

Management of rhinoceros beetle

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Coconut is a versatile crop that provides livelihood security to more than 12 million people in our country. Widespread prevalence of old and senile coconut palms coupled with low level of adoption of scientific management practices along with bad agricultural practices followed have been bottlenecks hindering coconut productivity. In order to tide over this issue, rejuvenation of coconut in seven districts of Kerala was initiated through planting of high yielding and pest tolerant varieties by farmers after removal of senile and disease advanced palms. Though value addition in coconut is being given a greater impetus at this point of time, its influence would be better realized only if the palm health is well maintained to maximize the yield. Palm health management is the key for successful establishment and maintenance of coconut gardens. Farmers who had resorted to large-scale planting of coconut seedlings especially dwarf or hybrids in the main field are facing severe problems with failure in seedling establishment in certain cases. Failure rate from several gardens has been reported as high as 40-45% in the establishment of coconut seedlings. This calls for deeper introspection to understand and suggest remedial measures to combat the problems. Studies conducted at ICAR-CPCRI revealed that entry of rhinoceros beetle (*Oryctes rhinoceros* Linn.) through collar region of the coconut seedlings and eating away the growing spindle was the main cause for this malady. The major factors associated with this attack are: dumping of waste around the coconut garden attracting



Rhinoceros beetle entering into the crown



Elephant tusk like symptoms due to beetle attack

the beetles for egg laying because adult beetles prefer decaying organic manure for egg laying and planting seedlings in closer spacing or shady

condition. Planting coconut seedlings with deficit light and space would diffuse volatile in favour of the pest orientating towards seedlings.

Waste dumping

Solid waste disposal including organic debris has become a concern as improper farm hygiene is one of the reasons for attracting gravid female adult beetles for egg laying. Farmers are hence advised not to accumulate organic debris and other solid wastes which could orient the weevil into the garden. Care should be taken not to mulch the coconut seedlings with coconut leaves as the decaying leaves also attract the beetles for feeding on coconut seedlings.

Light and space deficit

One major issue that received less attention in coconut rejuvenation programme is the high density mode of new planting with spacing less than 7 x 7 m. Such close spacing will induce large quantum of volatile cue attracting the beetles for feeding. Insufficient light will also disorient the growing spindle in search of light leading to etiolation. Denying light to a growing palm is equal to denying life to palms as the photosynthetic



Sideward emergence of spindle

efficiency is drastically reduced leading to weakening of seedlings. Usually closer planting will induce microclimate favourable for higher incidence of rhinoceros beetle attack and other diseases as well. Care should be taken for correct spacing in the planting of seedlings (Tall and hybrids 7.5 x 7.5 m; Dwarfs 7 x 7 m).

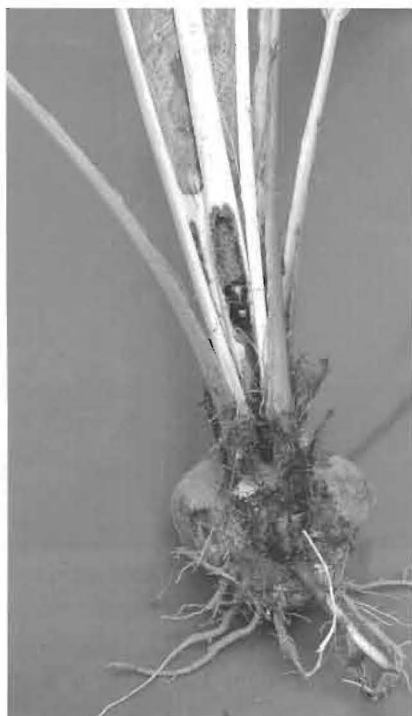
Rhinoceros beetle was hitherto mainly reported as a pest feeding on the growing spindle in juvenile palms or boring on to the inflorescence in yielding palms leading to inflorescence drying. Of late, this unique way of attacking coconut seedlings through entry from collar region leading to drying of seedlings is on the rise baffling the coconut community involved in the rejuvenation programme. Under such circumstances, the growing spindle gets twisted and resulting in elephant-tusk like symptom. In many cases, farmers uproot such seedlings / juvenile palms as the growing point gets twisted and stunted. Damage by rhinoceros beetle is sometimes fatal and the growth of the seedlings get affected leading to improper establishment in the main field. Recurrent beetle attack on the same seedling is often

noticed due to the emanation of odour in the healing process of the injured portions. There are also reports on the likely transmission of disease causing pathogen by rhinoceros beetle during the feeding process. This is yet another reason for the improper establishment of seedlings if proper care is not taken on the affected feeding part.

A sequence of good agricultural practices right from making pits of proper dimension (1 x 1 x 1 m), correct mode of planting, removal of old and damaged rootlets at the time of planting, providing adequate light and space in synergy with timely after care, agronomic operations such as watering, nutrient application etc at each critical stage ensures good establishment. Ensuring adequate shade to seedlings through coconut leaves during the initial phase of establishment is most essential to withstand the scorching summer hotness.

The pest and damage symptoms

Adult beetles attack coconut seedlings through entry from collar region causing wilting of seedlings. In addition to spindle damage on



Beetle thriving inside seedling



Stunted seedling

juvenile palms it paves way for the entry of red palm weevil and inflorescence drying by boring into the base of the inflorescence. Coconut seedlings up to 1.5-2.0 years old are severely affected by the beetle attack quite specifically during June-September period. Extruded frass or chewed up fibres

would be the characteristic visible diagnostic feature. Adult beetles are ubiquitous and lay eggs on the decaying organic debris. The grubs and pupae are confined within the debris and the adult beetle emerges out from manure pit and orient towards coconut palms / seedling for feeding.

Management strategies

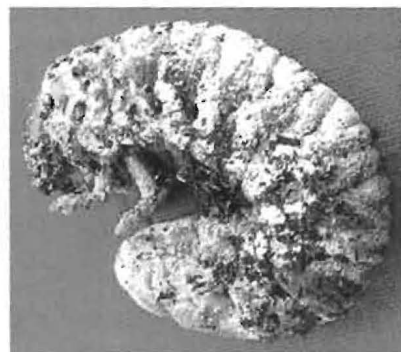
Obtain seedlings from accredited nurseries such as ICAR-CPCRI, KAU, CDB etc. Planting weak seedlings which fail to establish in most cases leads to enhanced pest attack. Never mulch the seedlings with coconut leaves during initial phase of establishment and planting two turmeric rhizomes, on either side of the seedlings is found to reduce pest attack. Planting at correct spacing (Talls and hybrids 7.5 x 7.5 m; Dwarfs 7 x 7 m) with adequate light for judicious release of volatile cues to reduce attack. Denser planting will lead to more pest attack. Regularly monitor and look out for any damage on the spindle region of the seedlings or at collar region. Hook out the beetle if any chewed up fibre is noticed on the collar region or any leaf axils. Fill up top most leaf axils with 100 g neem cake/ maroti cake / pongamia cake along with equal volume of sand in seedlings. The quantity of leaf axil filling should be increased to 250 g after three years. Placement of two napahtalene balls on top-most two

leaf axils to repel the pest Placement of two perforated sachets containing chlorantraniliprole (3 g) or fipronil (3 g) was found effective during monsoon phase. During dry period, 100 ml of water may be poured over the sachet after placement to release the molecule. Incorporation of weed, *Clerodendron infortunatum* on the manure pits has induced larval-pupal abnormalities affecting normal development of adult beetle through hormonal interferences. ICAR-CPCRI has developed a low-cost farmer-friendly approach of application of an entomopathogenic green muscardine fungus, *Metarhizium anisopliae* on the breeding pits @ 5 x 10¹¹ spores / m³ for the effective suppression of immature stages of the pest. Currently, *M. anisopliae* is multiplied on semi-cooked rice-based media for field application in organic manure as well as vermicompost pits @ 100 g per cubic metre. This technology through farmer-participatory and women group approach has created a great impact on the long-term bio-suppression of the pest in community-mode.

Integrating these technologies with holistic care at the initial stage of planting coconut will definitely result in good establishment and development of seedlings. Care to cheer with coconut is thus a reality for infusing bio-happiness in coconut farming. ■



Insecticide sachets

*M. anisopliae* infected grub*M. anisopliae* in semi-cooked rice