

Conclusion: Though all the factors are significant in Intensive Agricultural District Programme farms, there is only possibility of increasing human labour. In Non-Intensive Agricultural District Programme farms investment can be increased on manures and fertilisers and human labour. Since the factors bullock and seeds give negative returns, it shows that these factors are in over utilisation than the requirements. This clearly shows that the factors are more efficiently used in Intensive Agricultural District Programme farms than its counterpart.

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A Preliminary Study on the Insect Fauna Feeding on *Launoe* sp., an Obnoxious Weed, at Ichore with Special Reference to *Lixocleonus incanus* MSHL.

by

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Koebele (1924) was the first who exploited the possibilities of control of weeds through insects as early as 1898. Very little work on the biological control of weeds seems to have been done in India. In this connection the work of Rao (1931) on Lantana weed, Ayyar (1931) prickly pears by *Dactylopius indicus* Green., and *Dactylopius tomentosus* (ckll) and Subramanyan (1964) on Lantana by *Agromyza Lantana* Froggot and successful introduction of *Dactylopius ceylonicus* (Indicus) Green from India to Australia against prickly pear (Rivett 1929) deserves special mention.

Observations: A survey of the RAK. Agriculture College, Sehore, M. P. farm was done during the rabi season in 1964 to note the insect fauna feeding on the *Launoea* sp. an abnoxious weed belonging to the family compositae. Following insects and mite were recorded on this weed.

| S. No. | Scientific Name | Common Name | Systematic position |
|--------|----------------------------------|--------------|------------------------------|
| 1. | <i>Lixocleonus incanus</i> Mshl, | Brown weevil | Curculionidae; Coleoptera |
| 2. | <i>Aethus mumba</i> Dist. | Root bug | Cydnidae; Hemiptera |

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Campus — SEHORE. (M. P.)

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| S. No. | Scientific Name | Common Name | Systematic position |
|--------|---|-------------|----------------------|
| 3. | <i>Geotomus abdominalis</i> Sign. | do. | do. |
| 4. | <i>Geotomus</i> Sp. | do. | do. |
| 5. | <i>Dictyonota pusana</i> D & H. | Tingid bug | Tingidae; Hemiptera |
| 6. | <i>Lygacus civilis</i> Wolff. | Lygaeid bug | Lygaeidae; Hemiptera |
| 7. | <i>Seymnus nubilus</i> Muls. | Leaf miner | — |
| 8. | <i>Tyrophagus nutrescentae</i> (Schrank) | Mite | Acaridae; Acarina |

Among the above insects the brown weevil, *Lixocleonus incanus* Mshl. was found breeding in large numbers on this weed. Since no information regarding the life history and nature of damage of this weevil is available and further since the weevil causes great damage to the weed and thus contributes to the control of this obnoxious weed, a study on the external morphology, nature of damage and life history of the weevil was undertaken by the authors and the studies made are reported below.

External Morphology: The adult is an active medium sized dark brown weevil measuring on an average 10.1 mm. in length and 2.2 mm. in breadth.

HEAD: Head is prognathous and pear shaped, broader at the joint and tapering anteriorly. The posterior region of the head is of pale creamy colour, while the anterior region including the snout is dark brownish in colour with pink coloured tinge. Mouth parts attaining anterior position are dark black in colour. Antenna is typically eleven segmented club shaped. The scape is somewhat elongate, broader at the distal end and of dark brown colour. The pedicel is short and dark brown coloured having a narrow and curved joint with scape. The flagellar region contains a club shaped structure at the distal end constituted by four flagellar segments. Compound eyes are dark, round and black. The mid dorsal line of the head is like a raised ridge.

Thorax: Prothorax is distinct and prominent, dark brown and pink in colour with a broad pale creamy band at its anterior end. The prothorax is pitted on its dorsum. The prothoracic segments are not visible, as they are covered by the elytra. The elytra having nine rows of punctations are not well sclerotized in the freshly emerged adult. The freshly emerged adult is light brown in colour excepting for the snout and thoracic region, where the colour is more dark brown.

ABDOMEN: It is cylindrical and tapers posteriorly. Tergites convex membranous; sternites concave highly sclerotized. Abdomen is seven segmented.

Nature of damage: In an extensive survey, it was observed that the basal portion of the plants near the soil surface was found infested. The attack was upto 40%. The grubs of all the stages were found feeding in maximum numbers on the root up to a depth of 5" to 6", but where the soil was less, these were recorded feeding even up to a depth of 8" in the soil. Due to the feeding injury of the grub, milky secretion oozes out from the root zone to which are adhered the soil particles forming a case around the grub. Every attacked plant has such case indicating the presence of grub or pupa inside. In fields of wheat and linseed it was observed that the fields having the more amount of moisture had more attack of the weevil on the weed.

Host plants: Marshall (1923) has reported this insect for the first time in India. The grubs of this weevil were reported by him to be feeding on the roots of *Linnea asplenifolia* and on grasses, Sugarcane, maize and cotton.

Life History: Method and Place of Egg laying: The female weevil drills a hole in the root of a plant up to a depth of 5" to 6" and in some cases up to 8" by means of her strong snout and inserts the egg in the cavity and plugs it by means of milky secretion oozing out from the plant tissues owing to the mechanical injury caused while inserting the egg. To the milky secretion adhere the soil particle forming a natural hard covering for the egg, grub and pupa till the imago emerges out.

Egg: Generally, single egg is laid in a cavity, but in some cases two eggs have been found. Egg is small, oval and white when freshly laid and turn pale yellowish at the time of hatching. Average size of the egg is 1.24 m. m. in length and 0.91 m. m. in breadth.

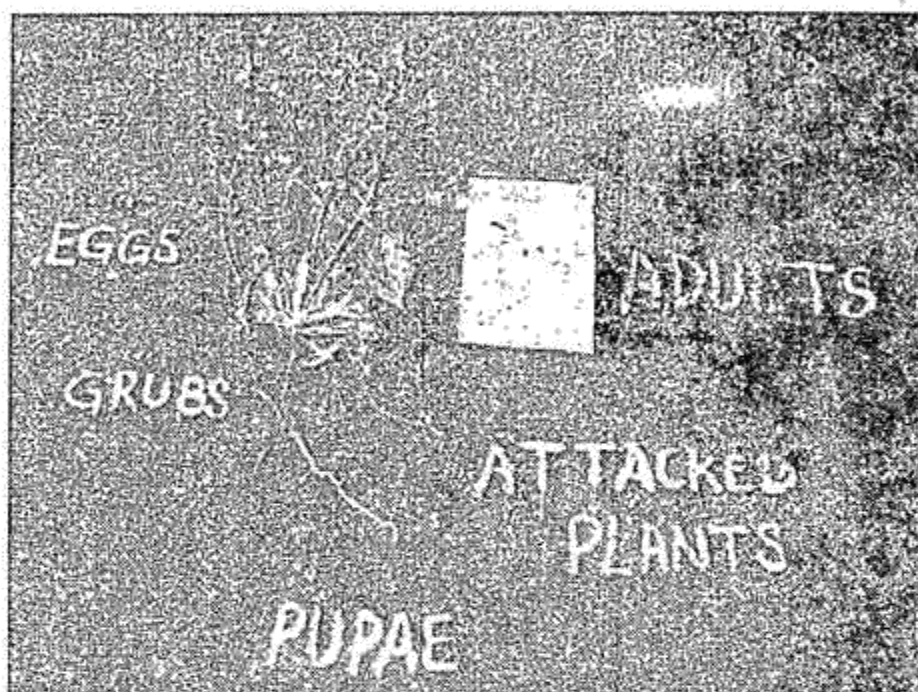
Under laboratory conditions the incubation period was found to range, from 6 to 8 days with an average of 7.2 days for 10 eggs.

FIRST INSTAR GRUB: Small, apodous, colour uniformly pale white. Body soft curved tapering posteriorly. Head yellowish brown.

FULL GROWN GRUB: Apodous, eruciform, colour pale white. Body soft and curved. Head well chitinised dark brown in colour, cephalic organs black in colour. Antennae vestigial. Setae are present in the head and abdominal region in a definite pattern. Full grown grub measures on an average 12.2 m. m. in length and 4.1 m. m. in breadth.

Under laboratory conditions the larval period was found to range from 50 to 60 days with an average of 55.5 days.

Pupa : Length of the body 10 m. m. Greatest width 4 m. m. General colour is pale white. Setae are present on the head, thorax and abdomen in a definite pattern. Legs are pale white. Elytra extending upto 5th abdominal segment. Antennal segments are not conspicuous. Abdomen 9 segmented.



Pupation take place inside the case. The pupal period was found to be 8 days under laboratory conditions.

At the end of the pupal period the adult sheds the pupal skin and appears with clytra dark brownish. In the course of 36 to 48 hours the elytra and legs become hardened then the adult makes a hole at the side and emerges out.

The whole life cycle from egg upto the emergence of the adult was found to range from 64 to 76 days.

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Changing Pattern of Cropping in the *Lower Bhavani Ayacut*

by

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Introduction: India has the longest mileage of irrigation canals in the world with the second largest acreage under irrigation (Anon 1962). In Madras State, the Lower Bhavani Project commanding 2,07,000 acres in the Gobi, Erode, Bhavani and Dharapuram *Taluks* of Coimbatore district and Karur *Taluk* in Tiruchirapalli district is an important irrigation scheme. The construction of this 10.5 crore project was started late in 1948 and completed in 1956 and the entire system thrown open for irrigation by September 1956. The evolution of Cropping Pattern in this Lower Bhavani Project Ayacut in the last decade is discussed in this article.

About the Project: The Dam is built just below the confluence of the Rivers Bhavani and Moyar some ten miles from Sathyamangalam. The dam rises upto 140 feet high above the river-bed. The storage reservoir called Bhavanisagar has a water spread of 30 square miles and a catchment area of 1,621.5 square miles. The height of maximum water level in the Dam is 120 ft. and on an average over 38,000 million c. ft. of

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