

ENTOMOLOGICAL NOTES.

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COCO-NUT PESTS.

In the Mandated Territory of New Guinea, foliage pests of the coco-nuts are of greater economic importance than all the other pests combined. In the previous issue of this *Gazette* the depredations of the Coco-nut Leaf Hopper (*Sexava spp.*) and also the research work on the problem of this pest were discussed.

The next in importance of the coco-nut foliage pests are the two beetles *Promecotheca antiqua*, Wse., and *Brontispa froggatti*, Sharp., belonging to the family *Hispidae*, a group of the *Chrysomelidae*.

Plesispa ruficollis, Speeth., and *Oxycephala papuana*, Gerst., have been collected in numbers (in the Manus District only, to date) both by themselves and in association with *B. froggatti*, and causing similar damage.

Oxycephala cornigera, Guer., has been collected in the opening spear of young coco-nuts but is comparatively rare, and its importance as an economic species has not yet been determined.

Promecotheca antiqua.

This pest is fairly generally distributed throughout the Territory, but is very much worse in some areas than in others. Where this insect is present in large numbers it causes severe setback to the palms and leads to serious falling off in production.

The damage to the foliage is of a twofold nature. Firstly, the beetles feed in parallel lines along the undersurface of the leaflets eating off the surface tissue, thus leading to a shrivelling of the attacked pinnæ. Secondly, the larvae mine in between the two layers of the leaf causing such to separate and thus die, a considerable area of leaf surface being rendered useless for the development of plant foods vital to the wellbeing of the palms. The combined effect turns the foliage brown, and palms badly attacked present the appearance of having had the fronds badly singed.

LIFE HISTORY AND HABITS.

The eggs are laid in a cluster, usually two or three together (sometimes as many as five) on the undersurface of the pinnæ, and covered with frass cemented with excretory fluids from the female. The egg-mass measures 3-4 mm. in diameter.

Under insectary conditions the egg stage has lasted 11-17 days (av. 14 days). The larvae on emerging immediately burrow in between the two layers of the leaf and keep feeding away from the site of entrance, the area attacked on the feeding-face gradually increasing as the larvae develop.

The larva is a dull white in colour with head reddish brown. The larval period occupies from 17-23 days (av. 21 days) under insectary conditions.

When the larvae are full-fed they retreat from the "feeding-face" and retire into the previously mined tissue, where a short pre-pupal stage is passed through before the transformation to the pupa takes place: owing to difficulties in observation the pre-pupal period has not been determined, the larvae dying when removed from the leaf tissue, which is in itself too opaque to permit a view of the larvae.

Pre-pupal and pupal periods combined average 14 days, but the adult on emerging, apparently does not emerge on to the surface for at least several hours. The complete life-cycle is thus 42-54 days (av. 49 days). As there is apparently no material seasonal variation in the development of this pest, it is probable that there are about seven generations in the year.

The adults measure 8-10 mm. in length and about 5 mm. in width. The head, thorax and anal two-thirds of the elytra (wing covers) are dark purple in colour, while the anterior portion of the elytra varies from orange to yellow in colour.

The life of the adults is apparently a fairly long one, the beetles in the insectaries having lived on small palms for at least six weeks.

CONTROL.

Spraying would probably control this pest, but in order to deliver the spray on to the foliage of most palms a power sprayer would be required, and the cost of insecticides and plant would be prohibitive from an economic point of view.

Dusting of the palms with insecticides would also be costly, even from the ground, as a power plant would be required here, as for spraying.

The use of aeroplanes has often been raised in this connexion but as most of the fronds tend to hang downwards, and the beetles feed on the undersurface of the pinnae, dusts from the air are not likely to reach effectively those parts of the foliage where the pest is feeding. Moreover, the relatively isolated nature of most plantations has to be considered, necessitating a considerable amount of manoeuvring and turning, and thus waste of time and fuel. In addition the cost of the aeroplane, pilot's salary and amount of insecticide wastage, all tend to rule out such a method of application of insecticides. From an economic point of view this means of attack is not practicable in this Territory.

If, in the early stages of a severe attack by this pest, infested fronds are cut off and burnt and all beetles coming down with the fronds collected and destroyed, a very material check of the infestation will be obtained. The loss of foliage is inevitable if the pest is allowed to increase normally, and in addition the pest population would be automatically increased by leaving the infested fronds for the larvae to develop in, and the subsequent generation, greatly augmented in numbers, would carry the infestation farther afield.

PARASITES.

Parasites of both egg and larva have been bred out in the laboratory from material collected in the field, but as a rule they do not appear to exercise any material control of the pest until a considerable amount of damage has been caused.

The egg parasite has been identified by the Imperial Institute of Entomology as *Anastatus* sp. (fam. *Eupelmidae*). The larval parasite is a species of the genus *Entedon* (fam. *Eulophidae*).

Brontispa froggatti.

This small Hispid has a distribution from the Phillipine Islands to the Solomon Islands. In this Territory it is generally distributed and mostly occurs on young palms up to about three years old. It has, however, been found in palms of thirteen years and more, but in these cases it does not appear to cause the severe setback that it does to the young palms. The most common native host plant is the Areca palm.

Damage is caused by erosion of the surface tissue of the opening leaflets by both the larva and the adults, giving rise to dead areas (often of considerable size) on the young pinnae, leading to loss of foliage surface for developing plant foods.

The adult is a slender beetle measuring up to 9 mm. in length and 1.5 to 2 mm. in width. Head and anteum black with the thorax and anterior quarter of the elytra (wing covers) yellow to orange: the remainder of the elytra black except for the basal tip which is orange: legs and undersurface of the body yellowish brown: elytra finely striated and punctate.

The eggs are laid in between the opening leaflets of the new frond (spear). The larvae emerge in about four days and spend their cycle in between the pinnae eating off the surface tissue. They reach maturity in about 22-29 days, when the transformation to the pupa takes place. This stage is capable of movement and can transport itself within the area between the pinnae: the pupa matures in about six days.

Young palms in the nursery or during the first three years of growth may receive a very severe setback from this pest, especially when the attack is severe.

In the nurseries, more especially, regular attention to collection and treatment with tobacco wash will keep the pest in control.

Plesispa ruficollis.

At a casual glance this species appears to be an overgrown specimen of *Brontispa froggatti*. The adult measures about 12 mm. in length and 3 mm. in width, with the head and thorax red, eyes black. The elytra are black with a fine margin red and are finely punctate.

Oxycephala papuana.

This very closely resembles the former species.

Oxycephala cornigera.

This beetle measures 12 mm. in length and about 3.5 mm. in width, with the head and thorax yellow. The basal half and median third of elytra are black, the remainder yellow.

Oxycephala wallacei.

This is often a serious pest of *Pandanus* foliage and has also been found occasionally on the fronds of mature coco-nut palms.

The adults in colouration are very similar to those of *Promecolheca antiqua* but are longer, measuring 13 mm. long and 4 mm. in width. The head, thorax and terminal third of the elytra are purple black, while the anterior two-thirds of the elytra vary from yellow to orange.

This is not a general pest of coco-nuts in so far as our information goes to date.

Lepidoptera.

The "Skipper butterfly", *Telicota bambusae* (fam. *Hesperiidae*) is often a serious pest of the foliage of coco-nut palms, usually only up to about 1½ years old, but it has on occasion been observed causing serious defoliation to palms of 3-4 years of age.

The caterpillars are bluish grey in colour with a relatively large flat head: they join two leaflets together with silken thread and during the day remain in this shelter, coming out to feed at night.

The adult varies considerably in colour from a general dull brown with orange brown markings to a general orange brown with dark brown markings. It measures about 3.75 mm. across the outspread wings. Two parasites have been bred from the pupæ:—

Brachymeria euploiae, Westw. (*Chalcididae*).

Euthromorpha insidiator, Smith. (*Ichneumonidae*).

Hand picking on small palms is the simplest and quickest method of control of the pest.

Caterpillars of *Prodenia litura*, F., occasionally cause a localised defoliation of young palms, but it is not a general pest of coco-nuts.

Larvæ of a small moth *Decadarchis ophiocypha*, Meyr. (fam. *Lycaenidae*) have been found causing damage to young foliage on the opening fronds of mature palms, generally when the palms are recovering from a severe infestation by *Sexava*.

INSECT PESTS OF THE SWEET POTATO.

The sweet potato is extensively grown in the Territory not only as a food for native labour rations, but also by free natives for their own consumption, while as a substitute for potatoes it is consumed by many Europeans.

Pests of this crop are therefore of decided economic importance.

A pest which may be referred to as "spectacular" is *Hippotion celerio*, L. (fam. *Sphingidae*, Hawk Moths).

The early stages of feeding of the larvæ of this species are generally not observed even when in plague form, but the voracious appetite during the last two or three days of the caterpillar stage very quickly defoliates the runners ("in a night" as is so often stated).

The young caterpillars are light green in colour and are distinguished by the presence of a "spine" standing up from the upper surface of the hind portion of the body. As they develop the colour deepens to almost black: when they reach maturity they burrow into the ground to pupæ. The larval period is at least ten days and the pupal period fifteen to eighteen days.

The adult moth measures 7 cm. (approx. 2½ inches) across the outspread wings. The forewings are brown with lighter coloured markings, and the hindwings reddish with dark markings. They only fly at night and are very swift in their movements.

Infestation by this pest is worst during the dry season, and often first comes into evidence about one month after the end of the wet season.

Dusting with Calcium Arsenate or Lead Arsenate, using a hand rotary dusting machine, has given effective control. The first treatment *must* be given as soon as the first indications of feeding are observed: two more dustings at about three-weekly intervals should then be sufficient. The nozzle should be kept well down in order to blow the dust *under* the foliage. Dusting will give the best results when carried out first thing in the morning while the dew is still on the foliage, thus assisting the powder to adhere more firmly to the surface.

Cylas formicarius, Fabr., (Sweet Potato Weevil.)

This is another serious pest of sweet potatoes, and is apparently widely distributed in this Territory, having been collected in Bougainville, New Ireland, New Britain and Manus, and reported from New Guinea.

The adult is a small, shiny, slender weevil or snout beetle, about 3.5 mm. in length, with the head, elytra and abdomen metallic blue-black, while the prothorax and legs are bright red.

The eggs are deposited in small cavities eaten out of both runners and tubers. The larvae emerge in less than a week and tunnel through the stem into the tuber. Infested potatoes develop a bad smell and bitter taste, and will not keep in storage for any length of time. Pupation takes place inside the plant in both the runners and tubers, the adults eating their way on to the surface. The adults feed on the foliage and stems.

The life cycle is from 4-6 weeks in temperate climates and is probably less in the tropics.

In planting up, slips from infested areas should never be used except in cases of absolute necessity, and a very careful selection must then be made.

Old tubers and vines should be carefully cleaned up after harvesting and either burnt or buried very deeply.

A certain degree of control of this pest can be obtained by spraying with Arsenate of Lead (1 lb. to 50 gals. of water) as soon as the weevils appear in the fields, or by dusting with the same insecticide.
