THE CONTROL OF BLACK BEETLE (ORYCTES RHINOCEROS L.) IN COCONUT PALMS.

W. R. C. PAUL, B.A., M.Sc., D.I.C., DIP. AGRIC. (CANTAB.)
ACTING INSPECTOR FOR PLANT PESTS AND DISEASES, SOUTHERN DIVISION.

THE coconut palm in Ceylon is subject to the depredations of the rhinoceros or black beetle (*Oryctes rhinoceros* L.). The pest is widely prevalent though not commonly serious, but in young palms in particular the damage to the crown may result in considerable retardation in growth. In severe attacks much of the crown is destroyed and in rainy weather a decay of the bud tissues sets in which leads eventually to the death of the plant. With the decay of the bud the red weevil (*Rhyncophorus ferrugineus* F.), a more destructive pest of the palm, may be attracted to the crown, but the normal damage caused by black beetle in the crown is seldom followed by the entry of red weevil.

The attacks of black beetle are confined to the crowns of healthy palms of all ages, the beetle stage only being involved. Red weevil, on the other hand, centres its attention on the stems of young palms to which it gains an entry generally by laying its eggs in wounds or cracks in the stem or leaf bases. Black beetle enters the crown through the leaf sheaths and bores its way into the tissues of the immature leaves and stalks enveloping the central bud, but it rarely reaches the central bud itself. The beetles feed on the sap issuing from the wounded tissues and migrate elsewhere for purposes of breeding. The damage to the leaves is seen after they unfold; it consists of the characteristic notches and serrations on the leaflets while on the leaf bases irregular holes and scars may be noticed. The presence of a beetle within the crown may be detected by the protrusion, easily seen in a young palm, of pieces of fibre from the bases of the younger leaves.

Breeding does not take place in the living palm but occurs in a wide variety of sites such as rubbish heaps, organic manure piles and rotting portions of plants. The presence of moist, decaying vegetable matter is necessary as food for the developing grubs

but the amount of food required may be quite inappreciable as the grubs have been found to subsist in the loose earth of supply holes.

In the control of this pest, the measures resorted to are directed against the beetles in the palm and the grubs in their breeding sites. The collection of the beetles while feeding in the crowns is carried out by means of a probe inserted between the stalks of the unfolded leaves enveloping the crown. The probe may comprise a flexible rod or wire with a barbed end on which the intruding beetle is impaled. After extraction, the hole, made by the beetle and often enlarged by the use of the probe unless a considerable degree of skill is exercised in its use, is plugged with such material as a mixture of sand and tar. This is necessary to prevent the entry of other organisms and the incidence of decay following the penetration of rain. The method requires the individual treatment of attacked trees and in general only a single beetle can be removed from the crown of each infested tree. On an extended scale the method applicable to the young palm thus has the disadvantage of being laborious and expensive. In addition it offers no satisfactory control if breeding is allowed to continue unchecked in the vicinity.

Attention to the grubs in their breeding sites offers greater possibilities of control. Elimination of the common breeding sites will effect a considerable diminution in the incidence of the pest and general sanitation is of vital importance in this connection. Collections of decaying vegetable refuse which provide an attractive substratum for developing grubs require suitable disposal which depends to a large extent on the nature of the material, the soil, and other conditions.

With easily decomposable plant residues such as leaves and succulent stems in which cellulose is the chief constituent, the practice of burying accumulations is preferable to burning as it provides on decomposition a valuable food supply for plant growth. Burying should be carried out at a reasonable depth with a cover of several inches of soil to prevent egg-laying beetles finding their way below. The forking in of such material to ensure sparse and even admixture with the soil may also be carried out with advantage. The incorporation of vegetable matter with the soil is not always advisable and should only be carried out where conditions are favourable to the activity of the soil micro-organisms which are responsible for the decomposition changes that take place in plant residues. On heavy undrained land the burying of vegetable matter may lead to harmful results and toxic compounds may be liberated.

The burying of woody material and other parts of plants in which lignin is predominant is of little value as decomposition is slow and its products are not rendered readily available to the growing plant. It is more advantageous to burn such material and to use the ash as a source of potash for the plant. Such woody material as rotting stumps and logs affords excellent breeding sites for black beetle and the general prevalence of this pest in Ceylon may be ascribed in part to neglect to dispose of decaying palm stems. Breeding commences in the less mature tissues at the apex of the stem but in young palms the stem may be liable to immediate attack along its entire length. Except in dry districts the burning of coconut stems and boles is a difficult operation. Splitting of the stem from the apex downwards until the harder tissues are reached and allowing the segments to dry is sufficient protection against the presence of grubs of black beetle in the dead palm. The harder wood offers no immediate attraction to the pest and need not be dealt with until further decay takes place when it may also be split, but in young palms which have died the whole stem requires to be split. When the split parts have dried, they will no longer breed the pest but they should be burnt for their ash content. The process of splitting coconut stems and boles, however, may prove prohibitive in cost on a large scale, and, if burning is difficult, the deep burial in large pits of all dead parts should be carried out. The addition of lime will facilitate decay.

The leaf bases of the coconut palm also decay slowly and contain decomposition products which are useless for plant growth. When buried in trenches they may attract egg-laying beetles, but, as the leaf bases are easily burned, they should be severed from the leaves and destroyed. Coconut husks have proved useful as a mulch in trenches and they have not been found to harbour the grubs of black beetle.

In the selection of breeding sites, black beetle has been observed to show a marked degree of preference. This indicates the use of traps of the material preferred for breeding in and efforts to induce the beetles to lay their eggs in them. The traps should be examined at frequent intervals when the different stages of the pest may be easily collected and destroyed. In the Matara district experiments with various traps have been carried out for over two years by Mr. E. Nicollier on Charlvic Estate, Kekanadura. Traps composed of rubbish deposits, grass pits and piles, kitul (*Caryota urens* L.) stems in piles, etc., have been tested but most success has been obtained from the use of mounds of grass which are built up to a height of three or four feet and have a slight central depression to facilitate the collection and entry of rain water for keeping the mass moist. They should be examined at intervals of about ten to fourteen days and can be

used again and again until the decayed state of the grass no longer attracts the beetles. All stages of the pest can be collected in the grass heaps and the eggs which are laid in specially constructed cocoons may be found to the extent of as many as twelve in each. It is realised, however, that grass is not always available on estates but use may be made of other material. Piles of refuse are easily made and it is not difficult to keep them moist internally. Coconut logs split into two and piled up have also proved successful. If a careful examination of the traps is carried out at suitable intervals, the collections which may at first comprise all stages of the pest may later show a progressive reduction in numbers with eggs as the predominant stage. Systematic collection gives little opportunity for other stages to develop. On a large area a number of traps should be placed at different points; in this way considerable numbers of eggs and also of grubs and adults may be secured. The breeding of black beetle can thus be effectively checked and a satisfactory control of its ravages attained. The use of breeding traps would appear worthy of extensive application, particularly in young plantations where black beetle can cause serious damage.