## Entomological Notes.

# PLANTATION HYGIENE AND RHINOCEROS BEETLE (ORYCTES RHINOCEROS).

(Following is an extract from some notes written by the Government Entomologist, Mr. G. S. DUN, B.Sc.Agr., on "Plantation Hygiene and Rhinoceros Beetles").

In the past few decades a good deal of attention has been paid to evolving practical measures whereby the damage the pest does can be reduced to a minimum. In no case have any outstandingly successful results been achieved. Nevertheless, various procedures can be adopted which, if carried out thoroughly and continuously, will tend to reduce the incidence of beetle attack, particularly in the case of heavy and localised outbreaks.

It has been mentioned before that the damage to the palms is caused solely by the adult beetles. The larvae normally live and develop in palms only after they have been killed. Generally speaking, it can be assumed that eggs will be deposited and larvae develop in any medium which contains a reasonable amount of rotting vegetable material. This covers such a wide range of materials that it would be an evident impossibility to check the beetle entirely by eliminating all the available breeding grounds. There are, however, a number of obvious sites which should be removed, destroyed or avoided as a matter of standard plantation practice, since these provide foci from which concentrated attacks on nearby palms will develop. Certainly the adoption of all or some of the methods mentioned below have achieved an appreciable measure of success in countries where they have been carried out.

From observations which have been made locally in recent months, and from overseas experience, it is possible to list a number of media which are extensively used by beetles for egg-laying. These include—

1. Dying and dead coconut and other palms. These appear to be the most favoured breeding medium in the Territory. Virtually all dead palms harbour the beetle larvae at some stage of their decomposition whether they are left standing in the plantation or are used for building purposes.
2. Town or village refuse heaps.
3. Vegetable rubbish (Cacao pods, coffee pulp and husks, leaves, garden compost pits, rotting fruit, etc.)
4. Waste material from sawmills.
5. Rice husks.
6. Banana stools.
7. Decaying logs in recently cleared land or normal forest detritus on plantations which adjoin cleared land,

and many other media of vegetable origin. It is worth noting here that coconut husks do not appear to harbour the beetle larvae. It is advisable, nevertheless, to ensure that the husks are spread in an even layer rather than allowed to accumulate in heaps. By so doing, the possibility of encouraging a concentration of soil of high humus content below the pile is avoided.

It has been observed that any vegetable material that is allowed to accumulate is not immediately suitable for the beetle to breed in. The optimum stage of attractiveness is only reached some three months after it has been put down and the attractiveness remains only for 9 months to one year, by

which time full decomposition has normally been completed. This time factor then will allow vegetable accumulations to be disposed of over a considerable period, thus avoiding any marked disruption of normal plantation routine.

Another favoured breeding site, which, however, is at present of limited importance in the Territory, is on plantations where stock is run. Cattle sheds, night paddocks, manure pits, etc., will always develop a heavy infestation of Rhinoceros beetles in their immediate vicinity unless the dung is regularly turned and the grubs destroyed or it is treated with some soil insecticide like Clordane.

The treatment of the breeding sites, while not always a simple matter, is nevertheless strongly recommended as the only method available of lessening the severe local concentrations of the pest which are developing at a number of points in the affected parts of the Territory. Brief notes are given below on some ways of disposing of the main breeding sites.

**(a) Dead or Dying Palms.**

Every effort should be made to remove these continuously as a standard plantation practice. They appear to be the most favoured breeding sites available and each one is capable of supporting as many as 100 or more full-grown larvae. It is preferable to cut the palm out slightly below ground level. It is a standard practice in Samoa to cut them out at waist level and gouge out the cut surface so that it collects rain water and so becomes unsuitable as a breeding medium. This method is not advocated in the Territory as the moist stump appears to be a suitable breeding ground for the various species of Palm Weevils which invade any cut or damaged palm surfaces. Disposal of the trunk is necessarily rather laborious but it is useless to cut it down unless it is effectively disposed of. In areas where trenches, foxholes, etc., still abound, the trunk may be cut into suitable lengths and placed in these, provided always that the topmost layer is covered with at least 8 inches of humus-free soil (clay, sand or subsoil). Such a layer will effectively disguise any vegetable matter from adults seeking sites for egg-laying.

Disposal of the trunks by burning is often impracticable, particularly in areas of high rainfall. Under dry conditions they can be effectively burnt if care is given to stacking the cut and split lengths, making sure that sufficient air spaces are left to allow development of an adequate draught.

If the labour is available the trunks should be cut into 3-4 lengths and then split into four. If these sections are stacked so that only two lengths are in contact with the ground and the remainder criss-crossed above them, they will dry out too rapidly for them to become suitable breeding sites. (As these dry, a proportion of the lengths can be used as fuel for the copra drier). As a general practice the use of sound coconut trunks for constructional work such as bridges, driers, labour houses, etc., is not to be recommended. If there is no alternative, care should be taken to see that the cortex is removed and the trunk and both ends are treated with Creosote. Even then the posts should not be allowed to remain in use for a period longer than nine months. They should then be removed, destroyed and replaced with fresh ones.

**(b) Refuse Heaps.**

Town and village refuse heaps are not only excellent breeding grounds but are undesirable from a public health point of view. If at all possible, such rubbish should be incinerated. This operation should be complete or the unburnt residue will only form a further breeding centre.

**(c) Vegetable Rubbish.**

With the interplanting of Coconuts with Cacao, a standard practice in the Territory, the burial of broken pods beneath a layer of humus-free soil

becomes essential. The same applies, although to a lesser extent, to such items as Coffee pulp and husks, garden rubbish, etc., or some similar deterrent.

**(d) Refuse from Sawmills.**

These constitute a purely local problem as the mills usually are away from any concentration of coconuts. However, sawdust accumulations in town areas (e.g. Rabaul) could be equally as important a source of infestation as refuse heaps.

**(e) Rice Huskings.**

Again, such breeding sites are of little current importance in the Territory, but they are mentioned as a possible future breeding ground and as an example of the type of material which one can expect to become of importance at a later date. The same would apply to accumulations of detritus from fibre crops, such as Manila hemp, kenaf, etc.

**(f) Banana Stools.**

With its particularly vigorous growth locally, the Banana constitutes a two-fold attraction to the Rhinoceros Beetle. The adults feed rather readily in the growing plant, while the rapid breakdown of the plant after fruiting renders the ground in the immediate vicinity of the rotting stump a suitable site for egg-laying. Accordingly all available steps should be taken to eradicate bananas other than those in cultivation for food purposes.

**(g) Forest Refuse.**

This is a constant source of infestation about which little direct action can be taken. It is noticeable that heavy infestation often occurs on the edges of plantations which abut on uncleaned forest or recently felled bush. It is obvious that little can be done to avoid this source of infestation. The only palliative that can be suggested for this is the use of split coconut traps placed at intervals along the edge of the forested area. These can be made of 4-ft. lengths of coconut, split in half and laid in small groups with the split face to the ground. However, it is pointless using such traps if labour is not available to inspect them regularly and bring in the catch for destruction. The period between collections should be about six weeks but, if this is not possible, the inspections should not be left for a period greater than three months or they will defeat their object by becoming a breeding ground themselves.

The foregoing remarks have largely been confined to limiting the larval stage of the post. The adult is a rather more difficult stage to deal with and only two procedures can be advocated, viz., trapping and the examination of palms.

**(a) Traps.**

The usual larval trap of split lengths of coconut logs can be used against the adults as well as the larvae by instituting more frequent inspections. If this is done at fortnightly intervals a much larger proportion of adults will be caught.

**(b) Light Traps.**

This method has frequently been advocated but there is little evidence to show that it would be of any appreciable value on plantations. The adults have only a limited flight range (several hundred yards) and it would require a very powerful light to attract even the beetle population within a circle of this radius.

**(c) Examination of Palms.**

Under present day conditions, it is probable that this method would not be an economic procedure, except, perhaps for young palms between the ages of one to three years, when the major damage appears to take place. If a system

of examination is instituted it is quite essential to see that the entrance holes are blocked up whether they have been found to contain an adult or not. The adults return to freshly-made holes and will only be prevented from so doing by blocking them with some inert material such as clayey subsoil, a mixture of clay and kiln ashes, etc.

### (d) Collection of Adults.

The regular collection of adults among young palms was a rather regular practice in the Territory before the war, even before the entry of the Asiatic Rhinoceos beetle. With the advent of the latter, it is evident that the need for the collection of the adults is more urgent now. With regard to collecting, it should be pointed out that the beetles it is desired to catch are the two Rhinoceros Beetles, not the Elephant Beetle. The latter is a relatively unimportant pest of coconut but, being more accessible than its more important relatives, has a tendency to predominate in the daily catch. When caught, both larvae and adults make suitable fowl or pig food. However, it is as well to kill them prior to feeding them to stock as they will bury themselves rapidly in any loose soil they encounter and so escape before being eaten.

Unfortunately, no one of the palliatives which have been outlined above can be put forward as a certain cure for the Rhinoceros Beetle problem, particularly under present day conditions. However, by a judicious use of some or all of the methods, it should be possible to obviate the more severe effects which the beetle is capable of causing.

In conclusion, some mention should be made of a rather contentious point that is often raised, viz., the role of native plantings in fostering the Beetle and causing added infestation to plantations. The writer is inclined to think that their importance is greatly exaggerated. While it is not uncommon to see badly damaged village and self-sown palms, it is considered that, in effect, the general level of damage is less than on plantations where the palms are grown as a monoculture. It has been mentioned before that the adult beetle has a relatively limited flight range, a fact that would aid its increase on a plantation, and, at the same time, hinder its spread among scattered native plantings. Another point which is often overlooked is the importance of the village pig as a scavenger; it is probably the only effective predator operating in the Territory at the present time, and it is surprising the variety of situations from which it is capable of ousting the Rhinoceros Beetle larvae.