RED PALM WEEVIL - THE TISSUE BORER OF COCONUT PALM

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In recent years, red palm weevil *(Rhynchophorus ferrugineus* Fab.) has become a major concern to coconut plantations in India. As compared to the other pests of coconut, this "hidden enemy that strikes to kill from within" is the most dreadful because once the palm is attacked it succumbs within six to eight months if timely control measures are not adopted. Of late, this pest has assumed serious proportions in all major coconut growing tracts of India as it is found throughout the year taking a very heavy toll on the coconut crop. In this article information gathered on different aspects of management of this pest is furnished to equip the farmer to control the pest.

Host plants

This pest enjoys a wide host range. In addition to coconut, this is a major nuisance on date palms and sago palms. Besides, it infests other palms such as African oil palm, toddy palm, talipot palm, the sedang palm, the palmyra, the sugar palm, the royal palm etc.

Distribution and damage

R. ferrugineus and related species of the same genus are present in most of the important coconut growing countries of the world viz. Indonesia, Philippines, India, Sri Lanka, Malaysia etc. This pest has assumed a major threat to date palms in the Middle East countries recently. It's closely allied species namely *R. schach* is a predominant pest of coconut in Malaysia whereas *R. palmarum* acts as the vector of nematode causing red ring disease of coconut in West Indies. *R. papuanus* and *R.phoenicis* are the other two species found in South East Asia and Africa.

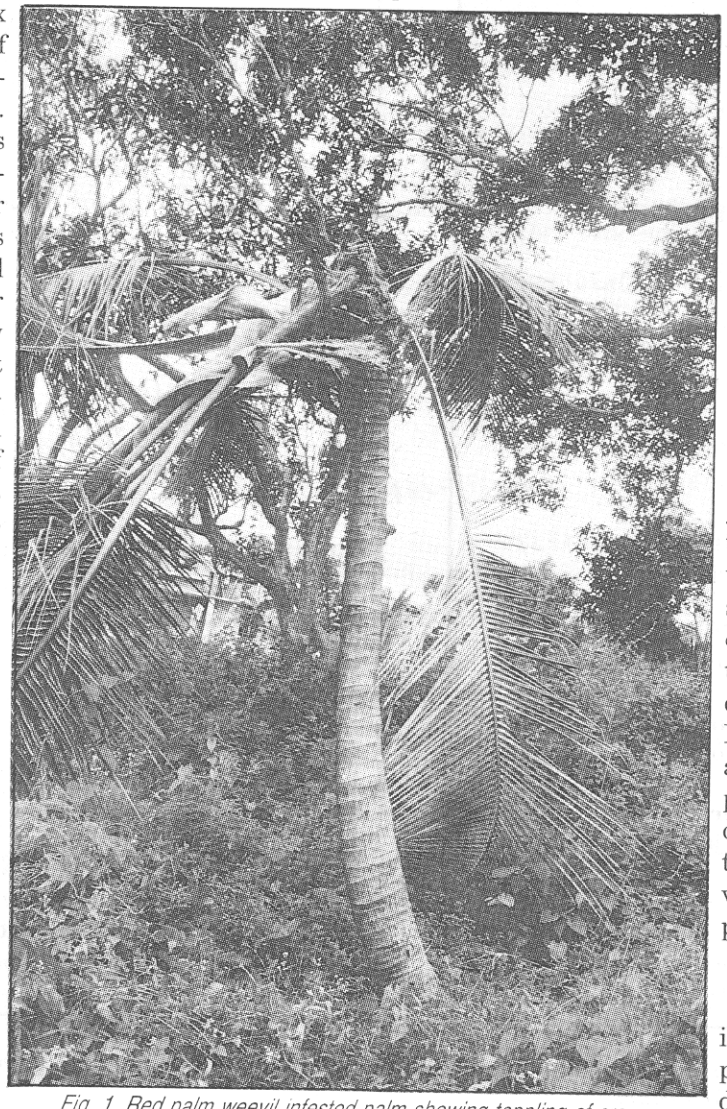

Fig. 1. Red palm weevil infested palm showing toppling of crown

The infestation by the weevil is more predominant in younger coconut plantations between the age group of 5 and 20 years. This is due to the soft and succulent nature of the stems of such palms which afford easy penetration by the pest. The weevil attacks the coconut in its prime youth by eating the tender soft tissues within by remaining safe and hidden and eventually resulting in the toppling of the crown portion *(Fig.1)*. It is estimated that about 5-10 per cent palms in the age group of 5-30 years are attacked by red palm weevil in different parts of Kerala.

Life Cycle

The pest completes its full life cycle on the palm itself with four distinct stages viz. egg,

grub, pupa and adult. Eggs are usually laid in fresh wounds or injuries on the coconut palm. The eggs hatch out in 2-3 days time into soft, white grubs. The legless (apodus) grubs bore into the interior of the palm by the peristaltic muscular contractions of the body. They feed voraciously on the inner soft succulent tissues and discard all fibrous materials. The larval period ranges between one and a half month to two and a half month. At the termination of the larval stage, the grub becomes yellowish brown measuring about four centimeters in length *(Fig.2)*. The body is distinctly curved bulging in the middle and slightly narrowing towards both head and tail portions. At the end of larval period, the grub makes elongated and oval cocoons made out of fibrous strands and pupate inside. The adult weevil emerges at the end of the pupation period which lasts for two to three weeks. The total biology from egg to adult takes about four months.

The adults are sombre reddish brown cylindrical weevils with a long curved and pointed snout or rostrum. The male weevils can be distinguished from the females by the presence of a turf of reddish brown hairs along the dorsal aspect of snout. Normally the newly hatched adults will remain in the pupal cocoons for a few days before they take off to new hosts.

Symptoms of Infestation

Generally, the pest infestation goes unnoticed and by the time the farmer recognises the problem, the growing point or cabbage of the palm might have been damaged. Hence, a thorough knowledge about the various symptoms manifested by the infested palms is very essential for timely detection of the pest infestation.

Infestation by red palm weevil is broadly of two types - through the crown and through the different parts of the stem including the leaf axil and the bole.

Rhinoceros beetle infestation on the spindle leaves or an incidence of fungal diseases like bud rot or leaf rot is followed by the attack of red palm weevil in many cases. Wilting or yellowing of inner leaves is invariably observed in such types of crown

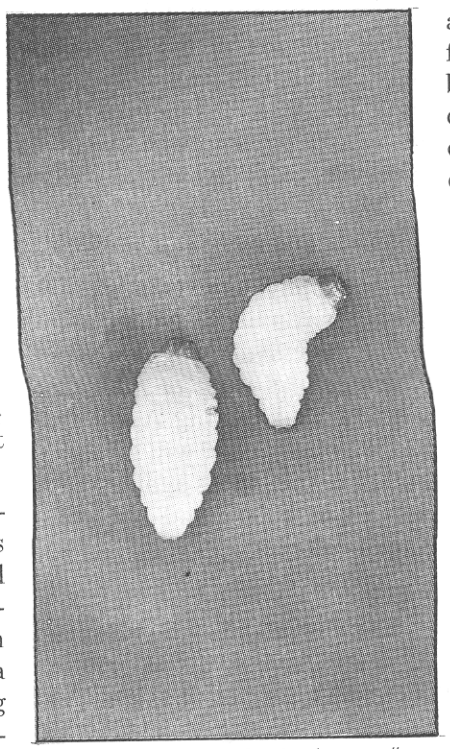

Fig. 2. Grubs of red palm weevil

entries. This is the most dangerous type of infestation as the growing point of the palm is damaged much earlier than in other types of infestations. This type, unless identified early can never be successfully treated.

As leaf axils offer soft and protected areas, they provide congenial sites for oviposition by the female weevils. Palms subjected to toddy tapping, steps cut on the tender stems for climbing purpose and broken or cut petioles also invite the adults as the exudating sap from them attract the weevils. In leaf axil entries, the green leaves may easily come off when pulled as the basal portions of such leaves have been eaten up by the tissue borer. Such leaves, when dry up and fall, the presence of small round holes about 2 cm in diameter can be located on the stem. Usually from these holes are seen exudation of a thick brownish viscous fluid and extrusion of chewed up and discarded fibres. The bases of attacked leaves sometimes split and extrusion of fibres is seen from these cracks. The total number of leaves on an infested palm decreases due to the early drying of the bottom whorls and delayed emergence of fresh ones. Presence of cocoons and weevils or chewed up fibres in leaf axils or at the bottom of the palm on the ground provides indication for the presence of the pest. The gnawing and nibbling sound produced by the grubs during feeding is easily audible in many cases. Injuries or cuts on the stem and bole portions happening through the cultural operations and implementations can also pave way for the weevil entry through these parts.

Management

Effective control of this pest through an integrated pest management approach is found to be quite feasible. Experiments conducted by CPCRI during 1970-82 at Karathikad village of Mavelikara taluk in Kerala State employing integrated pest control strategies against this pest was a success. At the initiation of the experiment seven per cent of the palms in the experimental area were showing weevil infestation. This could be reduced to zero level by the end of the experiment and the gardens could be maintained free of fresh infestation.

The important control measures to be adopted against this pest are described below:

1. Sanitation/Cultural:

The crown of the palms should be kept clean and tidy. Palms showing rhinoceros beetle damage and bud rot and leaf rot diseases should be properly treated. The practice of making steps on the stem should be discouraged. Whenever leaves are cut from the palm, they should be cut leaving behind a length of 120 cm from the base. This is to ensure that even if the cut petiole attract the weevils from ovi-position, the emerging grubs would not reach the main stem as the petioles will dry up and fall within two months. Coconut palms or any other host plants destroyed by the pest should be cut and split into small pieces so as to expose and destroy the various stages of the pest inside the palm. The discarded plant parts are to be burnt alongwith the dried rubbish collected from the plantations. It has often been observed in many gardens that the dead palm trunks are retained as such or only the crown portion is removed. In many cases farmers burn the dead palm trunks in their standing position without cutting/splitting. Often what happens in such cases is that the burning affects only the peripheral tissues of the trunk and the various stages of the pest lodged inside the palm are not killed and they act as breeding grounds and further dissemination sites. Care should be taken to see that uninfected palms especially those between the age group of 5 and 30 years that are cut for different purposes should be properly disposed off because these fallen and cut stems facilitate the profuse breeding of the weevil.

Trapping:

Trapping and killing adult weevils help to reduce weevil population in an area. Tender coconut logs of 50 cm length split longitudinally and the cut surfaces smeared with fresh toddy fermented with yeast or acetic acid can be used as effective attractant materials. The split halves should be kept one above the other so that their toddy treated surfaces face each other. Five to six such traps can be set up in a garden of 1 ha area at dusk and the attracted weevils can be caught and killed next day morning. Fermented toddy is prepared by addition of 5g yeast or 5ml acetic acid to 1000ml toddy.

Prophylactic:

A prophylactic treatment of filling leaf axils of young palms with a mixture of 25g sevidol 8G granules and 200g of fine sand thrice a year during April, August and December will give protection to the palms against both rhinoceros beetle and red palm weevil infestation.

Curative - Chemical method:

The weevil infested palms can be saved by the administration of Endosulfan at 0.1 per cent concentration or carbaryl (Sevin) at 1 per cent concentration to the palms. These two insecticides were found to be highly effective against the pest and as they are contact insecticides, they do not leave any residues on the crop. To prepare 0.1 per cent and 1 per cent concentration of the above insecticides, mix 3 ml Endosulfan or 20 gms of Carbaryl in 1 litre of water. Normally 1-1.5 litres of the insecticide suspension is required for treating one palm.

Plug all the holes on the stem with mortar or cement and allow it to set. Then locate the portion of serious attack and make a hole just above that region with the help of an auger. The direction of the auger should be slanting. Then insert the nozzle or spout of the funnel into the hole and gradually pour the insecticide suspension. Retain the funnel in this position until the required fluid percolates into the infested palm. In cases where the inside portion is largely eaten away by the grubs, the fluid will rush in. Otherwise percolation will be slow and gradual. Injection at two or three different points around the stem is necessary in order to ensure that the chemical reaches all the grubs and adults present in the ramifying tunnels produced by the feeding habits of the grubs.

If the point of entry of the weevil is from the top of the crown, clean the infested area above the growing point, taking care not to injure the cabbage. Then pour the insecticide solution slowly over it. In this case, there is no need for injection.

Recent investigations at Simon Fraser University, Canada could bring out an aggregating pheromone that could attract the weevils in very good numbers. Evaluation tests on the effectiveness of this chemical conducted at different countries have yielded promising results. Preliminary studies carried out at CPCRI employing the above pheromone revealed the attractiveness of this chemical in trapping adult weevils in fairly good numbers. Large scale field studies on the use of the pheromone lures in the management of the pest are planned at CPCRI. We hope that this may turn out to be a promosing tool for the suppression of the pest in nature.