Uttar Pradesh J. Zool 12 (1) : 40-44, 1992 ISSN 0256-971X

LIFE HISTORY OF *CASSIDA INDICOLA* DUVIVIER (COLEOPTERA : CHRYSOMELIDAE) - A PEST ON TWO SPECIES OF *CONVOLVULUS*

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The life history of *Cassida indicola* Duv. was studied in the laboratory at 28 ± 2^0C temperature and 70-80% relative humidity. Mating lasts for 35-45 minutes. Mated female lays 50-58 eggs in the ovipositional period of 20-22 days. Incubation period is of 6-7 days in duration. The larval stage consisting of 5 instars lasts for 15-16 days. The pupal stage lasts for 3-4 days with a pre-pupal period of one day. The total life cycle is completed in 25-28 days. The larvae and the adults feed voraciously on the leaf tissues.

INTRODUCTION

Cassida indicola Duv. was reported on *Convolvulus arvensis* L. in Pakistan (Baloch, 1977), but in India, *C. indicola* had been attacking both *C. arvensis* and *C. microphyllus* Sieb. An attempt is made herein to provide the requisite information regarding the life history of *C. indicola*. The results obtained by providing the leaves of the two host plants were same although the leaves of both the hosts were provided separately in separate jars.

MATERIAL AND METHODS

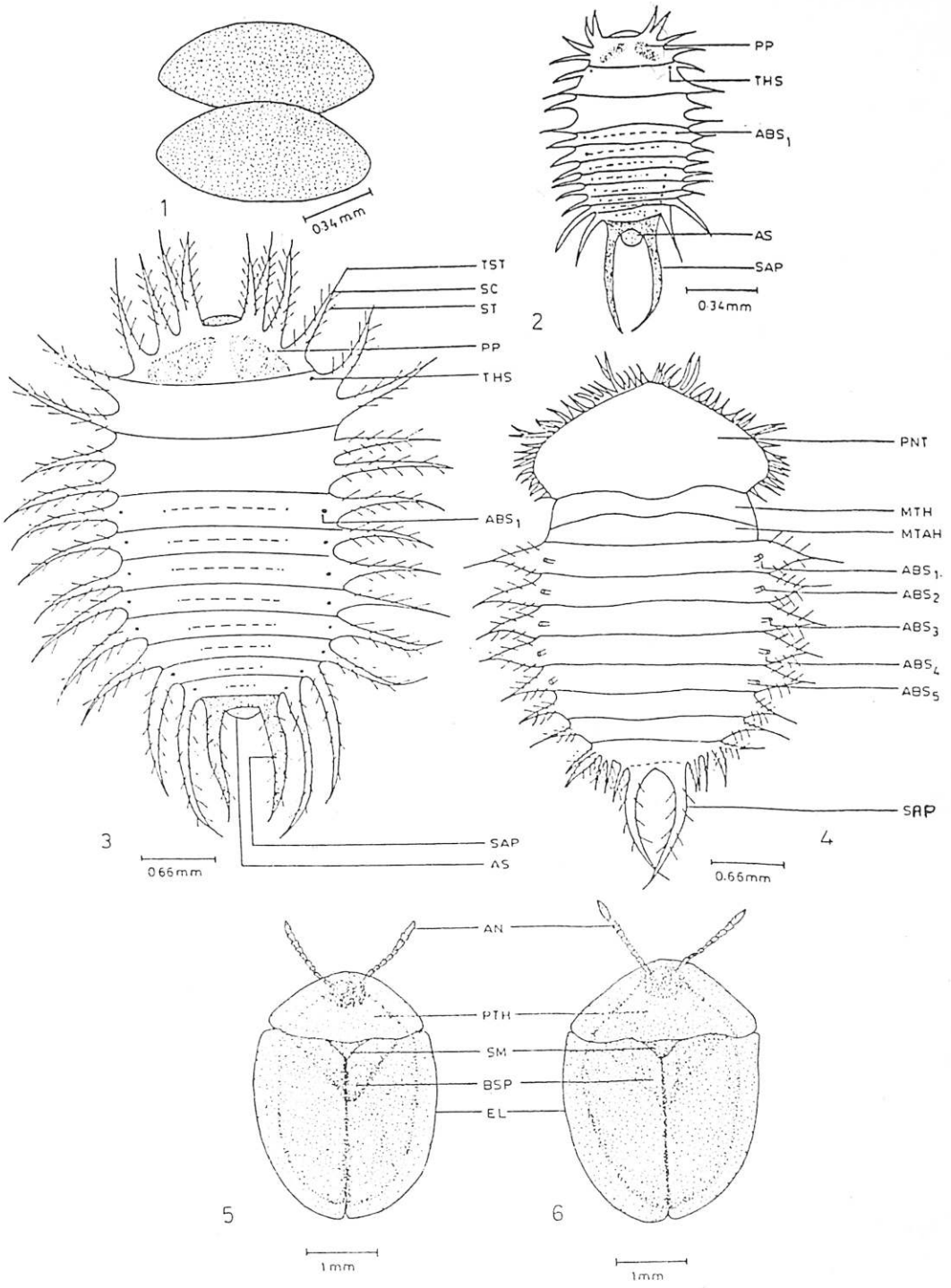
The adults of *C. indicola* were collected from the host plants *C. arvensis* and *C. micropnyllus* and were kept in pairs (a male and a female) in jars (1000 ml each) and each jar was covered with a piece of fine muslin cloth. The jars were kept in a B.O.D. incubator and the temperature was maintained at 28 ± 2^0C and the relative humidity was maintained at 70-80%. Fresh leaves of the host plants were provided twice a day. Eggs laid on the leaves were counted daily separately for each pair and the number of eggs hatched were also recorded daily. Newly hatched larvae were fed singly on the fresh leaves in large petri dishes (12 cm in diameter). Wet cotton wool covered with filter paper was placed under the leaves to prevent them from drying. The number of larval instars, total larval period and pupal period were recorded. The diagrams were drawn with the help of a graph eye piece.

RESULTS

Life history

A complete account of the diffferent stages *i.e.* egg, larva, pupa and adult in the life history of *C. indicola* is as follows :

Egg (Fig. 1) : Eggs are laid singly or in pairs on both the surfaces of the leaves. Freshly laid eggs are creamish in colour, elliptical in shape, measuring 1.03 ± 0.023 mm in length



Figs. 1-6. 1. Egg pair of *Cassida indicola;* 2. First instar larva; 3. Full grown larva; 4. Pupa; 5. Adult (male); 6. Adult (Female) (all in Dorsal view).

(ABS1-ABS5=1st to Vth Abdominal spiracles; AN=Antenna; AS=Anal siphon; BSP=Brownish spot; EL=Elytron; MTAH=Metathorax; MTH=Mesothorax; PNT=Pronotum; PP=Pigment patch; PTH=Prothorax; SAP=Supra-anal process; SC=Scolus; SM=Scutellum; ST=Seta; THS=Mesothoracic spiracle; TST=Terminal setae of scoli)

and 0.51 ± 0.028 mm in breadth on an average. The eggs lie longitudinally parallel to the leaf surface and are firmly glued to it. When laid in pairs, the eggs lie parallel to each other which are in the form of semi-transparent membranous coverings. The incubation period varies from 6-7 days with an average of 6 ± 0.51 days.

First instar larva (Fig. 2) : The larva emerges out of the egg and the head comes out first. The thoracic region takes more time for its protrusion than the abdominal part. The larva measures 1.12 ± 0.020 mm in length and 0.49 ± 0.050 mm in breadth on an average. It is pale green when freshly emerged and the colour gradually darkens into bright green. The first instar larva changes into second instar in 3 days.

Second instar larva : The second instar larva measures 1.38 ± 0.010 mm in length and 0.79 ± 0.020 mm in breadth. The second instar lasts for 2-3 days only.

Third instar larva : This instar resembles the second instar except for the fact that it is still large in size measuring 1.90 ± 0.035 mm in length and 1.05 ± 0.020 mm in breadth. The duration of this larval instar is 3 days.

Fourth instar larva : This instar apparently resembles the third instar, but measures 3.34 ± 0.040 mm in length and 1.68 ± 0.030 mm in breadth. This instar lasts for 3 days.

Fifth instar larva (Fig. 3) : The fifth instar is greenish brown in colour and measures 4.12 ± 0.030 mm in length and 1.95 ± 0.030 mm in breadth. Its duration is 4 days.

The body of the full grown larva of *C. indicola* is divisible into three parts *viz.* the head, the thorax and the abdomen. The head is hypognathus with downwardly directed mouth parts. The thorax is three segmented. Prothoracic segment is the largest and covers the head anteriorly. It bears a pair of pigmented patches on the dorsal side which are darker than the rest of the body. In all the larval instars, there are three pairs of thoracic legs and 16 pairs of lateral projections besides a pair of supra-anal processes.

The lateral processes as well as the supra-anal processes bear setae in all the larval instars except the first. The terminal setae of the lateral processes are larger than the others and also more sharply pointed. The lateral processes bearing setae are also called the scoli. The number of setae on the lateral scoli as well as the supra-anal processes increase in successive instars though this number is variable even among the individuals of the same instar. Each of the first eight abdominal segments bears two dark spots on the dorsal side and a dark median line between each pair of such spots.

The faeces as well as the exuviae of each moult are carried by the larvae on the supra-anal processes. The supra-anal processes appear ladder-like due to the method of attachment of the exuviae. The exuviae and the faecal masses probable help in the defence of the larvae because when touched the larvae curve their supra-anal processes carrying the exuviae and the faecal masses to bring them parallel to the dorsal body surface.

Pre-pupa : It is greenish in colour and attaches itself to the ventral surface of the leaf. It retracts its body and becomes broader in the middle. The exuviae as well as the faeces are shed off from the supra-anal processes. This stage lasts for only one day.

Pupa (Fig. 4) : The pupal stage is the inactive stage and the insect does not feed or move at all during pupation. It measures 3.96 ± 0.040 mm in length and 1.99 ± 0.040 mm in breadth on an average and is greenish-brown in colour. The first five abdominal segments,

each bears a leaf-like lateral projection and the pronotum has a fringe of small regularly arranged spinose processes.

Adults (Figs. 5 &6) : The mean length of the freshly emerged adult beetle is 4.00 ± 0.080 mm and the mean width is 3.00 ± 0.090 mm. The males (Fig. 5) are slightly smaller than the females (Fig. 6). The body of the freshly emerged insect is soft but becomes hard after a span of 7-8 days. The body is suboval and convex with a greenish testaceous colouration.

Behaviour

Feeding behaviour : *C. indicola* feeds on the leaves of *C. arvensis* and *C. microphyllus,* both in the adult as well as the larval stages. Immediately after emergence, the first instar larvae start feeding in the vicinity of the empty egg shells. They do not move about freely, but keep sitting at one place and after consuming that portion they move gradually to the next point. The larvae mostly damage the leaves from their lower surface. They eat up the lower epidermis as well as the other tissues usually leaving only the upper epidermis intact. The adults show equal preference for both the surfaces of the leaves. The rate of damage is in the order : Ist instar larva < IInd instar larva < IIIrd instar larva < IV instar larva < Vth instar larva > Adult.

The feeding activity of the last instar larvae is slowed down just before pupation. The pupa does not feed at all.

Mating behaviour : Mating is initiated a week after the emergence of adult females. It lasts for 35-45 minutes. Copulation occurs frequently with the same or different individuals.

Oviposition : Oviposition occurs 3 days after copulation and after 10 days of the emergence of adult females. Mated female lays 50- 55 eggs in the ovipositional period of about 20-22 days. The rate of oviposition declines with the age of the female.

DISCUSSION

Both the adults and the larvae of *C. indicola* have been found to cause extensive damage to *C. arvensis* (Family Convolvulaceae) in Pakistan by Baloch (1977). Almost all the species of *Cassida* L. show a marked preference for the members of the family Convolvulaceae as observed by Ghani (1971) and Takizawa (1980). In the present study, the insect under reference not only breeds on *C. arvensis* but also on *C. microphyllus.* Baloch (1977) has suggested the possibility of use of some toroise beetles for the control of field bindweed *C. arvensis,* and the present study is an attempt to enrich our knowledge regarding *C. indicola* with a view to use it as a controlling agent for its hosts.

The insect under reference completes its life-history on both *C. arvensis* and *C. microphyllus* in 25-28 days.

ACKNOWLEDGEMENTS

Thanks are due to the University authorities for providing facilities during the present investigation.

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