COCO-NUT PESTS.

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Pests of the Trunk.

The large Dynastids, *Xylotrupes gideon,* L. (Elephant beetle), *Scapanes grossepunctatus,* Sternb. (Rhinoceros beetle) and *Trichogomphus semmilinki,* Rits. (Solomon Islands Rhinoceros beetle), cannot be classed as major pests of the palms, but are yet of considerable economic importance in that by means of their eating holes in the soft tissue at the base of the head of the palm they lead to admission of the Palm Weavils, which are very serious pests of the trunk and "cabbage". By attention to the reduction of the numbers of these beetles in any area the danger of infestation by the Palm Weevil is very greatly lessened.

The eggs are deposited in the soil and are small round white bodies, and reach maturity in about 20 to 29 days. Just before emergence the young larva can be seen through the chorion (integement of the egg).

The grubs are a creamy (dirty) white in colour with reddish-brown head and with the upper surface of the body carrying brownish hairs. They feed in the ground, gaining nutriment from the humus, and are always most plentiful in situations where their food is most abundant (e.g. in or under heaps of old decaying vegetation, &c.). The pupal stage is also passed in the soil.

The total life cycle (i.e., from deposition of egg to emergence of adult) occupies about 3-4 months.

Xylotrupes gideon and *Scapanes grossepunctatus* have a general range throughout this Territory and into the Solomon Islands, but *Trichogomphus semmilinki* has never been collected outside the Kieta District and is apparently confined to the Solomon Islands Group.

The males are distinguished from the females by having a marked sculptural development on the top of the head and thorax.

Xylotrupes gideon has two "horns" with bifurcated tips, one projecting forwards and downwards from the thorax and the other forwards and upwards from the top of the head.

Scapanes grossepunctatus has two projections forward from either side of the thorax and one "horn" curving upwards from the top of the head between the two projections from the thorax.

Trichogomphus semmilinki has the thorax deeply excavated and has a short bifurcated projection from the middle of the thorax on the upper surface and directed forwards, with two short projections forwardly directed from the sides of the thorax, and one "horn" curving upwards from the top of the head.

The first two species are a very deep brown to almost black in colour, the females of *X. gideon* having the upper surface hairy.

Both males and females of *T. semmilinki* are shiny black.

The size of both sexes and also the nature of the structures referred to on the males, vary considerably, but the following measurements are taken from well grown specimens and are from the tip of the "horns" to the "tail".

X. gideon—8.7 cms. long, 3 cms. maximum width.

S. grossepunctatus—5.5 cms. long, 2.5 cms. maximum width.

T. semmilinki—5.5 cms. long, 2.7 cms. maximum width.

Observations have been carried out in the Botanic Gardens, Rabaul, on the trees on which the large Dynastids (practically wholly *X. gideon, S. grossepunctatus* being rare in that locality though plentiful in the kanaka groves even adjacent) are collected and in their order of preference the trees mostly frequented by the adults are—

Poinciana regia
Cassia multijuga.

These, grown as trap trees and *carefully collected over every day,* will assist materially in reducing the numbers of these beetles in any locality.

As previously stated, these beetles breed in soil, particularly in situations where the humus content is high. Attention should therefore be paid, by due attention to general plantation hygiene, to preventing as far as possible, accumulations of old vegetation and such like. In one instance that came under the writer's notice, advice was sought for the reason of the large numbers of these beetles occurring at one plantation, and on an inspection being made, a pit was found in which cut grass, fronds of palms, &c. had accumulated, and when this pit was cleaned out 346 adults and a large number of grubs of the Dynastids were collected.

In another instance under similar conditions two full kerosene tins of beetles were collected from one pit.

Serious losses are at times occasioned by one or more of several species of *small Dynastids* (*vide* Part 2, Vol. 1, N.G.A.G. for identifications) eating into the developing bud of the young palm from the time of planting out up to about the first year and a half of growth. Owing to the feeding of these beetles on the "bud" the young palm is killed. As the damage is done before the palm wilts, the collection and destruction of these beetles presents very great difficulties.

These beetles are always worse on areas where the planting has been done on old grass lands or where taro has been growing, i.e, the natural breeding ground of these beetles.

The Palm Weevils.

There are three species of *Curculionidae* which cause material damage to coconut palms in this Territory, *Rhyncophorus papuanus,* Kirach (the Black Palm Weevil), *Rhyncophorus schach,* F. (the Red Striped Palm Weevil) and *Sparganobasis subscruiata,* Mshl. (the Base Borer). Of these, the two former are only able to penetrate the trunk when there is an opening such as may be made by the large Dynastids or by a knife cut, &c., and their attack is usually worse on relatively young palms and in areas where the plantation has been badly neglected.

The eggs are laid in any freshly made openings, and the larvae tunnel into the trunk of the palm and in the "cabbage"; if the bud becomes affected in the course of the channellings the palm dies.

Careful attention to pest control will reveal any openings liable to enable these pests to become operative, and if such are cleaned and tarred, no infestation will ensue.

If the larvae have already developed, by placing the ear close against the trunk they can generally be heard gnawing at the tissue, and the infested portion can then be readily located, cut out, and the cavity tarred.

The larvae of these two weevils are large creamy-white fleshy grubs with brown heads and strong jaws. The adults measure 3 cms. long and 1.25 cms. wide across the junction of the elytra (wing covers) with the thorax.

The adults of *Rhyncophorus papuanus* are a general dull black in colour, while *Rhyncophorus schach* have two red stripes on the dorsal surface of the thorax.

Both species breed freely in the Sago palm, and where these are growing adjacent to plantations the greatest care should be taken to see that any such which become infested are destroyed, and where they are worked for native food, that old stumps, heads, &c., of the palms are destroyed, as well as the old rotting waste.

The use of some fumigant would ensure the destruction of all larvae whereas in cutting out the affected parts small larvae are liable to be missed.

Previously, carbon disulphide was placed in the workings to kill the larvae, but the danger with this chemical is the high degree of explosive inflammability of its vapours when mixed with air.

Paradichlorbenzene (a white crystalline solid) would probably be just as effective and is both non-poisonous to humans and non-inflammable. It will certainly kill the larvae in the plant tissue.

The Base Borer, *Sparganobasis subscruciata,* is a smaller weevil, and as its popular name implies, attacks the bole of the palm, the larvae tunnelling at first more or less in the surface portion, but as the infestation develops, boring all through the bole. From the evidence in hand this appears rather to be a pest of relatively young palms, although old palms have also been reported to be attacked.

Although recorded from widely scattered sections of the Territory, it does not appear to be a pest in the same category as the two former species.

Pests of the Spathes.

Lepidoptera.

The large spathe moth *Tirathaba rufivena,* Wlk., is generally distributed throughout the Territory.

The eggs are laid on the spikes soon after the spathes open and the caterpillars feed on the male flowers, amongst which they form a webbing of silken fibre and frass; female flower buds are sometimes attacked and destroyed.

The attack is always most severe on spathes which are choked and are unable to open out freely. From observations made at the Demonstration Plantation, Keravat, the first five or six spathes thrown are the worst attacked, the following one being but slightly infested, if at all.

The larvae are reddish and are very quick in movement either backwards or forwards. The adult varies in appearance in the sexes, the female having the veins of the wings red, while the male is generally silvery-grey with a black margin to the fore wings. The adult measures about 2.5 cms. across the outspread wings.

In appraising the economics of *Tirathaba rufivena,* it must be remembered that a palm will only set a certain number of nuts, and this will be less than the number of female buds on any one spathe in most instances; consequently some of these buds will therefore be shed in the normal course of events. However, if the caterpillars of this moth cause a few buds to fall, unless the loss by this means is excessive, it is only carrying out nature's normal function. This is not to say that it is not of economic importance, for at certain times at least it can be a decided pest.

A small *Tineid moth* (unidentified) has bred from larvae collected inside unopened spathes from the Kieta District. The eggs in this case are apparently laid in the striae on the outside of the sheath, and the larvae bore through to the inside, the site of entry being marked by a minute globule of dried sap. It does not appear to do material damage, but might lead to the introduction of fungi, &c.

Rhyncota.

The Pentatomid (Stink Bug) *Axiagastas campbelli,* Dist., is prevalent all through the Territory, and where particularly so may lead to a slight amount of nutfall. It is present in all stages of development, both in the heads of the palm and on the opening spathes. Owing to lack of extended records on areas where this bug is present in large numbers, its economic importance is difficult to assess.

The adult is about 12 mm. long and 7 mm. wide, the upper surface black with lighter markings.

Coleoptera.

The large Dynastids (Elephant and Rhinocerus beetles) at times damage the female buds.

Two species of "Stag Beetles" (Lucanidae) feed on the male blossoms and sometimes damage the female buds. *Eurytrachelus egregius,* Mill. (the Black Stag), is dull black in colour; the males measure up to 5.5 cms. in length and 1.5 cms. in width. *Metopodontus bison,* Ol. (the Brown Stag), is shiny brown in colour, with a yellow margin round the wing covers and thorax. The males measure up to 5.5 cms. long and 1.25 cms. wide.

Two other species of Lucanidae, *Cyclommatus margaritae,* Gestro., and *Cyclommatus speciosus,* Boisd., have also been collected on newly opened coco-nut spathes.

The males in all the stag beetles have false "jaws" projecting in front of the head, and are commonly called "sisors" by the natives.

Three species of *Cetonidae* have been found feeding on the male blossom, *Lomaptera batchiana,* Thoms. (the Green Cockchafer) being the most numerous, the other species being *Panglaphyra douboulayi,* Thoms., and *Poecilopharis emilia,* White.

Other Coco-nut Insects.

Rhabdocnemis obscura, Boisd., and *Diocalandra frumenti,* are two other weevils which will oviposit in ends of cut fronds or where some opening has been made into the midrib of a frond. Although they may increase damage after it has been done by some other agency, they are only pests of secondary importance to coco-nut palms.