DEPARTMENTAL NOTES

THE RHINOCEROS OR BLACK BEETLE OF COCONUTS*

(Kalukuruminiya, Sinhalese. *Karuvandu,* Tamil.)

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NATURE AND EXTENT OF DAMAGE

THE Rhinoceros or Black Beetle, is well known wherever coconuts and other palms are grown in Ceylon. The damage to healthy palms is done only by the beetle stage (fig. 1), which flies to the crowns of palms and bores into the cabbage in order to feed on the juice or sap. On the head of the beetle is a horn which is used in tearing out the fibres which are gradually pushed out as the beetle bores its way in. Its mouth parts are not formed for biting off and chewing pieces of tissue, but are specially adapted for chiselling out pieces of fibre as it tunnels its way into the softer portions of the crown and for sucking up the sap which flows from the wounds. This beetle neither lays its eggs nor breeds in healthy living palms, but it is occasionally found breeding in dead or dying palms attacked by the Red Weevil or killed by disease, lightning, etc.

The Black Beetle attacks palms of all ages, sometimes causing serious *direct* injury and subsequent loss of crop. There seems to be no definite evidence that under Ceylon conditions it is ever directly responsible for the death of palms by its own unaided efforts. On estates where this pest has been allowed to breed in large numbers in old stumps and logs, in buried branches and other vegetable refuse, the emerging beetles have caused serious loss of crop by boring into the spathes and even into young and half-grown nuts.

The outward signs of damage by this pest are to be seen in all coconut areas by the ragged and tattered appearance of the mature leaves which are often badly notched (fig. 7). Sometimes the bases of the leaf-stalks are pierced with large holes, so that they often break off in high winds. These types of injury are the result of the earlier borings of the beetles into the young leaves and stalks while these are still closed up in the heart of the crown. Older palms may often show small permanent scars or holes on their trunks as the result of former injury by this pest.

The injury which this beetle causes *indirectly* is often more serious than the direct injury, since the wounds it makes in the crown may be attractive to egg-laying Red Weevils. The weevil grubs frequently kill young palms and cause serious injury to older palms as the indirect result of Black Beetle attacks. Apart from the danger of Red Weevil injury, unless the wounds

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made by the Black Beetle are promptly treated after the removal of the beetles, then either the wounds may become infected with bacteria or fungi, or secondary decay may set in during wet weather; in either case death of the growing bud may result.

LIFE-HISTORY AND HABITS

Beetles.—The beetle (fig. 1) is a rather large dark-brown to blackish insect, usually reddish brown underneath, with a horn projecting slightly backwards from the top of the head. This horn is usually larger in the male than in the female. The latter has a thick mat of reddish-brown hairs on the underside of the end of the body. The beetles are active about dusk, but during the day they are sometimes to be found boring into the crowns of palms, where they go to feed, hiding inside decaying palm stumps and logs, or buried in heaps of manure and other vegetable refuse where they may have recently emerged from their cocoons on whither they may have gone to lay their eggs.

Eggs.—The female beetles, after feeding and mating, deposit their eggs in almost any dead and decaying vegetable matter. A list of such breeding places is given later. Each egg or group of eggs is embedded in a lump of vegetable matter (Fig. 2) so that the young grubs, on hatching, will be provided with food. The eggs (Fig. 2) are whitish to creamy white, rather long oval when freshly laid, but gradually swelling to nearly double their original size before hatching. They take from 12 to 18 days to hatch at Peradeniya, but this period may possibly be shorter under the warmer conditions in the chief coconut districts.

Grubs.—The young grubs are whitish with pale brown heads and six legs (Fig. 3). They have mouth parts suitable for biting and chewing their food which consists of fairly soft decaying vegetable matter. This passes through the body, soon giving it a dark greyish colour, especially towards the hinder end. This darker colour of the grubs is especially noticeable when they are about half-grown (Fig. 4). The older grubs are able to chew up and consume harder and more woody material, such as decaying palm branches, logs and stumps. Full-grown grubs have a tough, rather leathery, whitish skin which is not so transparent as in younger grubs; the fine hairs covering the body give it a tawny appearance (Fig. 5). These grubs, before preparing to form their cocoons, assume a dull creamy, rather waxy appearance, stop feeding and become inactive, gradually expelling the undigested food from the body. This inactive stage occupies from about 1 to 3 weeks. The total grub stage usually lasts from about 3 to 4 months at Peradeniya, but may possibly be shorter in the coconut districts. It may take as long as 6 to 8 months if the conditions are not favourable.

Pupae.—The full-grown grubs form their pupal cells or cocoons in various places depending on the nature of their breeding ground, but usually avoid pupating in their food material, if possible. For instance, grubs which have been feeding in stumps and logs often hollow out their cells in the surrounding harder portions, but sometimes the cell is made of the chewed up coconut fibre in which they have been feeding. This material is cemented together to form a rather large, hard, oval hollow cell. Grubs which have fed in manure or refuse heaps, or in buried vegetable matter usually make their cells in the adjacent soil at least one foot below ground level. The grub, after constructing its pupal cell, gradually shrinks to

about two-thirds its former size, and changes into the pupal stage after moulting for the last time. The pupa is pale brown at first, but becomes rather darker and velvety in appearance later on. It somewhat resembles the beetle in size and shape, except that the legs and wing-sheaths are folded under the body (Fig. 6). The pupal stage lasts from about 6 to 9 weeks at Peradeniya, and this includes a period of about 2 to 3 weeks during which the emerged beetle remains in the cell before coming out to feed. Under field conditions elsewhere this total period may possibly be shorter.

Breeding Places.—The Black Beetle will lay its eggs in any place where there is decaying matter, either animal or vegetable, of sufficient bulk to attract the egg-laying females. The grubs, and sometimes other stages of this pest, are usually to be found in any heap or pit containing manure of cattle or other animals, town refuse, decaying palm droppings (except nuts), dead grass, paddy straw, old cacao pods, etc., but it is mainly in the lighter, rather sandy soils of the coastal districts that large accumulations of buried or mulched refuse of all kinds become dangerous breeding places. The beetles also breed freely in the dead and decaying stumps and logs of such palms as coconut, palmyrah, areca, etc., which have been killed by the Red Weevil grubs, by disease or by other agencies, such as cyclones, lightning, etc. Black Beetle grubs have also been found occasionally in dead and decaying stumps of old dadap and of jungle trees.

It may be mentioned here that the Black Beetle *is not known to breed to any dangerous extent* in any of the following materials unless these become mixed with any of the above-mentioned breeding materials: (1) mulched or buried coconut husks, (2) the main portions of coir refuse dumps, or (3) creeping leguminous cover crops or the leafy and less woody portions of bush green manure plants mulched or buried alone.

CONTROL MEASURES

Against the Beetles

The collection of beetles from the palm crowns is carried out on many estates as a routine measure, but is of little value if beetles are allowed to breed freely in any of the places listed above. The removal of the beetles, unless very carefully done, may cause further injury to the palms if the wounds are left untreated, since these soon become attractive to egg-laying Red Weevils. After the extraction of the beetles, all wounds should first be treated inside with tar or other disinfectant, and then filled in with a mixture of sand and tar which is then covered with a plug of clay.

Against the Grubs

Since the Black Beetle breeds wherever coconuts and other palms are grown either as an estate crop or in private compounds in towns and villages, it is essential that both estates and gardens should be kept as clean as possible. These sanitary measures involve the disposal of all previously mentioned kinds of refuse in such a way that they do not accumulate in large masses for more than one month at a time.

Palm logs used for fence posts, temporary bridges, building purposes, etc., should be first split up within two months after cutting.

On Estates.—On no account should estates with lighter rather sandy soils practise the mulching or burying *in bulk* of any of the usual materials known to breed Black Beetle. Cattle manure, town refuse and other mixtures of this type should not be buried in pits or trenches or mulched in large masses, but should be spread thinly and evenly over the soil and turned in at intervals so as to add humus to these sandy soils. Cattle manure, etc., which has to be kept for any length of time should be examined once a month and all stages of the beetle should be removed and destroyed. Palm branches, logs and stumps should be burnt if possible every two months, to be on the safe side, and the ash mixed in with the soil.

In order to compensate for this destruction of valuable humus it is recommended that leguminous green manure crops be grown in alternate rows between the palms and turned in to the soil at least once in every two years, the other rows being then similarly treated in their turn.

On inland estates with heavier soils, experiments should be tried to see whether various kinds of refuse can be buried or mulched in bulk with safety. This material should be buried under at least one foot of soil well pressed down. At the first signs of any breeding of Black Beetle this practice should be stopped and the refuse should in future be disposed of in the manner recommended for estates with lighter soils.

The addition of some poison to masses of buried manure or other refuse with the object of preventing the breeding of the beetle grubs or of killing grubs already there cannot be recommended at present, since the application of any suitable and effective poison would be likely to cause serious injury to palms manured with this poisoned refuse.

SUMMARY

The adults of the Rhinoceros or Black Beetle (*Oryctes rhinoceros*) cause direct injury to the crowns of coconuts and other palms by boring into the softer growing portions to feed on the juice flowing from the wounds. This damage only becomes evident later by the ragged appearance of the opened leaves. Wounds made by the Black Beetle, unless promptly treated, may attract egg-laying Red Weevils, the grubs of which can directly kill or seriously injure palms of all ages, but especially young palms, unless prompt treatment is given.

The Black Beetle does not breed in healthy palms, but goes back to any decaying refuse to lay its eggs for the breeding of the next generation. Therefore the regular destruction or proper disposal of all organic refuse of the types mentioned above will help to control this pest and prevent serious injury to the palms. Regular collections of Black Beetles in the crowns of palms is of little value if these beetles are to be allowed to breed unchecked in towns and villages and on estates.