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Studies on the Biology of the Cricket (Paranemobius Pictus (Sauss) (Orthoptera:gryllidae) a Pest on Vegetables & Paddy

Usha Saxena Department of Zoology, M. S. College, Saharanpur (U.P.) - 247001

ABSTRACT

In Paranemobius pictus Copulation occurs in April to August. The over active male with protruding genitalia slips under the female and inserts spermatophore in female genital capsule. During copulation both partners are in same direction and lasts up to 30 minutes (maximum) female cricket lays 85 eggs (average) in her life span of 250 days. Incubation varies as : 5-8 days (in summer), 7-12 days (in monsoon). It undergoes diapause in winter. Life cycle completes through seven instars. This cricket bear economic importance due to its pest value (on vegetable and paddy crops) and as bait in fishing.

KEYWORDS : Paranemosius pictus (Sauss), Orthoptera, Gryllidae, Instar, Nymph.

INTRODUCTION

Crickets are famous for their melodious songs and Infamous due to damaging nature in field, store and kitchen causing foul smell and long jumps *Paranemobius pictus* (Sauss) in found in abundance on the river banks and adjoining crop field of Murna river at Shahdol and Bichhiya river at Rewa (M. P.) Where it damage the paddy and vegetable crops. Locals use it as bait for fishing. *Paranemobius pictus* has been reviewed as cricket in general. Biology and related topics in Orthoptera have been studied by : Baumgartner (1905), Lefroy (1906-1909), Fulton (1915). Bionomics and Biology: Household insect pest and their control: Singh (1941), Singh (1952) studied biology of *Gvmno grvllus* humeralis, Bunting (1954), Hasbell and Ives (1954) studied culture of *Acheta domesticus* Narain (1962) on the copulation in *Grvllodes sigillatus*. Rearing methods of Orthoptera has been described Haskell and Ives (1954).

MATERIAL & METHODS

Rearing was done in rectangular (Wooden cages 1xbxh=3x2xl½m) two longer sides covered by wire mesh and a sliding glass top to provide food etc. and observations. Crickets were collected from the field. 10 male and 10 females of good health were released in the cage. Food plant and water was placed in a glass vial with cotton plugged top.

After copulation females oviposit. The eggs are placed in small flower pots with moist soil and covered with glass chimney covered atop by thin muslin cloth. The life cycle is studied during April to August and maximum number available during July-August months. On the banks of Murna (at shahdol, and Bichhiya rivers (at Rewa) in M.P.

OBSERVATION & RESULTS

Copulations :

In *Paranemosius pictus* prior to pairing the male becomes very active, running this way and that in search of the female. The genitalia of the male is seen protruding from the genital capsule at hind end. However, in the female, no exciting movements are seen. As soon as the male approaches the female, he turns the top of the abdomen towards her and slips below the female and then raises the top of his abdomen and by a jerk inserts the spermatophore in between the ovipositors and the subgenital plate of the female. During the copulation the male is very active. The copulating pair face in the same direction. Now the male slips out and the female rubs off the spermatophore by dragging the tip of her abdomen on the floor or with the help of her hind tarsal spurs.

Oviposition :

Oviposition in *Paranemobius pictus* takes place from April to August (highest July and August). The female eggs after 48 hours of copulation. Egg laying takes place mostly during the night or the early hours of the day. At the time of oviposition, the female becomes very active and restless. She bends the tip of her abdomen strikes the tip of the ovipositor against the place of oviposition and then inserts the ovipositor in the place of oviposition and then withdraws a part of it. She then bends her abdomen and the valvulae of her ovipositor are moved a bit apart so that a channel is formed in which an egg is seen moving towards the place of oviposition. She deposits about three or four eggs at one place at a time. No sticky substance is deposited by her on the eggs. Maximum number of eggs laid by a single female in a day is 85 and during her life is 250.

Eggs :

The eggs of *Paranemobius pictus* are whitish yellow, about 2 mm long and 05 mm wide. The older eggs become brownish in colour. Before hatching the chorion of the egg becomes transparent. The period of incubation varies with the season. In summer season, it varies from 5 to 8 days, in monsoon season it varies from 7 to 12 days.

Hatching :

At the time of hatching the embryo inside the egg shows movements and within two or three minutes of these movements, there occurs a longitudinal slit in the chorion of the egg near the head of the embryo. Through this slit the embryo, wrapped in embryonic cuticle comes out of the egg. This is the pronymph (Fig. IB). Immediately after coming out the embryonic cuticle above the head of the pronymph, bursts out due to enlargement of the cervical ampulla of the pronymph setting free the first nymph. The new hatched nymph (Fig 1C) is whitish in colour. Slowly and slowly it moves about and changes its colour and starts feeding on the embryonic cuticle.

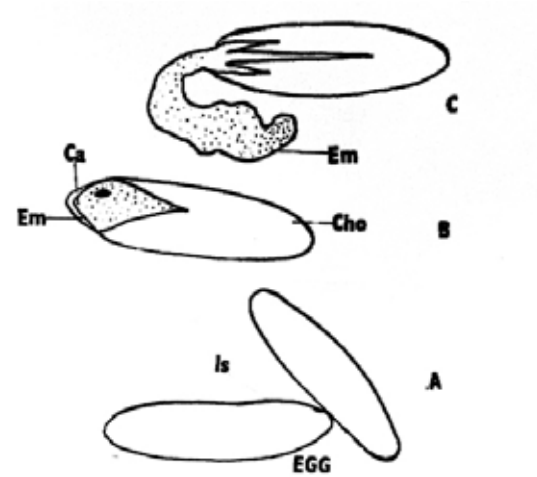

Figure 1. A- The Egg and Egg-case showing the longitudinal slit.

B - Pro-nymph wrapped in embryonic cuticle is coming out of the Egg.

C - The egg-case and the embryonic cuticle in which the first nymph was wrapped.

- Ca – Cervical ampulla.
- Cho - Chorion.

- Em - Embryonic cuticle.
- LS - Longitudinal slit.

Moulting:
Moulting in *Paranemobius pictus* usually takes place in the morning or in the afternoon. Before moulting the nymph becomes inactive and stops feeding and at the time of moulting, It stretches its legs outward, moves the antennae to and fro and trembles its entire body. Suddenly the nymph bends its head, the skin in the mid dorsal region of the thorax and head breaks and through this slit the nymph with its new skin comes out. Time taken in moulting varies from 20 to 30 minutes. The newly emerged individual is yellowish white. Normal colour of the body is acquired in about four hours.

Nymphal Instars :
In *Paranemobius pictus*, however, seven nymphal stages have been observed. During development the most obvious changes are in the body size, length of antennae, in the development of the wings and in females ovipositor also. Duration of the nymphal stages depends on climatic condition season.

The First Instar Nymphs (Fig. 2) :

It is 2 mm long, greysh dorsally and whitish ventrally. The head resembles that of the adult. The three Ocelli are also present. The pronotum is the biggest and the hind pairs of legs are the longest in size. Wing rudiments are absent. The last segment of the abdomen bears a pair of cerci of about 0.5 mm length.

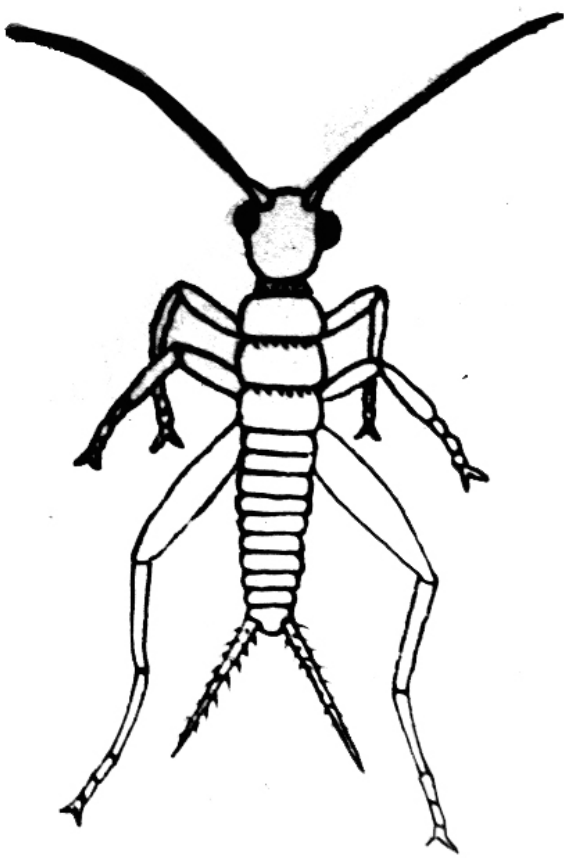

Figure 2. First instar nymph

The Second, Third and Fourth Instar Nymphs :
They resemble the first instar nymph in form but differ in size of head width, body length and length of anal cerci. The antennae in second instar are about 3mm in length but in the fourth instal become sufficiently longer the wing rudiments and genitalia are not visible externally. In fourths instar nymph the lateral areas of the meso and metanota have become dorsoventrally flattened. (Fig. 3).

The Fifth Instar Nymphs (Fig. 4) :
The fifth instar nymph is less than 5 mm in length. The antennae are about 20 mm long. The cerci are about 3 mm long. The valves of the ovipositor in female are clearly seen (fig. 6). The wing rudiments have not yet appeared but the lateral areas of the meso and meta nota have become dorsoventrally flattened.

Figure-3
Four Instar nymph

Figure-4
Fifth Instar nymph

Figure-5
Seventh Instar nymph

The Sixth Instar Nymphs :
The sixth instal nymph is about 5 mm long. The head is about 1.5 mm wide. The antennae are more than 20 mm in length the cerci are about 4 mm long. The ovipositor in female has elongated and is about 2 mm in length (fig. 7). The wing pads are.

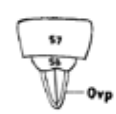

Figure 6
Ovipositor of Fifth Instar Nymph

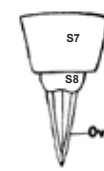

Figure 7
Ovipositor of Sixth Instar Nymph

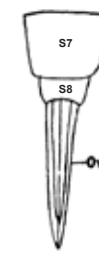

Figure 8
Ovipositor of Seventh Instar Nymph

OVP - Ovipositor S7 - Seventh sternum S8 -Eighth sternum

The Seventh Instar Nymphs (Fig. 5):
The seventh instar nymphs is about 9 mm long, the head is now 2 mm wide and antennae have further elongated. The cerci are now 7 mm long. The antennae have become longer in comparison to the sixth instar nymph. The ovipositor in female is well developed and is about 5 mm long (fig. 8). The wing pads are very clearly marked. Lastly, *Paranemobius pictus* bears economic value because it has been observed damaging paddy and vegetable crops in the fields near river Murna at Shahdol. Specially the floral parts including leaves are preferred as diet of the cricket. The fisherman also use them as bait for fishes and are preferred over the earthworms.

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