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Sexual Behaviour and Sex Determination of Cotton Grey Weevil, *Myllocerus Maculosus* Desb. (Coleoptera : Curculionidae)

by

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Introduction : *Myllocerus maculosus* Desb. commonly known as cotton grey weevil is economically an important species pre-occupied in the literature as a minor pest of cotton, maize. *arhar (Cajanus cajan)*, sugarcane, mango, apple, pomegranate, lady's finger *etc.* Recently it has been observed causing serious damage to *bajra (Pennisetum typhoides)*, a very important cereal crop of Rajasthan. Although the preliminary work has been carried out on the biology and control of this pest by Trehan (1929) and Rahman (1940 a & b), so far estimation of population and its dynamics has not been studied. It is apparent that the lack of information for sex determination is a prohibiting factor for such studies. Present studies, therefore, should prove a great asset for those who are engaged in forecasting the pest outbreaks, studying the population dynamics and other related studies of this nature.

Materials and Methods : A satisfactory culture was obtained in the insectary on the foliage of young *bajra* plants. These specimens were used for morphological and sex behavioural studies. The mating behaviour was studied in the field and under captivity in the laboratory. The same specimens were dissected out to confirm their sexes. On the basis of external morphology, characters were correlated to sex on a comparative basis. The ano-genital vestibules were studied by lifting the last abdominal sternites with the help of a minute pin, first exposing the pygidium and then the ano-genital vestibule proper. Later these specimens were released in the field to study the effect of exposing ano-genital vestibule on its normal behaviour.

After a few showers, adult weevils emerge from their earthen pupal cells constructed in the soil. They initially feed on the young foliage and then mating impulse sets in. The male hunts after the female. As soon as the male approaches the female, she runs away from the chasing male. The chase continues for sometime till the female becomes stationary under the shady parts of the plant and the male approaches either left or right side of the female. Fore-,mid-, and hind legs of the male hold the thorax, mid-abdomen and the anal segments of the female respectively. The female expresses its annoyance either by moving its antennae back and forth, by moving its abdomen right and left or wandering on the leaves of the plant. Male keeps

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its antennae closely adhering its body (Fig. I) and continues its grip on the female. At times male rides on another male or three individuals of different sexes ride together.

FIG. I

After waiting for one or two hours the riding male tries to open female genitalia by inserting its last tarsal claws, to which the female resists. The female yields after repeated persuations and keeps its genitalia open. The penis being short the male finds it difficult to insert in the genitalia, keeping riding on the female back and, therefore, slips backwards making an angle of 45° with the female body. Now it easily inserts its penis in the vagina and remains in coitus. The couple mate for one or two hours and many times may fall off to the ground if disturbed by strong wind or other agencies. The mated male walks away while the female remains in the same spot for a few minutes before it commences oviposition.

In a mating pair the female is larger than the male. However, in few cases larger males have also been observed mating with smaller females. Males measure 3.8 to 5.4 mm long with an average of 4.9 mm whereas the females measure 5.2 to 5.4 mm long with an average of 5.7 mm. On the basis of their body colours, the weevil population can be classified into two distinct groups: one with blue tinged white body and the other with light pinkish brown body. This colouration is due to the pigemented scales which clothe the body. The elytra, constituting major part of the body, sometimes, possesses patches of scales forming colour bands of different size, shape and patterns. They are oval, circular or horse-shoe shapped. In the older weevils, where the scales fall off, the body colour is dull blakish brown. However, similar body colours are also observed in an young weevil drenched in the rain.

In addition to the body size, the weevils differ in their external morphology. The abdomen of the female is larger, broader and have a convexity on the venter whereas in the male abdomen is shorter, narrower and almost flat on the venter (Fig. II). Third abdominal sternites of the female is much wider and has a more pointed process at anterior side than that of male (Fig. III). When the elytra and hindwings are separated from the abdomen, thin, less sclerotized, transparent tergites are visible. In the male 8 tergites are distinguishable whereas in the female only 7 are counted. The 8th tergite of the female push backwards into the ano-genital vestibule and constitutes the genitalia. In the process of exposing the tergites, at times, the abdomen gets punctured and the blood oozes out.

By lifting the last abdominal sternites from the ventral side, the pygidium is exposed without disturbing the elytra. The pygidium so exposed is larger and broader in the female than that of the male (Fig. IV). Further

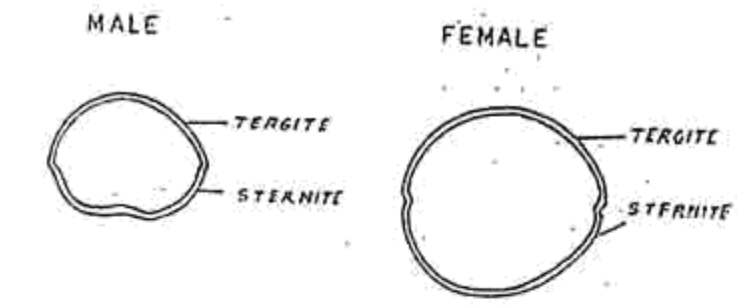


FIG. II

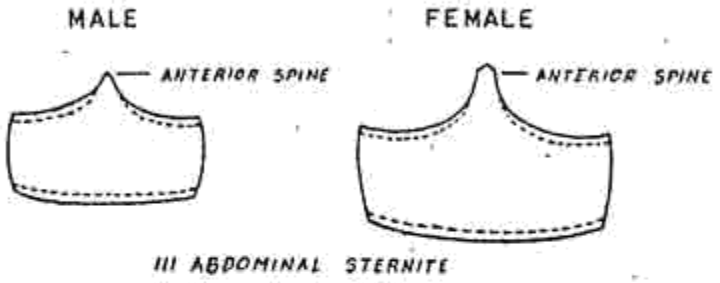
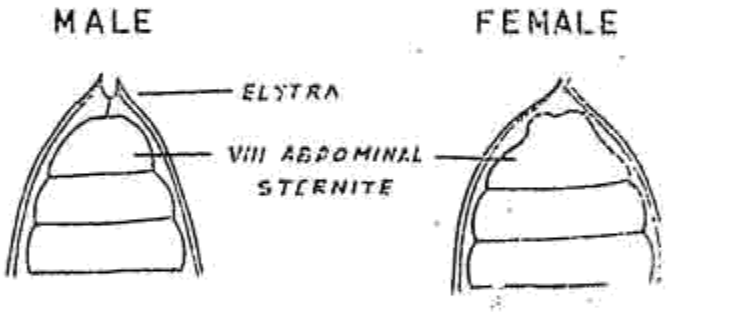
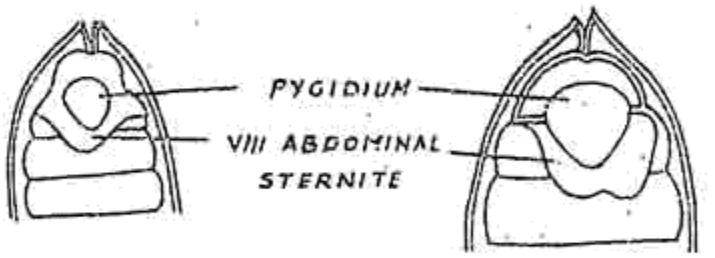


FIG. III





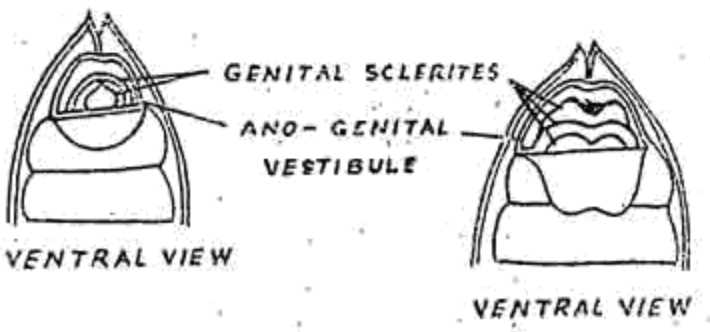


FIG. IV

when the ano-genital vestibule is opened, 3 larger, deep brown, highly sclerotised, genital plates are visible in female whereas in the male only two delicate, yellowish very lightly sclerotised, genital plates are seen. The weevils, used for the purpose and later released in the field exhibited normal behaviour.

Discussion: Usually body colour, size and mating behaviour are used as the basis for distinguishing the sexes. Among cotton grey weevil, body colour is distinctive but not sex specific. In the mating couple, though the female is larger than the male, there have been observed few females which are smaller than the males. Riding together is not a proof that they belong to different sexes as frequently male mounts on another male. Thus, none of these basis can be employed for sex determination.

Length, breadth and shape of the abdomen and sternites can not be profitably used since these are comparative characters and hence may lead to wrong conclusions. Number of tergites would have been a good basis to distinguish the sexes but forcible lifting of the elytra frequently causes irrepairable injury to the individuals and do not lead a normal life. Therefore, external genital characters are the soundest criteria for sex determination of this insect. As the individuals so observed are not injured and exhibited normal behaviour there is no room for erroneous conclusion. Hence, there is no need to perform statistical analysis of the data collected by this method. After some practice this method is as quick as any other method employed for the purpose.

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