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INTEGRATED PEST MANAGEMENT OF COCONUT RHINOCEROS BEETLE *ORYCTES RHINOCEROS L* (DYNASTIDAE: COLEOPTERA)

Amogha and Mukesh Indliya

Department of Entomology, College of Agriculture
Rani Lakshmi Bai Central Agricultural University, Jhansi, UP
Corresponding authors mail id: amoghamonappagowda09@gmail.com

Introduction

Coconut (*Cocos nucifera*) is a member of palm tree family Aracaceae. It is originated in Indonesia. It is widely distributed in tropical regions of the world, ranging between 20°N and 20°S latitude. The major three coconut producing countries are Indonesia, Philippines and followed by India. In India, top three coconut producing states are Kerala, Karnataka and Andhra pradesh respectively. Coconut is prominent crop in India with area 21 lakh hactres, production is 21,288.24 million nuts and productivity is 9897nuts/hactre (CDB, 2018-19). Coconut is often referred as 'tree of life' because of its wide range of uses(Jalani et al., 2003). Not only fruit, every part of tree including leaves, flowers and trunks are also useful. Coconut is major crop in southern states of India because of its commercial purposes and home uses.

But major threat for coconut crop is pest and diseases. The coconut crop is being attacked by 830 insects and mites species, 173 fungi and 78 species of nematodes attack the palm during different phases of growth and incur substantial crop loss (CPCRI, 1979). Among various insect pests rhinoceros beetle (*Oryctes rhinoceros L*) is the major pest distributed widely in all coconut growing tract.

The adult beetle cause serious damage by boring into spindle leaves and spathe causing characteristic 'v' shaped geometric cuts on leaves and oblong shaped holes on spathes(Rajan et al., 2010). Frequent infestation results in stunting of trees and death of growing point in young plantations. The infestation can be easily made out by the chewed fibrous material present near holes. The damage made by this pest provides egg laying site for another lethal pest viz., red palm weevil and entry for fungal pathogen. The grub breeds in the manure pits, compost, cattle dung and dead and decaying palm.



Figure 1: Characteristic 'V' shaped geometric cuts on leaves

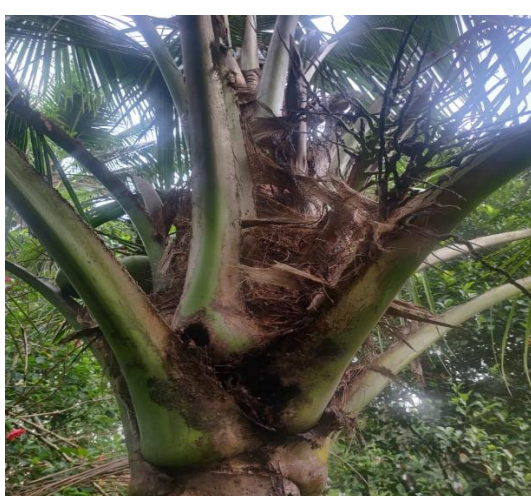


Figure 2: bore holes near crown region

Integrated pest management

IPM is a pest population management system that utilizes all suitable techniques and methods in as compatible manner as possible and maintains the pest populations at levels below those causing economic injury level (FAO, 1972). And main components of this IPM are cultural control, mechanical control, biological control and chemical control. The chemical control always must be the last strategy.

Cultural control:

- Decaying trunk of trees in the coconut gardens should be burnt as they serve as breeding ground.

Mechanical control:

- At the time of peak infestation (June-sept) beetles should be extracted from the crown region with the help of iron hook. And holes has to be filled with a mixture of sand + mancozeb at 3g/kg.
- Setting up of light traps are recommended.
- Installation of pheromone traps for monitoring and mass trapping @20/ha.

Biological control:

- The potential breeding sites like manure pits are treated with fungus *Metarrhizium anisopliae* which are effective against grub stage causes disease called as green muscardine disease.
- Release 10-15 beetles inoculated with Oryctes virus in 1 hactre of garden.
- Release natural enemy *Platymeris laevicollis* against rhinoceros beetle.
- Castor cake at 1kg is soaked in water in small mud pots and when kept in coconut garden attracts beetle. Slurry should be changed once in a month.

Chemical control:

- Treat the manure pits with carbaryl dust 0.1% solution at least once in 3 months.
- Mixture of sand + carbaryl dust in equal proportion should be filled in the axils of innermost 2-3 leaves on the crown twice a year during pre and post monsoon periods.
- Beetles should be trapped with a attractive breeding materials treated with diflubenzuron 0.025%.

Conclusion

Coconut is one of the prominent crop of India which contributes 27,900 crore to the country's GDP in 2018. Due to attack of pest and improper management of crop leads to the loss of crop. Rhinoceros beetle is one of the major pest of coconut and the control of this pest is must. In India, the pest control strategy was more oriented towards chemical control. Due to increased awareness on side effects of indiscriminate use of chemical pesticides had made the IPM the need of present era. IPM is holistic approach aimed to minimize pest impact and to maintain the integrity of ecosystem. And for effective result management strategies should be followed in a larger area through community based pest management approaches (Srinivasan et al., 2018).