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OBSERVATIONS ON *OBTUSICLAVA ORYZAE* SUBBA RAO
(HYM: PTEROMALIDAE) PARASITE OF *PACHYDIPLOSI ORYZAE*
(WOOD-MASON) MANI (DIPT: CECIDOMYIIDAE)

There are a few records of parasitisation of *Pachydiplosis oryzae* (Wood-Mason) Mani a pest of rice (*Oryza sativa* L.), by Chalcidoids. In a recent paper, SUBBA RAO (1973) created a new genus and species of Pteromalid, *Obtusiclava oryzae* Subba Rao. The parasite acts as an ectoparasite on larvae and pupae of *P. oryzae*. In the present investigations, an attempt is made to study the salient features of the life activities, adult behaviour and extent of parasitism of the parasite. A five year's field study on extent of parasitism revealed that parasite has a perfect adaptability to its host and can safely be placed for trials in biological control projects.

METHODS AND MATERIALS

The studies on biology of the parasites were carried out in the laboratory. Mass collections of the host larvae and parasites were made from the different fields. Mating and oviposition behaviours were observed in petri-dishes and glass chimneys of different sizes. Eggs, larvae and pupae were reared in small covered cavity blocks with moist blotting papers. The structure of eggs, larvae and pupae were studied after mounting them in Polyvinyl alcohol mounting medium. Field observations were made as frequently as possible. Silver shoots collected from the fields were examined in the laboratory to assess the extent of parasitism. The studies were carried out at a room temperature of 26°C.

RESULTS

Sexual behaviour.

No pre mating period is observed and male exhibits sexual behaviour soon after emergence. The beginning of courtship behaviour is indicated by male with vibrating wings, approaching the female. The excited male taps antennae of female and mounts it. At this posture the male continues tapping the antennae of female. Suddenly the male moves backward in order to copulate. Copulation takes place for about 2 seconds. Post copulatory courtship is also observed in certain cases but female resists male's attempts to copulate for the second time.

Oviposition.

Soon after copulation, the female starts searching suitable silver shoots for oviposition. In the searching behaviour, the female touches the shoots with its antennae. The suitable host for egg laying is the fourth instar larva or the pupa of *P. oryzae*. Female usually spots the host at the base of silver shoot, where generally the host is found. The female after encountering the spot intensifies drumming and pierces the ovipositor into the silver shoot. To attain a suitable depth, the ovipositor is drilled several times into the shoot. In this drilling process the inhabitant of the silver shoot is always stung and paralysed. Eggs are always laid singly at any point on or extremely near the host.

Immature stages.

Egg. The egg measures 0,64 mm in length and 0,20 mm in width. Egg is rounded at the posterior pole and drawn out to a blunt point anteriorly (Fig. 1). Egg is white in colour with smooth chorion. The egg incubates in about 36 hours.

Larval moulting.

During post embryonic development the larva passes through three moults and four instars. Total larval period last for 8-10 days. Moulting in each

instar is somewhat similar. Preparatory to each moult the larva becomes lazy and stops feeding. Before the ecdysis the colour of the larva turns dirty white and thorax becomes a little swollen. These changes herald the moulting of the larva into the next instar. During the process of moulting the larva shows rhythmic body movements, which exert pressure and break the weaker membrane. Once the old membrane is broken the larva wriggles out gradually by a series of typical convulsive contractions and expansions of the body leaving the old cuticle behind.

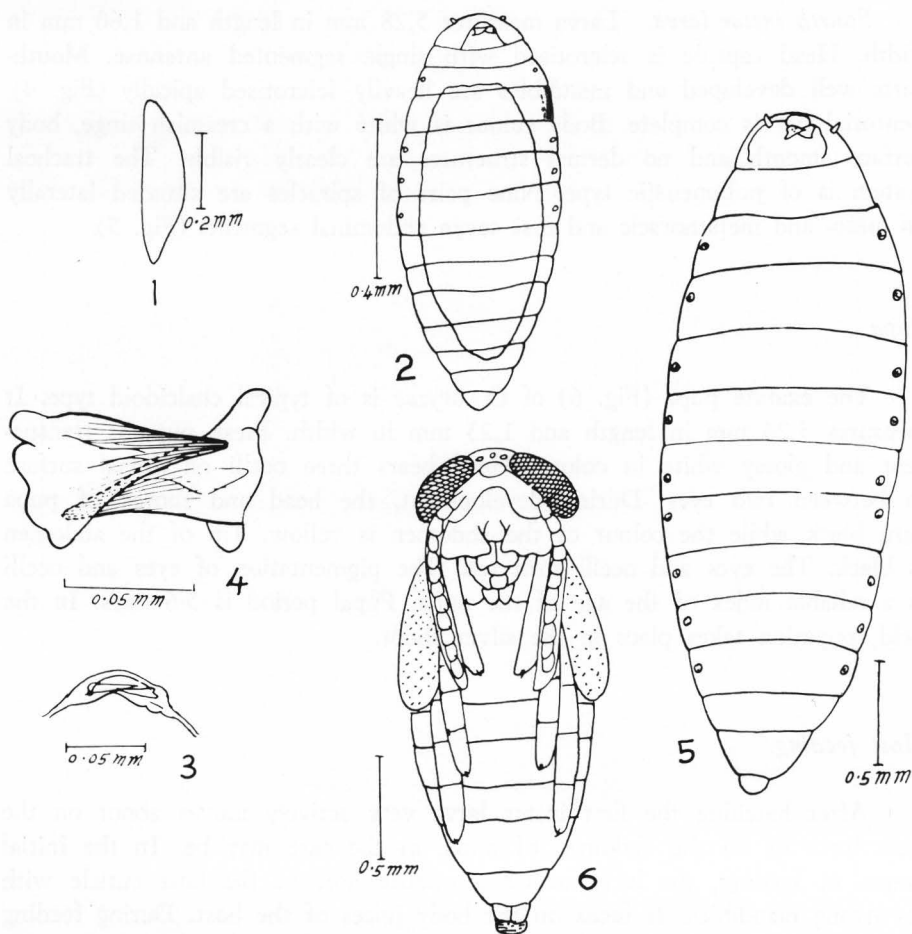


Fig. 1-6 - Immature stages of *Obtusiclava oryzae* Subba Rao: 1, Egg; 2, First instar larva; 3, Mouth parts of first instar larva; 4, Mouth parts of fourth instar larva; 5, Fourth instar larva; 6, Pupa.

First instar larva. First instar larva (0,96 mm long and 0,26 mm wide) is white in colour with a yellow patch of embryonic food inside the body, extending from the mesothorax to about fifth abdominal segment. The head is large, chitinous dorsally but rounded anteriorly. Mouth parts are situated ventrally. Antennae are small and situated dorsally. Two pairs of setae situated around the oral cavity. Epistoma is developed and tentorial bar is complete. Mandibles are thorn shaped and their tips overlap each other (Fig. 3). Body surface is smooth and tapers posteriorly. Four pairs of spiracles are situated laterally on meso-thoracic and first three abdominal segments (Fig. 2).

Fourth instar larva. Larva measures 5,28 mm in length and 1,60 mm in width. Head capsule is sclerotised with single segmented antennae. Mouth-parts well developed and mandibles are heavily sclerotised apically (Fig. 4). Tentorial bar is complete. Body colour is white with a creamish tinge, body surface smooth and no dermal structures are clearly visible. The tracheal system is of polipneustic type. Nine pairs of spiracles are situated laterally on meso- and metathoracic and first seven abdominal segments (Fig. 5).

Pupa.

The exarate pupa (Fig. 6) of *O. oryzae* is of typical chalcidoid type. It measures 3,24 mm in length and 1,23 mm in width. Fresh pupa is transparent and glossy white in colour. Head bears three ocelli on dorsal surface in between two eyes. During development, the head and thorax of pupa turn black while the colour of the abdomen is yellow. Tip of the abdomen is black. The eyes and ocelli turn red. The pigmentation of eyes and ocelli is a reliable index of the age of the pupa. Pupal period is 5-6 days. In the field, pupation takes place in the silver shoot.

Host feeding.

After hatching the first instar larva very actively moves about on the host larva or on the abdomen of pupa, as the case may be. In the initial stages of feeding, the larva makes a minute hole in the host cuticle with its strong mandibles. It feeds on the body juices of the host. During feeding the larva keeps its head attached to the host body with its posterior part suspended like a pendulum. Gradually the body of the parasite becomes elongated, length about three four times the breadth. Later the parasite starts

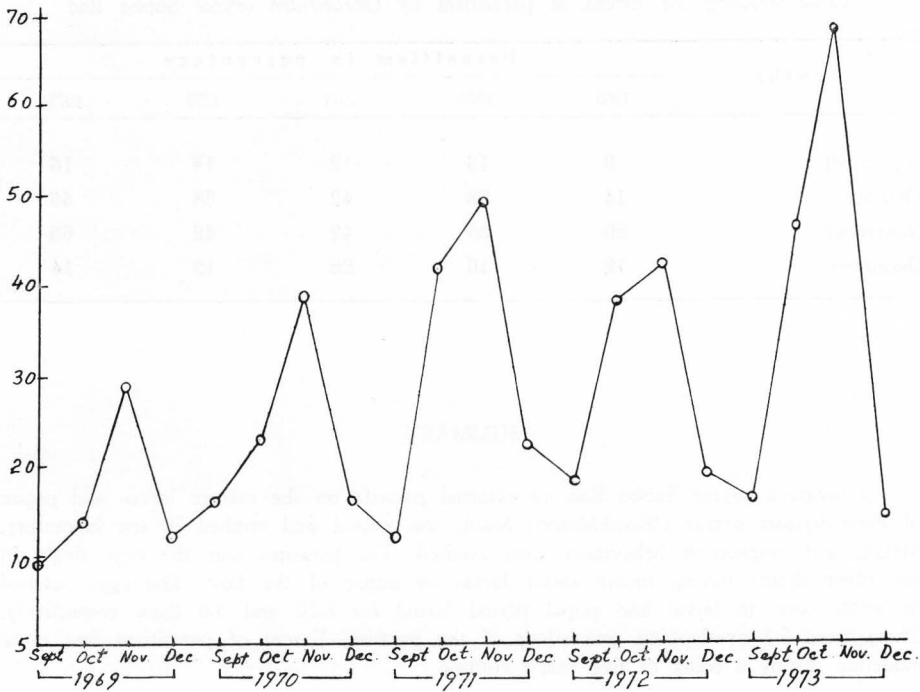


Fig. 7 - Showing the extent of parasitism by *Obtusiclava oryzae* Subba Rao.

feeding the whole body contents of the host leaving only the outer body wall intact. At this stage it acquires creamish white colouration of the host larva or pupa and its shape also undergoes a considerable changes. The body of the parasite swells up very much in the middle. It is remarkable that the parasite consumes only one host larva or pupa during its development.

Seasonal history and extent of parasitism.

Obtusiclava oryzae Subba Rao appears in the field in September and remains active up to December. The peak period of parasitism is October and November, when a large number of silver shoots are parasitised. In December the parasite starts declining. From the captivity and total length of life cycle the parasite passes through 6-7 overlapping generations in a year.

Extent of parasitism from September 1969 to December 1973 was studied in the field and shown in the following table and Fig. 7.

Table showing the extent of parasitism by *Obtusiclava oryzae* Subba Rao

Months	Parasitism in percentage				
	1969	1970	1971	1972	1973
September	9	16	12	18	16
October	14	23	42	38	46
November	29	39	49	42	68
December	12	16	22	19	14

SUMMARY

Obtusiclava oryzae Subba Rao an external parasite on the mature larvae and pupae of *Pachydiplosis oryzae* (Wood-Mason) Mani, was reared and studied in the laboratory. Mating and oviposition behaviours were studied. The parasites laid the eggs singly in the silver shoots having fourth instar larvae or pupae of the host. The eggs hatched in 36-40 hours, the larval and pupal period lasted for 8-10 and 5-6 days, respectively. There were 6-7 overlapping generations of the parasite. Extent of parasitism was quite moderate during a course of five year's studies.

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