Pseudaulacaspis pentagona Targ. as a papaya pest

by

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Papaya (*Carica papaja* L.) in Suriname is generally attacked by the scale insect *Pseudaulacaspis pentagona* Targ.[2]) (fam. Diaspididae), a species recorded from an impressively large number of foodplants and practically cosmopolitan in distribution. Especially young trees up to about one year old may develop very poorly and often die as a result of the scale insect infestation. The stems may become thickly encrusted with a white flocculent matter, which proves to be composed mainly of masses of male scales. This white cover is often erroneously regarded by the layman as "mould".

In Suriname, papaya trees are often grown on badly drained soils, and especially in the rainy seasons the most frequent cause of death of the trees will be excess soil moisture. However, trees may also succumb to infestation of *P. pentagona*; the harmful and destroying properties of this insect were demonstrated by our experiments.

In this paper, data concerning the morphology, life-history and type of injury of the scale insect will be given. Reference can be made to FERRIS, G. F., 1937, Atlas of Scale Insects of N. America, S. I.: 109; GREEN, E. E., 1896, Coccidae of Ceylon, I : 87—90, and NEWSTEAD, R., 1901, Mon. of British Coccidae, I : 173—176.

MORPHOLOGY

E g g. The ovally-shaped egg has a length of 0.24—0.27 mm and a width of 0.15—0.16 mm. The colourless-pale appearance of the newly laid egg changes gradually into a pale pink to orange colour during development.

L a r v a I. The newly hatched pale pink-orange coloured larva has a length of 0.25—0.30 mm and a width of 0.15 mm.

L a r v a II (male). The full-grown orange-coloured male larva attains a length and width of about 0.66 mm and 0.32 mm, respectively.

P u p a e. The yellowish-orange coloured prepupa has a length and width of about 0.47 mm and 0.27 mm. The pupa measures 0.66 mm in length (stylus sheath of 0.1 mm exclusive), and 0.30 mm in width.

A d u l t m a l e. The orange-coloured winged male has a body length of 0.60 mm; the stylus measures 0.23 mm.

M a l e p u p a r i u m. The snowy-white coloured full-grown puparium, with its yellowish-brown larval I exuvium (0.35 × 0.22 mm) incorporated at the tip, reaches a length of 1.20—1.40 mm, and a width of 0.37 mm. The puparium, with a well developed ventral scale, completely conceals the pupa. The lateral sides of the elongated uncarinated puparium run nearly parallel; the carina may be feebly visible or may even be absent.

L a r v a II (female). The pyriform to ovally-shaped light orange-brown

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[2]) Determination by G. F. FERRIS, Stanford Univ., California.

exuvium has a length and width of 0.67—0.77 mm and 0.41—0.44 mm, respectively.

Larva III. The pale creamy colour of the young broadly pyriform larva gradually changes into yellowish-orange or pink as the female larva becomes full-grown and pregnant. The body attains a length and width of 1.3—1.5 mm and 1.3 mm, respectively.

Female scale. The moderately convex scale of the female is approximately circular or ovate and varies, when full-grown, from 1.9—2.7 mm in its largest diameter. The colour is snowy white, but more greyish inconspicuous scales are often present. The exuvia are situated approximately centrally or are placed near the margin, in which case the first exuvium is sometimes projecting.

Life history

The female scale insect deposits her eggs gradually over a period of about two weeks; total numbers of 80—120 can regularly be counted. Hatching occurs after 5 days. The crawlers, which can be detected by the naked eye as pink-orange specks, wander during a few hours or even less, and then settle. They mainly crawl in an upward direction, also infesting the younger green top region of the papaya plant. Wind dispersal of larvae I may cause the infestation of plants in the environment of an infested papaya tree. When a tanglefoot barrier is smeared around the stem of an infested papaya plant, enormous numbers of crawlers of a new generation accumulate along the lower margin of this barrier, forming an orange-coloured band that may become soaked at its upper margin by the sticky glue (see fig. 1). The crawlers may fix themselves onto the stem, but they may also choose leaf stalks, leaf veins and even fruits as their permanent sucking place. Young larvae often aggregate in groups so close together that they hamper each other during their later stages,

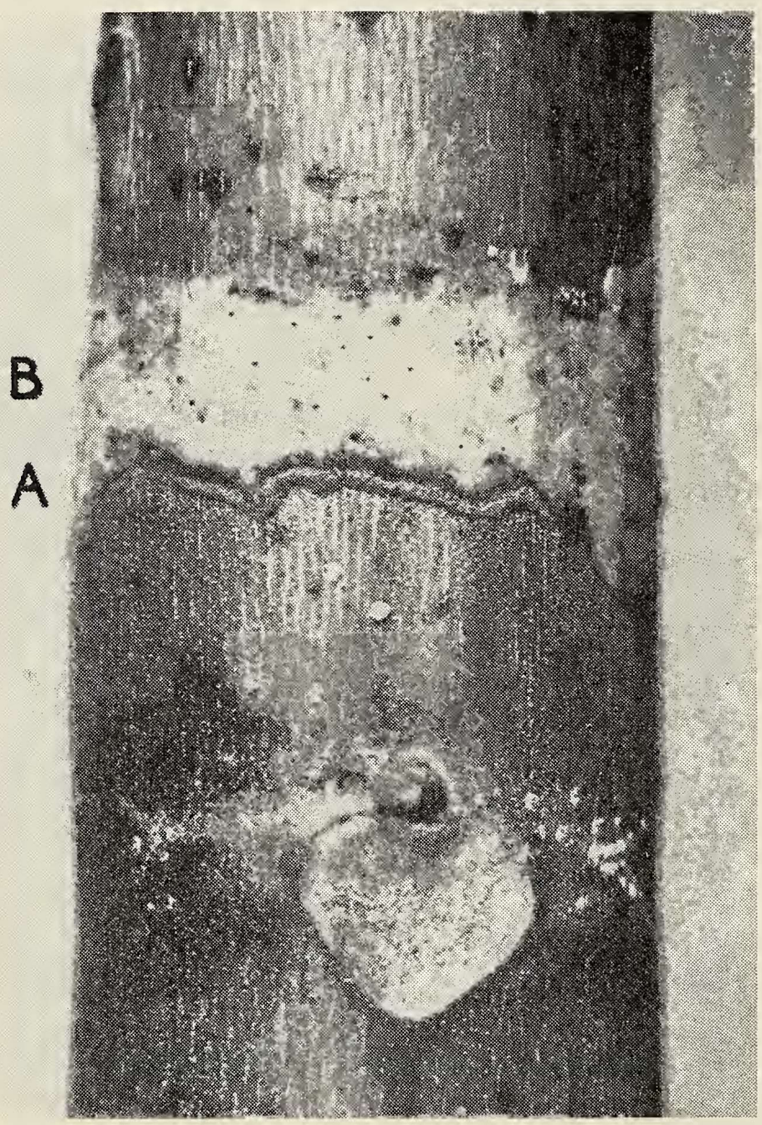

Fig. 1. Band-like accumulation of crawlers (A) along lower margin of tanglefoot barrier (B) on one year old stem; about natural size.

notwithstanding the fact that nearby areas of the plant offer plenty of space. During the development of the male larvae, smaller or larger areas of the papaya plant often become encrusted with the snowy white scales that cluster thickly together, their hind parts more or less elevated. The female scales are often inconspicuous against the woody parts of the plant. However, when attached on the younger green tissues they remain snow-white.

The development of the scale insect is rather fast. As the hatching of the larvae of a new generation starts 45—50 days after the appearance of crawlers, 7 generations can be expected per year.

Several Coccinellid beetles[1]) and their larvae prey intensively on the scale insect, viz. *Pentilia castanea* Muls., *Oeneis nigrans* Muls., *Azya trinitatis* Marshal and a *Coccidophilus* sp. The larvae of *P. castanea*, which on account of their white waxy filaments somewhat resemble mealybugs in appearance, may sometimes appear in such large numbers on scale-infested papaya trees that they succeed in eliminating the pest.

A *Chrysopa* sp., near *silvana* Navas[2]) and a *Nodita* sp.[2]) (Chrysopidae) can also be recorded as predators.

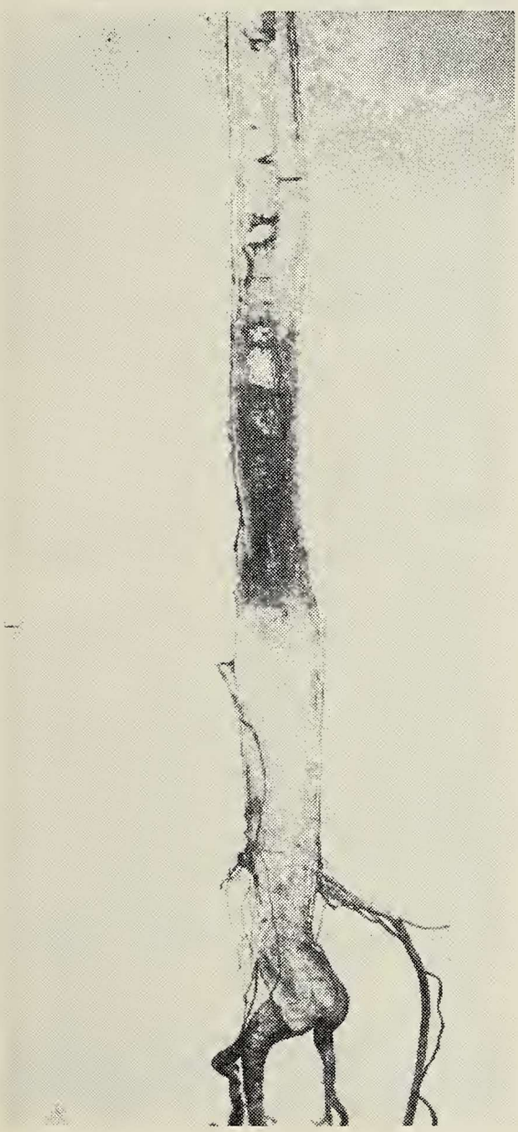

Fig. 2. Longitudinal section through eleven-months old stem damaged by scale insects; roots and stem base healthy; much reduced.

Type of injury

Leaf stalks and leaves infested with scale insects gradually turn yellow and die. The sucking of the many thousands of scale insects on the stem of the papaya plant may result in a narrowing of the stem, a fact which could also be proven by experiments. Through forcing crawlers to settle on a limited stem area between two tanglefoot bands, it was possible to obtain a marked reduction in the stem diameter over this zone and to produce a marked constriction within a few months. When the scale insects were destroyed by brushing them off the bark of the papaya plant, the stem gradually recovered and regained its normal diameter within 5 months.

When not eliminated mechanically or otherwise, scale insects may cause shrivelling of the bark and the death of the plant. A soft necrotic area may appear on the stem, often situated at a short distance from the base of the plant. Figure 2 shows a longitudinal section through such a stem damaged by scale insects.

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[1]) Determinations by E. A. Chapin, U.S.D.A.

[2]) Determinations by S. Parfin, U.S.D.A.

Two brown Scolytid species, 2.2—2.7 mm long and 0.8—0.9 mm wide, belonging to the genus *Xyleborus*[1]), may bore into the dying area and its environment, while fly maggots, Staphylinid-beetles, spring-tails, mites and fungi acting as new invaders may also hasten the death of the plant. Finally, the whole papaya tree dies or breaks off near its base.

The type of injury described here can be noticed on heavily infested young trees up to about one year old. Older plants with well developed woody stems are retarded in their growth but seldom die by the attack of scale insects.

However, as already noted at the beginning of this paper, papaya trees collapse when weakened by a too high level of subsoil water, which causes rotting of the roots and of the stem base while the leaves turn yellow and drop. This holds for young plants as well as for large older trees. The death of so many fruit-bearing trees during the rainy seasons is due to their growth on a poorly drained soil. If they are simultaneously attacked by scale insects, their collapse is accelerated.

[1]) Determination by W. H. ANDERSON, U.S.D.A.

Vlinderwaarnemingen in 1956

door

G. DIJKSTRA Hzn.

Sinds enkele jaren (1953 en volgende) zijn we bezig de vlinderfauna van het moerasgebied rond Eernewoude te onderzoeken. Het terrein aldaar is merendeels in handen van „It Fryske Gea" en wordt beheerd als reservaat. Van onze vangsten aldaar hopen we t.z.t. in de *Ent. Ber.* verslag te doen.

De weersgesteldheid was in 1956 dermate ongunstig, dat we deze terreinen vrijwel niet konden bezoeken. Veel wind, dikwijls regen en vooral ook de hoge waterstand maakten het werk veelal onmogelijk. We, mijn vriend CAMPING en ik, verlegden ons terrein van waarnemingen derhalve naar Beetsterzwaag, waar we van de weersomstandigheden minder last hadden. Het terrein rond Beetsterzwaag en Olterterp bestaat uit honderden hectaren oud en nieuw bos, dennen, eiken en gemengd met ondergroei en hier en daar een stukje hei. Dit gebied is als één geheel te beschouwen; de dorpen liggen in elkaars onmiddellijke nabijheid en een duidelijke grens is er niet.

De volgende soorten zijn merendeels het resultaat van onze vangsten in 1956. Ik vermeld hier slechts de interessantste en tevens die, welke nog niet in de Catalogus van LEMPKE uit Beetsterzwaag vermeld zijn.

Thecla quercus L.
Hesperia comma L.
Shinx pinastri L.
Deilephila porcellus L.
Stauropus fagi L.
Hoplitis milhauseri F. 29.V 2 exemplaren.
Drymonia querna F. meerdere; op 14.IX nog een vers exemplaar; tweede generatie ?
Drymonia trimacula Esp. gewoon.