

# A novel technique to guard juvenile palms from rhinoceros beetle attack

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*Rhinoceros beetle, Oryctes rhinoceros* Linn. (Coleoptera: Scarabaeidae) is a major pest of the coconut palms. Adult beetles damage the unopened spear leaves, spathes and inflorescences and chewed up tissues as fibers are seen intruding from the entry points. The damaged fronds show characteristic V- or wedge-shaped cuts as they unfold (Fig 1& 2). Repeated attack by this black beetle causes stunted growth of the palms and occasionally, palm death could also happen at severe infestation. Besides the injury due to direct feeding damage, the bore holes serve as entry points for the lethal pests and pathogens like red palm weevil and fungi causing bud rot, respectively. Seedlings and juvenile palms (of 3 - 4 years old) are highly susceptible to the rhinoceros beetle attack than the tall palms (Fig. 3). Twisting of the spear leaves, stunted growth and improper establishment of seedlings was observed in the field conditions when the seedlings get severe beetle attack in the initial stages of its growth (Fig. 4).

Although *O. rhinoceros* is persistently active and reproductive throughout the year, its detection is often cumbersome due to its nocturnal habit and cryptic nature of residence within the palms. Damage monitoring is possible only by visual inspection of symptoms developed in the host palms.

Integrated Pest Management (IPM) for rhinoceros beetle comprises of a series of phyto – sanitary, preventive and curative methods. However, major constraints for non-adoption of IPM practices include high labour cost, low produce cost, uneconomical land holding size and lack of technical knowhow among farmers. Currently, management of rhinoceros beetle in palms is either non – existent especially with farmers of small land holdings or by growers who rely greatly on insecticide application in larger areas. Due to awareness of adverse effects on human health, unavailability of skilled personnel



Fig 1 Rhinoceros beetle



Fig 2. Damage symptoms of Rhinoceros beetle

for adopting timely management practices and non-feasibility of adopting various strategies in homestead gardens and small and marginal hold farmers warrants an alternative strategy.

In IPM programs, physical control methods aim at limiting the pest access to plant parts or to induce behavioral changes, or to cause direct pest damage/death. Exclusion nets are commonly used as safer physical pest control tool in many agricultural and horticultural crops because of its easy – to - use and eco - friendly attributes. It acts as a barrier for the insect pests to attack the crop. In order to



Fig 3 Severity of beetle attack in seedlings and juvenile palms



Fig 4 Improper growth and spear leaf twisting



Fig 5. Loosely wrapping spear leaf with adjacent leaf base



Fig. 6 Beetles entrapped in the nylon net mesh

protect the growing tips of seedlings and juvenile palms from beetle attack, an experiment was carried out on the effect of nylon nets as a pest exclusion barrier technique at ICAR – Central Plantation Crops Research Institute, Kasaragod, Kerala, India (12°30' N, 75°00' E and 10.7 m) during 2017 - 2018, wherein 1 meter length of nylon net / fish net (3.2 x 3.2 cm) was used to loosely wrap the unopened spindle leaf along with 2 - 4 topmost adjacent leaf base of each palm in a circular fashion (Fig. 5).

The study results indicated that loose wrapping of unopened spear leaf with adjacent leaf base with nylon nets had significantly reduced the per cent leaf damage due to beetle attack in juvenile palms by 64 % during 2017- 2018. In contrast, in the control plot, the damage was increased by 27 % from the pre treatment. As an indirect effect, it was also observed that adult beetles (more than 700 numbers) were entangled in the mesh of the nylon nets of what was tested which was indeed an unexpected result of the experiment which provided benefit by trapping adult beetle population in the open fields (Fig. 6). So, the use of nylon nets as pest exclusion barrier not only restricted the pest entry but also acted as a passive trapping mechanism. It was noticed that the implementation of this technique did not affect any of the crop physiological activities as the net material used was of coarse and clear type. Further loose wrapping of nylon nets allowed to open and remove the entangled beetles at regular intervals. The study has demonstrated the use of locally available nylon nets as physical barrier could be a less expensive alternative practice against rhinoceros beetle in young palms. These types of exclusion systems can be deployed rapidly especially in the organic farming system as well as in the small and marginal gardens and forms sustainable way to manage the pest by reducing the need for pesticides. ■