

Laphygma frugiperda S. & A. and Mocis repanda F. in Suriname

by

J. B. M. VAN DINTHER

(*Entomologist, Agricultural Experiment Station, Paramaribo*)

I. Laphygma frugiperda S. & A.

Importance and distribution

This Noctuid is one of the caterpillars most noxious to field crops in Suriname. All moth stages are present during the whole year. According to METCALF & FLINT¹), the area where this insect is a continuous resident extends from the Gulf States of North America southward through Central America and the West Indies to South America, the pest being most injurious in the warmer parts of its range. This tropical insect is unable to overwinter in the Northern States of N. America, where the ground freezes hard. During spring and summer, however, large numbers of moths migrate from the Southern States northward, even up to Canada, covering hundreds of miles.

In the Northern States of N. America this caterpillar is called: the fall army-worm; in the Southern States: the Southern grass-worm.

Foodplants and nature of injury

For Suriname the following foodplants may be recorded: rice, corn, sorghum, sugar cane, pasture grasses, soybeans, peanuts, and cabbage.

METCALF & FLINT¹) mention as foodplants in the United States: corn, sorghums and other plants of the grass family as the preferred ones; besides: alfalfa, clover, beans, cowpeas, peanuts, potato, sweet potato, tomato, tobacco, cucumber, turnip, spinach, cabbage and cotton.

In Suriname, injury is usually limited to rather young foodplants up to seven weeks old, with the grass family as the favorite group of foodplants. Sometimes plants are also attacked in a latter stage, e.g. corn, where caterpillars bore into the ears and feed in them; but as the female moth prefers young foodplants for laying its eggs, injury is normally done to the foliage and stems of the young plant. As to the type of injury the following data, which are based on observations of caterpillars on Para grass (*Brachiaria purpurascens* Raddi), can be given.

The young larva 1 starts feeding on the upper or lower surface of the leaf, eating the tissue in long narrow strips in such way that only one membranaceous epidermis remains. The length of these strips varies from about 0.3—1 cm, parallel to the leaf veins. Larva 1 may also feed along the leaf margin. Larvae 2 and 3 show the same feeding habits as larva 1, but destroy larger parts of the leaf. Leaves attacked by larva 4 and the subsequent larval stages show irregular parts eaten away. Larval stages 6 and 7 are very voracious. They devour the leaves and often destroy the stems and the heart of the plant, leaving only some hard leaf veins and parts of the stalk. Green mucous excrements mark recent larval activity.

¹) METCALF, C. L. & FLINT, W. P., 1939, *Destructive and Useful Insects*: 344.

Peanut and soybean plants often show a remarkable symmetrical leaf injury of various forms caused by an earlier larval feeding on the vegetation point where the young not yet unfolded leaves are partly destroyed. In some cases wilting caused by stem injury of young soybeans has been noticed.

Description of the stages.

Egg. Nearly spherical, about 0.5 mm in diameter. The shell surface shows a cell-like structure with vertical ribs. At the apex of the egg 10 cells, which may vary in size, are centred around the micropyle (see fig. 1). The new-laid egg is silky grey-greenish in colour; afterwards the colour becomes dark.

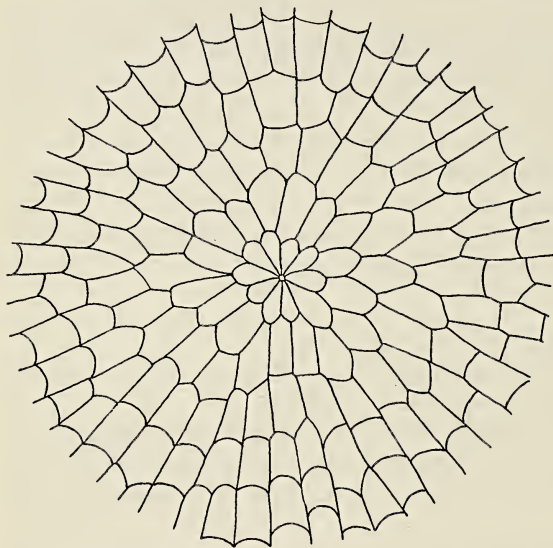


Fig. 1. Central top part of *L. frugiperda* egg.

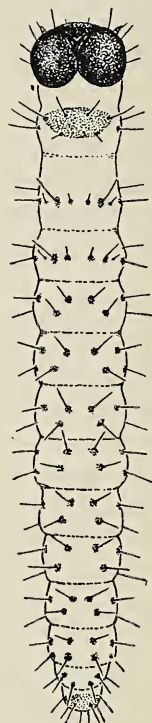


Fig. 2. *L. frugiperda* — full grown larva 1. Dorsal view.

Larvae. There are seven instars. The table shows the head-width of each instar in comparison with the calculated width according to DYAR'S law.

Larval instar	Observed widths	Dyar's law (ratio 1.45)
1st instar	0.3 mm	(0.3 mm)
2nd "	0.4—0.5 "	0.4 "
3rd "	0.6—0.8 "	0.6 "
4th "	0.9—1.2 "	0.9 "
5th "	1.4—1.6 "	1.3 "
6th "	1.8—2.2 "	1.9 "
7th "	2.7—2.9 "	2.8 "

Larva 1. The young larva of about 1 mm long is hyaline with some brown-red colour in the thoracic and abdominal segments. The older larva has a more

yellow-green colour. Head shining black. The setae are inserted on slightly elevated darkly coloured tubercles (see fig. 2).

Larva 2. Length about 3—4 mm. General colour green; head shining black. Pronotum dark with 3 parallel narrow pale stripes; the one in the meson clearly visible, the lateral ones vaguely. The older larva shows a vague elongation of these 3 stripes on the other thoracic segments and the abdomen. Arrangement of setae as in the first instar.

Larva 3. Length about 6 mm. General larval colour green. Setae tubercles black. Head shining black; median epicranial suture and both its lateral arms with a greyish-white border. Pronotum black with the three lightly coloured stripes plainly visible. They continue on the other body segments. Larva with a brown longitudinal band just above the spiracles. This band is ventrally bordered by a yellow-white smaller one.

Larva 4. Length about 1 cm. See larva 5.

Larva 5. Head shining black; median epicranial suture and both lateral arms lined whitish or yellowish-grey. Lateral head part with several greyish-white spots, often regularly arranged and fused in rows. Basal part of the labial palpus whitish, a small dark ring at its apex. Pronotum black with the three light yellow-white stripes continuing on to the other body segments. The primary body colour dorsally between these stripes greyish-green, with many fine brown stripes.

Laterally, the body has a more uniform greyish-brown band with a longitudinal yellow-white vague stripe in its midst and latero-ventrally, at the height of the spiracles, margined by a yellow band on which irregular orange-brown fine lines are present. Ventrally the body colour is greyish-green, with many irregular fine brown stripes close together. Thoracic legs dark like the basal parts of the abdominal ones. Segment 10 dorsally black. Body with rather strong well developed setae, inserted on small black, slightly projecting tubercles.

Larva 6. Length about 2.5 cm. Head dark; median epicranial suture and both lateral arms lined whitish-grey; frons and clypeus light brown; grey spots dorsally at both sides of the suture, increasing in number towards the lateral parts of the head and often arranged in rows or fused. Head region on which the six ommatidia are located light brown. Basal part of labial palpus whitish with a dark ring at its apex. Pronotum with three yellow white stripes continuing backwards on the other body segments as three parallel stripes. Zone between the stripes greyish-brown, as brown short fine lines cover the greyish-yellow primary body colour. Laterally the body has a broad dark brown-black band reaching the spiracles, with some yellowish line parts in the lower part, and latero-ventrally bordered by a yellow band. This band, about half the width of the broad brown-black one, is ornamented with irregular orange-brown fine lines. Ventrally the body colour greyish brown-green as there are many fine brown winding lines close to each other on a greyish-green primary body colour.

Setae on small black tubercles, often with a very small white dot near the black seta base.

Larva 7. Length of the full grown caterpillar about 3.6 cm, width 0.4—0.5 cm. For description see larva 6.

It must be pointed out that only a general colour description for each of the

larval stages has been given. There is often a considerable colour variation: e.g. the number of grey spots on the head capsule is variable; the primary head colour may vary from brown to black; the three parallel dorsal lines are sometimes only vaguely visible and of a greyish-brown; ventrally the fleshy body segments may be of a yellowish-green. Dark coloured larvae can also be found.

P u p a. Brown, shining. Length about 1.5 cm; width 0.5 cm. Segments 2 to 7 with a plain stigma, placed on a more dark brown coloured small area. The abdominal end provided with two short spines close together.

A d u l t. Male moth: the front wing, with a length of about 1.5 cm, is dull greyish-brown, marked at the tip with a white spot. Reniform spot small, the orbicular spot oval and partly placed in a diagonal greyish-white bar, with its lower extremity connected with a short white transverse line. The cross lines are rather distinct. The somewhat transparent hind wing is pearly white, with a brownish margin. Female moth: front wing, with a length of about 1.5 cm, is dull greyish brown, all markings are indistinct. The somewhat transparent hind wing is pearly white, with a brownish margin.

Life history.

During dark, when the moths are active, the female deposits its eggs in clusters on the leaves of its foodplants. These clusters are composed of rather regularly arranged rows; during experiments with moths in breeding cages egg totals varying from 19 to 53 have been observed. In the field egg masses with egg totals of 200 or more can be found. Here the eggs are often covered with a fine down of a greyish colour. The egg hatches in about five days and the young larva leaves the egg shell by loosening a small cap after gnawing a circular slit around the upper part of the egg. Then the larva devours the egg shell and soon begins feeding on the leaf of the foodplant, while moving forward. If disturbed the larva lets itself drop by means of a fine silky thread. In the subsequent larval stages this spinning capacity is almost lacking.

The small larvae are not generally noticed. Usually only larval stages 5, 6 and 7 consume so much of a foodplant that they alarm the farmer. Larvae feed openly during day light and do not leave the foodplant. The elder stages, however, may also feed after dark and remain hidden by day near the base of the foodplant in the earth or under leaf debris. Probably they protect themselves in this way against their natural enemies and the hot sun. Larvae may also be found between the leaf sheaths and in the heart of the plant. The duration of each of the first six larval stages is about two days and larva 7 feeds during three days.

The full-grown caterpillar enters the soil and makes an earthen cell at a depth of about 2—4 cm below the surface. The pupal cell is oval-shaped (length about 2—2.5 cm, width 1 cm) and more or less consolidated with silk. The larva rests motionless in the cell for two days before pupation takes place. The pupal stage lasts for about 7—9 days, so that development from the egg stage to the moth stage takes about 30 days. This means that there will probably be 8 to 9 generations annually as during breeding experiments female moths started egg-laying about 12 days after their appearance.

Natural enemies. Several wasps belonging to the Polybiinae and Polistinae (fam. Vespidae) prey intensively on the *Laphygma* caterpillars. The following species could be recognised¹⁾: *Polybia liliacea* F., *P. striata* F., *P. sericea* Ol., *P. chrysothorax* Web., *P. rejecta* F., *Gymnopolybia vulgaris* Ducke, *Polistes canadensis* var. *panamensis* Holm., and *Polistes versicolor* Ol.

Hunting wasps may often be noticed when they fly between the caterpillar-injured plants. Sometimes they perceive a caterpillar during flight and pounce upon it; they may also alight upon a plant and go in search of prey. The caterpillar attacked is probably paralysed by a sting. The wasp almost immediately starts stripping the body wall and muscle tissue, leaving the head capsule and green mucous body contents behind.

Sometimes the caterpillar succeeds in escaping a wasp attack by dropping itself to the ground. Undoubtedly wasps form an important group of predators. Unfortunately in most cases injury to the field crop is already done by this time. Birds were also noticed as predators viz. "roodborstje" (*Leistes militaris* L.) and "kawfoetoeboi" (*Crotophaga ani* L.). (Species names by Mr. F. HAVERSCHMIDT, judge at Paramaribo).

As to the parasites of *L. frugiperda*, the following species have been noticed: the Braconidae *Apanteles marginiventris* Cress., and *Meteorus laphygmae* Vier., as determined by C. F. W. MUESEBECK, and the Larvaevorid *Archytas piliventris* (Wulp) of authors, as preliminary identified by C. W. SABROSKY (U.S.D.A., Washington 25, D.C.).

A. marginiventris parasitizes the larvae and pupates in a silky cocoon 4 mm × 1.5 mm on the leaves of the foodplant of the caterpillar.

M. laphygmae also parasitizes the larvae and pupates in a brownish membranous ellipsoid cocoon (length about 5 mm) to the base of which a several centimeters long filament has been attached.

A. piliventris parasitizes the *Laphygma* larvae and probably the pupae also.

(To be concluded)

Forster, W., und Wohlfahrt, Th. A., Die Schmetterlinge Mitteleuropas. Sechste Lieferung. Franck'sche Verlagshandlung, Stuttgart, 1955.

Slechts iets later dan beloofd was is de zesde aflevering verschenen en daarmee is ook het tweede deel van dit standaardwerk over de Middeneuropese vlinders voltooid. Het slot van de Lycaeniden en de volledige tekst van de Hesperiden plus de platen 21—28 vormen de inhoud. Bovendien werden de twee banden voor de voltooide delen meegezonden, zodat nu twee keurig gebonden delen in de boekenkast kunnen prijken.

De prijs voor het complete tweede deel bedraagt gebonden DM 53. Tekst zowel als afbeeldingen zijn voortreffelijk. Het is vooral prettig nu eens een moderne bewerking van de Middeneuropese Lycaeniden en Hesperiden te bezitten. Een onmisbaar werk voor een ieder, wiens belangstelling verder reikt dan de Nederlandse grenzen. — LPK.

¹⁾ Identifications according to the Vespidae collection of Dr GEIJSKES, Paramaribo.