FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

ORGANISATION DES NATIONS UNIES POUR L'ALIMENTATION ET L'AGRICULTURE

ORGANIZACION DE LAS NACIONES UNIDAS PARA LA AGRICULTURA Y LA ALIMENTACION

AGP:CNP/75/21

May 1975

Pests and Diseases

Fourth Session of the FAO Technical Working Party on Coconut Production, Protection and Processing

Kingston, Jamaica 14 - 25 September 1975

AN INTEGRATED APPROACH TO THE CONTROL OF RHYNCHOPHORUS FERRUGINEUS F. THE RED WEEVIL OF COCONUT PALM

by

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Red weevil Rhynchophorus ferrugineus F. is the most dangerous pest of cocoonut palm in India and Sri Lanka. Its related species R. sahach oliv. and R. palmarum are equally important pests in Malaysia and West Indies and the latter is causing the spread of the red ring disease of cocoonut, which is caused by the nematode Rhadinaphelenchus cocophilus. R. papuanus and R. phoenicis are the other two species found in South-east Asia and Africa. Thus this weevil is a menace to the crop in all cocoonut growing tracts of the world. Besides cocoonut they also damage most of the palmaceous plants (Lever 1969).

Grubs of R. ferrugineus tunnel inside the palm and feed on the soft portions, especially, the 'heart', resulting in the death of the infested palm. If timely curative chemical control measures are not adopted the death of the victim is almost sure. Usually palms below the age of 20 are preferred by the pest.

The pest being a tissue borer and due to the concealed nature and tallness of the host plants most of the infestations go unnoticed and when detected majority of the trees will be beyond recovery, resulting in the eventual death or the infested palms. Hence eventhough there are very effective and sure methods of curative chemical control, saving the infested palms from death becomes very difficult. Even if the palm is saved by insecticidal treatment, the palm will take few years to regain the normal vigour and this causes loss in yield. Coconut palm being a single budded plant, if the growing point is damaged, insecticidal curative treatment will be of no avail. Because of these limitations it is not advisable to depend only on curative control measures. This pest can better be kept under check by integration of all the known methods of weevil control. A brief account of the hitherto known methods of red weevil control and possibility of its integration is dealt below.

Symptomatology and Surveillance

Sustained surveillance on infestation of the pest is an absolute must. Periodical examination of palm under the susceptible age group will help in detecting infestation in its early stage. Being a concealed tissue borer a clear knowledge of symptoms of infestation is essential in the timely control of the pest.(Kurian and Mathen, 1965).

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According to Abraham et.al. (1966) the symptoms include wilting or yellowing of inner leaves, characteristic odour emitted from the rotting crown, easy coming off of the green leaves when handled, presence of small round holes on the stem, extruding of chewed up coconut fibres, oozing out ofa brown fluid from the holes on the stem, longitudinal splitting of leaf base, presence of cocoon/weevil or pupal fibres or chewed up fibres in the leaf axils or base of the palms and gnawing sound produced by the feeding grubs and ultimately the toppling of the crown.

Methods of control

1. Sanitational

Dead palms or palms beyond recovery may harbour the pest and serve as a source for further spread. Coconut logs and stumps may provide facility for breeding of Oryctes. Attack of Oryctes generally paves the way for entry of red palm weevil into young palms. Hence, removal of dead trees destruction of logs and stumps and disposal of breeding sources of Oryctes are essential pre-requisites for weevil control.

2. Mechanical

a) Dead trees are to be split open exposing the different stages of the pest present inside and the debris including the cut logs and crowns are to be burned.

b) Trapping the adults

Trapping the adults and destroying them is another method by which pest population can be brought down. Another use of trapping the adults is to detect the presence of pest in a garden as also to assess the population. Various types of traps are in practice in different parts of the world. Maharaj (1973) designed a metal trap for collection of adults in Trinidad. He found that this trap is better in efficacy and cheaper than log traps. The same was put to test in Sri Lanka and found useful.

(1) However, log traps gave better results as compared to metal traps when put to test in India.

Haglay (1965) reported that a mixture of malt extract skatole and iso-amyl acetate is a good attractant to adult weevils of R. palmarum. Field studies made at Kayangulam (India) using the above combination and set in traps designed in India in comparison with cocoonut toddy applied in splits of cocoonut logs revealed that adults of R. ferrugineus are rarely found attracted to the chemical combination but log + toddy trap proved much more effective. Tender stem 1 m long, split longitudinally into two equal halves and treated at the cut surfaces with fresh toddy, and split pieces kept in a position one above the other are used as log traps.

(2)

3. Biological

(3) No effective parasite or predator which can be employed for the biological control of the pest has been recorded from India so far. However, a few of them which can be employed in an integrated control programme are cited here. A pymotide mite Tetrapolypus rhynchophori Ewing has been recorded as a predator in Western Tropics (Kurian, 1963). A earwig Chelisoches moris F is commonly met with on the crowns of coconut palms infested by red palm weevil in India. On an average of one earwig in its life period consumed, under laboratory conditions, as many as 662 eggs or 633 early instar grubs of the pest (Abraham and Kurian 1972). The reduviid bug Platymeris laevicolis an exotic predator on oryctes adults imported from Zanzibar into India is found feeding well on the grubs and adults of the weevil under laboratory conditions.

4. Chemical

a) Prophylactic

The wounds produced on palms due to cutting of steps for easy climbing, attack of rhinoceros beetle, bud rot, etc. are favourite sites of oviposition by the female weevils. Abraham (1971) found treatment of such wounds with BHC or Coaltar + BHC as an effective measure to prevent red palm weevil entry to palms through wounds.

Another way of causing injury to the palm is by cutting the green leaves of the palm for various uses. Grubs emerging from eggs laid at the cut ends will tunnel towards the stem and gain entry into the interior as long as the petiole remain green. Abraham and Kurian (1971) found that if leaves are cut at 120 cm away from the leaf base, 75 percent of pest entry through cut ends of leaves can be avoided.

Adult weevils hide during day time in the leaf axils and eggs are also laid in the leaf axils. Mathen and Kurian (1966) recommended filling of leaf axils of young palms with 5 percent BHC/Chlordane plus a sand mixture as a prophylactic measure of control.

b) Curative

Once infestation is detected in a palm, curative measures have to be adopted. Nirula (1956) advocated the administration of 1 percent solution of Pyrethrins - piperonyl-butoxide (Pyrocon-E) into the affected part of the palm. Kurian and Antony (1957) gave details of administration of this chemical. After clearing the infested tree plug the holes on the stem with cement and drill an artificial hole on the tree trunk just above the affected portions in a standing position to a depth of 15 cm by the help of an augor. Keep the funnel like injector in the hole and pour the insecticide suspension into the injector. Insecticide will slowly percolate into the hole and come in contact with the pest inside. It has been practical experience that the chemical suspension should be administered through two or three different points around the stem in order to ensure that the contact poison reaches all the grubs and adults of the pest present in ramifying chambers within. Demonstration of the injection process as a curative method of control to ryots form part of the activities of the CPCRI and Agricultural Department in the various coconut grown states in India (Kurian and Mathen 1968). A similar method of pouring diluted Metasystox into a hole, about 5 cm deep, drilled in the trunk just above the injury is practised in Sri Lanka.

Kurian and Mathen (1965) and Mathen and Kurian (1967) found carbaryl 1 percent (Sevin) as good as Pyrocon-E in action but cheaper. Abraham et al. (1975) reported a still cheaper and effective chemical viz. trichlorphon 0.2 percent. Subbarao et al. (1972) recommended phostoxin tabulates because of its fumigant action.

5. Autocidal

Autocidal control is one among the modern and sophisticated of the techniques employed in the field of pest control. Release of large numbers of sterilized males into the pest infested area to compete with the natural male population and thereby giving greater chance to the females to copulate with the sterilized ones results in the decrease of pest population in the future generation. Bhabha Atomic Research Centre, Trombay has worked out the dose for sterilizing red palm weevil adult males, as 1500 rads of gamma rays. A preliminary experiment was in progress at Kayangulam (India) in collaboration with BARC to test the efficacy of this technique in the control of red palm weevil infestation. A 400 ha area comprising nearly 20 000 young palms with 6.4 percent of the palm infesting the pest was selected. Tagged male weevils were liberated in the area and with the aid of 'log + todd' trap recapturing from the total population was done. Based on the results the field population was assessed and sterilized males were released in

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the centre of the experimental area follow up studies made with females collected from the experimental area showed that viability of eggs laid by them was only 70 percent as against 95.74 percent for the eggs laid by females collected from other areas. This decrease in the viability of eggs laid by the females collected from the experimental area is the result of sterile male release. (Annual report of CPCRI 1974).

This sophisticated method will definitely prove more affective and complementary if it is employed in a larger area, after reducing the pest population by implementing all the other known and proved conventional methods mentioned earlier in the paper.

Thus an integrated pest management, involving mechanical, chemical, prophylactic and curative, biological viz. exploitation of biological control agents indigenous and exotic and utilization of sterile male technique, would appear to be the ideal solution for protecting the crop from the ravages of this deadly enemy.

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