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BIONOMICS OF *THIACIDAS POSTICA* WALKER (LEPIDOPTERA : NOCTUIDAE), A PEST OF *ZIZYPHUS MAURITIANA* LAMARCK

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Zizyphus mauritiana Lamarck (Rhamnaceae), *ber*, is an economically important species and also one of the major lac-host trees for the cultivation of *Rangeeni*, and sometimes *Kusmi*, lac. *Thiacidas postica* Walker is the most frequently occurring defoliator on this plant. Only two species, namely, *Thiacidas postica* and *T. villis* Wlk. have been recorded from India (Hampson, 1892). *T. postica* has so far been recorded on *Zizyphus* spp. only, most common of which is *Z. mauritiana* (Hampson, 1905; Lefroy, 1909; Fletcher, 1917 and 1921; Ayyar, 1940; Sevastopulo, 1940; Gardner, 1941; and Basha, 1952), while Norris, Glover and Aldis (1934) and Glover (1937) recorded it on *Z. xylopyra* and *Z. mauritiana* and Wiltshire (1964) on *Z. spinachristi*. Sah (present co-author) observed it on *Z. oenoplia* Mill., *Z. mauritiana* and *Z. xylopyra* at Mirzapur in 1966.

The first and second instar larvae feed in groups on the soft tissue of the leaf, leaving the papery epidermal tissue. The later instar larvae feed singly starting from the margin and eating the whole lamina including the veins. During serious infestation they defoliate whole trees and retard their growth; young plants suffer most (Figs. 1 and 2).

Systematic position

Hampson (1892), Dudgeon (1901), Lefroy (1909) and Swinhoe (1903) placed *T. postica* in the family Lymantriidae. Later, Hampson (1905) included it in Lasciocampidae but Fletcher (1921) retained it in Lymantriidae. Collenette (1935) was the first to point out that Genus *Thiacidas* Walker 1855, Type *T. postica* Walker 1855, was a noctuid and that it was wrongly included in Lymantriidae. This was not taken note of by Sevastopulo (1940) and Gardner (1941), who continued to include it in Lymantriidae. Gardner (1946), however, accepted Collenette's inclusion of *Thiacidas* in the Acronyctinae on the basis of the larval structure. Gardner (1948) again examined the Genera *Acronicta* Treitschke, *Diphthera* Treitschke, *Simyra* Ochsenheimer and *Thiacidas* Walker and included them in the subfamily *Acronictinae* (cf. spelling in Gardner, 1946) of the family Noctuidae with the statement that the larvae of this subfamily have a considerable resemblance to Lymantriidae but lack the mediodorsal glands on A_6 and A_7 of that family. Wiltshire (1964) included this species in the Noctuidae.

Life History and Description of Stages

The pest was collected in the larval stages from *Z. mauritiana* trees and reared on their leaves in glass dishes 10.0 cm in diameter and 5.0 cm deep, covered with wire-netting. A pair of adult male and female moths was introduced in a battery jar, 10 cm. in diameter and 30 cm deep, containing green twigs of the food plant and paper strips for egg laying.

1. *Pre-oviposition and oviposition periods and fecundity :*

The pre-oviposition period was observed to be 2.0 days and oviposition period 4-5 days. Copulation continued for 10-12 hours at any time during the day

or night. However, eggs in batches of 10-126, glued together, were deposited during the night only on paper strips or leaves supplied for the purpose and sometimes on the wall of the battery jar. Eggs in the field were generally found on the ventral surface of the leaves and rarely on twigs. The number of eggs laid varied from 318-708, maximum during August to October and minimum during November to June.

2. *Description of various stages and their period of development :*

(*i*) *Eggs :* The egg (Fig. 3a) is chocolate coloured with the upper pole raised and the bottom flat and attached to the stratum. Seven white, raised, longitudinal lines run from the sides of the egg towards the upper pole and end in a circle, a little below the center of the pole. This makes the egg appear like a bamboo basket tied with a white rope. It measures 0.68 mm in diameter. Hatching generally takes place in the early hours of the day. The incubation period was found to range from 5-13 days (Table 1).

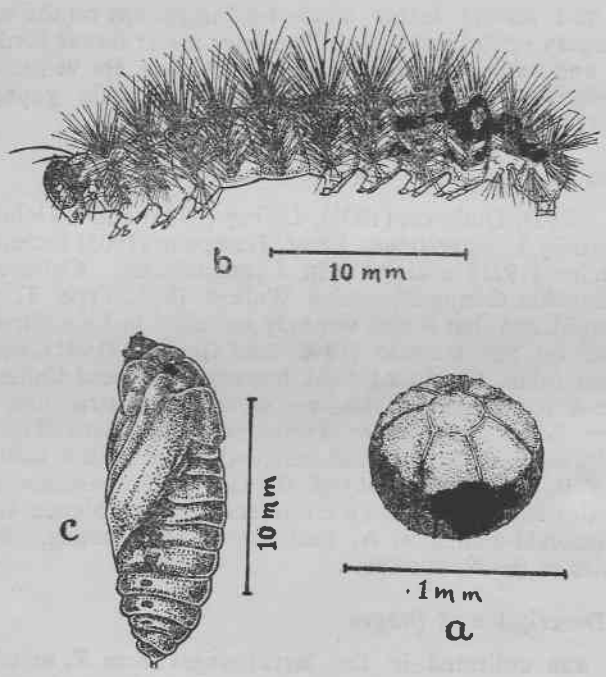

Fig. 3 (a) Egg of *T. postica.* (b) Mature larva of *T. postica.* (c) Female pupa of *T. postica.*

(*ii*) *Larval instars :* The larva passed through six to eight instars; seven instars in the generation reared during September to November 1961, six instars in the generations during November 1961 to March 1962, June to September 1967 and August to November 1967, and six to eight instars in the generation during March to May 1962 and March to April 1968. Larvae in all the instars are nearly similar and, therefore, only the newly hatched larva has been described in detail and the characteristic features of the larvae in the other instars are mentioned.

Fig. 1. Infestation of *Z. mauritiana* tree by *T. postica.*

Fig. 2. *Z. mauritiana* tree denuded by *T. postica*.

Table 1

Duration of various stages in the life-history of *Thiacidas postica* Walker

Number of generations reared		Date of egg-laying	Number of eggs under observation	Egg stage (days)	Number of larval instars	Total larval period (days)	Prepupal period (days)	Pupal period (days)	Date of adult emergence	Total duration egg to adult (days)	Longevity			
											Male		Female	
											Days	Number	Days	Number
1		2	3	4	5	6	7	8	9	10	11	12	13	14
1961-62														
1		30.9.1961	6	6.0	Seven	21.6 (18-25)	4.6 (4-6)	24.1 (20-34)	20.11.1961 to 27.11.1961	52.5 (51-58)	6.0 (4-9)	4	5.5 (3-8)	2
2	(*i*)	24.11.1961	20	13.0	Six	51 3 (47-55)	24.2 (6-26)	22.3 (13-39)	3.3.1962 to 23.3.1962	104.6 (99-119)	3.9 (2-6)	12	4.3 (2-7)	8
	(*ii*)	24.11.1961	2	13.0	Six	51.0 (46-51)	131.0 (125-135)	20.0	6.6.1962	214.0	4.0	1	4.0	1
3	(*i*)	15.3.1962	3	6.0	Six	16.0	6.3 (6-7)	10.3 (9-11)	21.4.1962 to 24.4.1962	38.6 (37-40)	5.6 (5-6)	3	—	—
	(*ii*)	15.3.1962	4	6.0	Seven	20.0 (18-24)	5.0 (4-6)	14.7 (12-16)	25.4.1962 to 6.5.1962	45.7 (41-52)	4.6 (4-5)	3	6.0	1
	(*iii*)	15.3.1962	1	6.0	Eight	23.0	7.0	25.0	15.5.1962	61.0	5.0	1	—	—

(*Contd. on next page*)

1		2	3	4	5	6	7	8	9	10	11	12	13	14
1964-65														
1			4	Larvae collected from field on 4.11.1964			208.0	11.5 (10-14)	20.6.1965 to 24.6.1965	—	4.6 (4-6)	3	8.0	1
1967														
1	(*i*)	29.6.1967	10	5.0	Six	17.1 (17-20)	11.1 (9-19)	10.1 (7-12)	7.8.1967 to 17.8.1967	43.5 (39-49)	4.7 (3-7)	4	5.3 (4-7)	6
	(*ii*)	29.6.1967	5	5.0	Six	20.2 (16-19)	52.4 (45-56)	7.6 (7-10)	16.9.1967 to 21.9.1967	81.8 (79-84)	5.6 (4-7)	3	7.5 (7-8)	2
2	(*i*)	13.8.1967	12	5.0	Six	19.0 (16-21)	8.6 (4-12)	9.0 (7-11)	18.9.1967 to 28.9.1967	44 3 (36-46)	4.5 (3-6)	4	6.0 (4-7)	8
	(*ii*)	13.8.1967	6	5.0	Six	16.5 (16-19)	41.6 (37-52)	10.5 (8-12)	22.10.1967 to 3.11.1967	74.8 (70-82)	5.5 (5-7)	4	7.5 (6-8)	2
1968														
1	(*i*)	4.3.1968	8	6.0	Six	17.5 (16-18)	5.7 (4-7)	10 1 (9-11)	10.4.1968 to 14.4.1968	39.3 (37-41)	3.6 (3-6)	5	6.0 (5-7)	3
	(*ii*)	4.3.1968	11	6.0	Seven	19.8 (18-23)	4.1 (3-5)	12.1 (9-15)	11.4.1968 to 19.4.1968	42.2 (38-46)	4.0 (3-6)	5	6.1 (4-8)	6
	(*iii*)	4.3.1968	2	6.0	Eight	23.5 (23-24)	5.5 (5-6)	15.5 (15-16)	23.4.1968 to 24.4.1968	50.5 (50-51)	7.0	1	8.0	1

The figures in parentheses denote the range in days.

The newly hatched larva has a black head with short, thinly and evenly distributed setae. The prothorax is black, depressed in the centre, with anterior margin dirty green and posterior creamy. Legs are light brownish; abdomen creamy with ten segments and five pairs of prolegs on the abdominal segments 3 to 6 and 10. Long white setae of various sizes occur all over the thorax and abdomen, a pair of long pale brown setae on the metathorax, four on the abdominal segment 8 and a pair on segment 9 with lower half black and upper half white. The larva measures 1.6 mm in length. This instar lasts 2-8 days.

The prothorax of the second instar larva is creamy, with the middle portion black. Two long and black setae are present on the abdominal segment 1 and three on segment 8. The larva measures 2.6 mm in length. This instar lasts 2-8 days.

The abdomen of the third instar larva is yellowish with reddish tubercles bearing white setae of various sizes. Two long and black setae are present on the metathorax, four on the abdominal segment 8 and two on segment 9. The larva measures 6.5 mm in length. This instar lasts 2-9 days.

The fourth instar larva develops a white V-mark on the head. Body becomes pale yellowish green. Two long and black setae each are present on the prothorax and metathorax and five each on the abdominal segments 1, 9 and 10. Six tubercles with long and white setae are seen on each somite. Nine pairs of elliptical spiracles with black margins are present on the prothorax and abdominal segments 1 to 8. The larva measures 11.0 mm in length. This instar lasts 2-8 days.

The fifth instar larva measures 21.0 mm in length. This instar lasts 2-13 days.

Ground colour of the body of the sixth instar larva (Fig. 3b) is white above and pale yellow beneath. A variable dorsolateral band of dark colour is present on each side from the prothorax to the last abdominal segment and reddish tufts of hair on abdominal segments 1 to 8. The larva measures 24.8 mm in length. This instar lasts 2-19 days.

The seventh and eighth instar larvae have a white fleck on either side near the ocelli; setae of the head rather long and few. Prothorax is without lateral pencils and abdominal segments 1 to 4 without dense compact tufts. Body setae rather long, fine not conspicuously branched and mostly white but a few longer, thicker and black setae are present. Spiracles are large and elliptical, with black margins. Ground colour of skin is white above and pale yellow beneath, both with some mottling; a variable dorsolateral band along each side is usually darker with some blackish mottling. Legs are testaceous; prolegs pale green with some testaceous externally. Gardner (1941) has described a mature larva in greater details. The mature or final instar larva measures 30.0 mm in length soon after moulting and 43.4 mm just before pupation. The seventh instar lasted 4-13 days in 1962 and 3-7 days in 1968, while the eighth instar 4.0 days both in 1962 and 1968.

Total larval period was found to be 16-55 days.

(*iii*) *Prepupa :* The mature larva passes through a prepupal stage, when it stops feeding and wanders restlessly in the breeding cage. The colour of the larva gradually changes to pale yellow, all the hairs are shed and the length is reduced. It then makes a tough cocoon of white silken threads reinforced with bits of leaves and hairs shed by it, and rests inside it. Finally it moults into a pupa. In the field, pupation takes place in the folds of the leaves fallen on the ground. The prepupal stage usually lasts 3-26 days, but a somewhat longer period lasting 37-56 days was observed in all examples of the two generations of 1967.

An unusually long duration lasting 125 and 135 days was observed in two examples of the generation reared from November 1961 to June 1962, while all the four larvae collected on 4.11.1964 remained in the prepupal stage for 208 days from 14.11.1964 to 10.6.1965. This phenomenon has also been observed by Wiltshire (1964), who found many of the autumnal larvae spending ten months in, what he calls, prepupal coma in the cocoons in Bahrain.

(*iv*) *Pupa* (*Fig. 3 c*) : The general colour of the pupa is brown, except for the thoracic segments which are dark brown. Six pairs of spiracles are visible, on the abdominal segments 2 to 7. The last abdominal segment has two cremasters. Apparently there is no difference between the male and female pupae except the size ; male being smaller than the female pupa. The pupal stage lasts 7-39 days.

(*v*) *Adult* : Head, thorax, abdomen and fore-wing are greyish-brown with black double lines on fore- and hind-wings. It has been described in detail by Hampson (1892). The longevity was found to be 2-9 days for male and 2-8 days for females.

3. *Seasonal history* :

The various stages and generations usually overlap. The active period was found to be March to November, though the larvae have also been recorded in January (Mehra, 1956). Five generations could be reared in the laboratory-first generation between early March to mid-May, second from end of June to mid September, third from mid-August to end of October and fourth from end of September to November. The fifth generation resulting from the eggs laid in the last week of November was considerably prolonged till the end of March. Some larvae of this generation went into prepupal coma and emerged as adults only in June.

Natural Enemies

A braconid, two ichneumonids and a chalcid were reared in the laboratory from the field-parasitised material.

(*i*) *Apanteles taprobanae* Cam. (Braconidae) was found as an endoparasite of the third and fourth instar larvae. The parasitic larvae spun cocoons immediately on emerging from the host body. It took 4-5 days for the adult to emerge from the pupa. Field parasitism was found to be 24.3 per cent in July 1963 (107 larvae collected and 26 found parasitised) and 22.0 per cent in July 1964 (145 larvae collected and 32 found parasitised).

(*ii*) *Charops obtusus* Morl. and *Goryphus* sp. (Ichneumonidae) were found as endoparasites of the host larvae in December 1964. The parasitic larvae, on emerging from the host, spun cocoons and hung themselves from the branch of the tree with the help of silken threads.

(*iii*) *Brachymeria* sp. (Chalcididae). Five specimens emerged from the mature larvae of the pest in December 1964 and four specimens as hyperparasites from *C. obtusus* Morl.

SUMMARY

Thiacidas postica Walker has been recorded as a defoliator of *ber*, *Zizyphus mauritiana* Lamarck. It is active during March to November, after which the activity is retarded due to cold. The life-history and various stages of development

have been described. There are five generations in a year. The pest completed its life-cycle in 36-214 days. Some of the autumnal larvae spent 125-135 days and some 208 days in prepupal coma in the cocoon. A braconid (*Apanteles taprobanae* Cam.), two ichneumonids (*Charops obtusus* Morl. and *Goryphus* sp.) and a chalcid (*Brachymeria* sp.) have been recorded from the larval stages of the pest. The chalcid was also recorded as a hyperparasite from *C. obtusus*.

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