

Bionomics and control of *Nephopteryx eugraphella* Rag.—A pest of Sapota.

By M. C. CHERIAN, B. A., B. Sc., D. I. C.

and

K. P. ANANTANARAYANAN, B. A. (Hons.).

Agricultural Research Institute, Coimbatore.

Introduction. Sapota (*Achras sapota*) is subject to the attack of a number of insect pests such as *Nephopteryx eugraphella* Rag. (fam. Pyralidae), *Metanastria hyrtaca* Cr. (fam. Lasiocampidae), *Phenacoccus iceryoides* Gr., and *Pseudococcus lilacinus* F. (fam. Coccidae). Of these the first mentioned is the most important. It occurred in a pest form in Coimbatore in 1938 and again in 1941. As details about the pest are lacking studies were undertaken and the results thereof are recorded.

Nature and extent of damage. Damage is caused to leafbuds, flowerbuds, tender fruits and leaves in varying degree by the caterpillars feeding on them. It is less pronounced at the beginning of the season and becomes conspicuous as the fruiting season advances when the pest increases in number. Flower and shoot-buds are bored in by young caterpillars and the injured buds either drop or wither. The caterpillar has the habit of moving on from one bud to another and in doing so injures a good many resulting in considerable loss of buds. The leaves are also in their turn attacked. The caterpillar constructs a tunnel of webs and frass and then feed on the green matter from within this shelter. The tunnel is extended as the caterpillar moves to fresh areas. In cases of severe damage a number of leaves are scraped and eaten likewise and are reduced to papery skeletons. They develop subsequently the brown appearance which is so characteristic of damaged leaves. The caterpillars have also a tendency to clump together the leaves by silken threads and feed on them from within the folds. Sometimes as many as 3 or 4 caterpillars may be found in a tunnel.

Distribution. In India the pest is reported from the Punjab, Bengal, Bihar and Madras Presidency.

Alternate host plants. Hampson (1896) has recorded the insect on cured tobacco and on *Mimusops elengi*. Fletcher (1920) has recorded the same on *Mimusops elengi* in addition to sapota.

Life history and habits. *Moth.* Hampson (1896) has given a brief description of the moth. It is about 17–18 mm. in size and grey in colour. The female is slightly bigger than the male and has an yellowish brown brush-like projection at the tip of the abdomen. The moths pair end to end in a day or two after emergence and the female begins to lay eggs immediately after. The moths fed on sugar solution under laboratory conditions

are known to live for periods ranging from 3 to 18 days. The number of eggs laid by a female varies a good deal; the maximum is 226 distributed over a period of seven days.

Egg. Eggs are laid singly or in groups of 2 or 3 on any part of the tender shoot either in close proximity or in scattered portions and are without a covering of scales. In nature eggs are even found suspended on the silken strands connecting the folded leaves. On the leaf the eggs are laid on both the surfaces and are placed more towards the mid-rib. The egg, when freshly laid, is broadly oval in shape measuring 0.75 mm. by 0.5 mm., pale yellow in colour without any artistic markings or ridges. It turns slightly pinkish on the second day, is more deeply pink coloured on the third day and hatches on the fourth day. The pinkish tint is due to coloured irregular lines on the developing embryo seen through the egg shell.

Larva. The newly hatched caterpillar is about 1.5 mm. long with its body showing a slight pinkish tint especially at the sides and between segments. The head and pro-thorax are pale blackish. Soon after hatching the caterpillar is very active and wanders about from leaf to leaf and over buds to fix up a suitable spot for its feeding. The feeding habits of the caterpillar have been given in paragraph two. The full grown larva is about 25 mm. long, slender and of pinkish colour. There are a few longitudinal close-set lines on the dorsal side. The head is flattish and the head shield is mottled with brownish black patches or irregular lines. The ventral surface and ventro-lateral borders are greenish pale. The body surface is smooth and glistening with only isolated hairs. The five pairs of prolegs are pale white, long and slender and have their hooks in a circle. The pink coloured thin lines in the later stages get suffused into broader bands, disposed, one as a dorsal median band and three to form lateral bands. Just before pupation the pink caterpillar turns yellowish.

Pupa. The larva constructs a cocoon of silk and frass within which it pupates in a day or two. In the field, cocoons are found on the leaves. The pupa which is at first green and soft turns brown in two days. It is short and thick measuring one c. m. in length.

Life cycle. The egg, larval and pupal periods were 3 to 5, 17 to 32 and 7 to 11 days respectively. The total life cycle varied from 32 to 45 days. The life cycle records of 20 moths selected at random and reared from June to September, 1941 are given below.

No.	Egg period in days.	Larval period in days.	Pupal period in days.	Total life-cycle in days.
1	3	20	10	33
2	3	26	8	37
3	3	27	8	38
4	3	28	9	40
5	5	17	10	32
6	5	22	10	34
7	5	23	10	38
8	5	28	7	43

No.	Egg period in days.	Larval period in days.	Pupal period in days.	Total life-cycle in days.
9	5	32	8	45
10	3	22	7	32
11	3	22	9	34
12	3	23	10	36
13	3	25	10	38
14	3	27	10	40
15	3	24	11	38
16	3	26	9	38
17	3	25	10	38
18	3	26	10	39
19	3	26	10	39
20	4	26	12	42

Natural enemies. A Braconid larval parasite and a Chalcid pupal parasite were recorded from the field material.

Control. Sapota does not admit of any costly control measure. Spraying with Calcium arsenate at a strength of $\frac{1}{2}$ ounce in one gallon of water gives effective control. Spraying with a decoction of *Thevetia nerifolia* kernels at a strength of one ounce in one gallon of water was tried and the caterpillars which got a direct hit of the spray died in a few hours but those which kept inside the webs escaped injury. As a single caterpillar attacks a number of buds and leaves and since moths lay eggs purposely in old frass and webs, it is desirable to remove and destroy all infested material to minimise injury and reinfestation.

Literature.

1. Hampson, G. F. (1896)—*Fauna of British India*. Vol. IV, Moths, 77.
2. Fletcher, T. B. (1920)—*Rep. Proc. 3rd Ent. Meeting, Pusa*, 124.

Experiments on Ergot production in Madras.*

By K. M. THOMAS, B.A., M. Sc., D. I. C.,

Government Mycologist, Coimbatore

and

T. S. RAMAKRISHNAN, M.A.,

Assistant in Mycology.

Introduction. Ergot is the hard violetish-black sclerotium of the fungus *Claviceps purpurea* produced on the earheads of certain cereals and grasses. The fungus infects the young ovary and finally replaces the grain with the sclerotium. Ergot is a valuable source of medicine recognized alike in *British Pharmacopoeia* (B. P.), *Pharmacopoeia of the United States of America* (U. S. P.), *Prescriptio Internationalis* (P. I.) etc. The ergot of commerce is chiefly obtained from rye, crops of which get natural infection from year to year. The ergot of sheep's fescue grass, though very much less abundantly obtained, is valued very much higher by manufacturing

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