS, P.E. 1964. Changes in marching of locusts with rearing conditions.- *Behaviour* **23**: 193–202.

UVAROV, B.P. 1966. Grasshoppers and locusts. A handbook of general acridology. Volume 1, Cambridge University Press, 481 PP.