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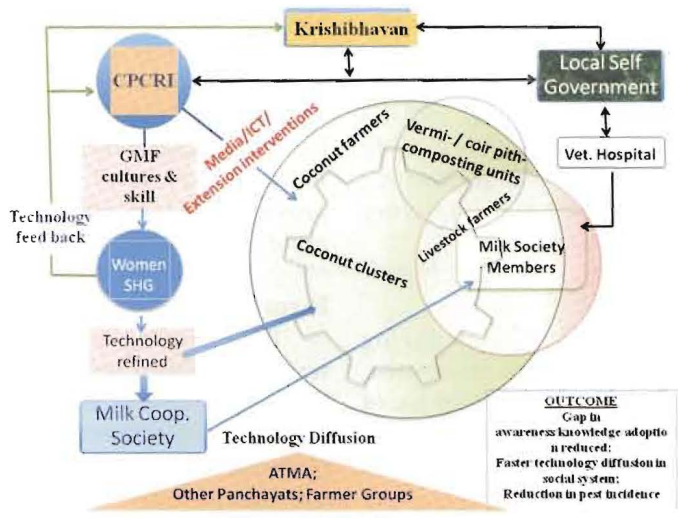
Through Area-Wide Farmers' Participatory Approach...

Managing coconut rhinoceros beetle

The *Oryctes rhinoceros* (L.), popularly known as black beetle, is major pest of coconut in all coconut-growing states. This pest affects different stages of growth, *viz.* coconut seedlings, juveniles and adult bearing palms. Severe infestation of young plants leads to reduction in growth, sometimes, even loss of plants in the field. It can also induce considerable yield reduction by the damage inflicted in unopened bunches in bearing palms. The typical symptoms are geometrical V-shaped cuttings in opened coconut fronds. In some cases, toppling of spindle leaves also can be noticed. In many coconut gardens, 25-40 per cent of total palms could be found to be showing rhinoceros beetle infestation symptoms. Hence, the yield reduction is considerable in a given area, which warrants adoption of management technologies. Attack by the beetle could act as a predisposing factor for subsequent attack of red palm weevil and complete death of palm. Though many management practices including biocontrol approaches are recommended, there is only very low level of awareness and adoption regarding biocontrol agents against black beetle. In order to overcome this lacuna, area-wide farmer participatory community based initiative has been taken up by Central Plantation Crops Research Institute, Regional Station, Kayamkulam.

COCONUT, a perennial multipurpose tree crop, is being cultivated mostly by small and marginal farmers in the country. India is one of the major producers of coconuts with the highest productivity among the major coconut-growing countries of the world. Coconut is cultivated in 18 states of India with maximum area and production in Kerala, Karnataka, Tamil Nadu, Telengana and Andhra Pradesh. It is estimated that the demand for coconut is expected to be 21,795 million nuts by 2025, while the supply is expected to be only 15,734 million nuts, indicating a gap of 6,061 million nuts. As there is no scope for increasing area under coconut, the only option to bridge the gap is to increase the productivity further. The competitiveness of the sector will largely depend on the productivity of the crop. Any crop loss due to pest attack is a major concern of coconut farmers. Hence, integrated pest management plays a crucial role in productivity improvement for a perennial crop like coconut.



Area-wide community extension approach for bio-management of rhinoceros beetle

TECHNOLOGY FOR MANAGEMENT

The IPM practices recommended consist of mechanical, chemical, cultural and biological methods. A participatory analysis indicated that farmers prefer low cost, safer, easily adoptable control practices to manage the pest. Biocontrol methods are preferred by farming community as they are environment-friendly, safe, cost- effective and efficient as well. Scientists of ICAR-CPCRI, Regional Station, Kayamkulam, have evolved effective bio-management techniques against rhinoceros beetle, using the green muscardine fungus (GMF), *Metarhizium anisopliae*. Rhinoceros beetle lays eggs in cow dung pits, vermicompost units,

coir pith heaps, degraded coconut logs/ oil palm trunks etc.

Treatment of such breeding sites with GMF @ 5 × 10^{11} spores per m^3 (100g metarhizium culture per litre water) effectively brings down the population of the pest. The fungus does not affect the earthworms in vermicompost, when treated. Different stages of grubs and adults are infested by the fungus within a fortnight of its application. Incorporation of *Clerodendron infortunatum,* a common weed seen in coconut gardens, in the breeding sites also inhibits the growth stages of the black beetle. This practice is also compatible with GMF treatment in breeding sites. It is necessary to treat the breeding sites with the fungus only once in a year. Filling of top most 2-3 leaf axils with naphthalene balls (12g) or salt, ash and sand mixture (@250 g) or marotti or neem cake sand mixture (each @ 250 g) are also recommended as prophylactic measure once in 45 days.

Area-Wide Community Extension Approach

Social participation and group dynamic skills are required for overcoming the problems of small and marginal size of coconut holdings and achieving scale of economics. The breeding sites of the pest are widely distributed in a geographical area which, and hence campaign mode of technology adoption is needed. Technological options are available through research efforts for improving the competitiveness of coconut cultivation. Technologies recommended generally needs refinement to suit farmers' resource base. The major constraints recorded in adoption of IPM included non- availability of sufficient quantities of GMF, labor scarcity, cost and low level of knowledge on utility. The bio- management adoption among coconut farmers is found to be less than 10 per cent. Taking cue from these issues, CPCRI successfully intervened and facilitated Area-Wide Community Extension Approach (AWCA) in augmenting the technology utilization by refining its delivery mechanisms.

Approximately 4,000 ha of area in different panchayaths (Thekkekara, Devikulangara, Krishnapuram, and Bharanikkavu of Alappuzha districts and Edava panchayath of Thiruvananthapuram districts in Kerala) were brought under the process. Two-three women groups of 12-15 members in each ward were involved in technology transfer activities and treatment of breeding sites, thus mobilizing a total of 150-200 women representing each panchayaths in popularizing and adopting the technologies. This indicated that these technologies were very much women friendly and doable.

Timeline of Programme

The participatory efforts were initiated during 2007 at Thekkekara and Devikulangara panchayaths, Alappuzha district, Kerala in an area of 1,500 ha of coconut using rhinoceros beetle pheromone traps and farm level production (FLP) of green muscardine fungus. The lessons learned were the factors of unsustainability of FLP at individual level units and the inability to reach all the breeding sites within a short time span. During 2010, along with technical interventions, social interventions were also pilot tested. Farm level GMF production units were initiated by trained and educated women farmers' group for decentralized production and supply of bioagents. These groups, later on, successfully evolved as a model in which four of them are serving as master trainers for technology dissemination to other farmers. The initial technology was refined by the group, resulting in saving 30 per cent time for preparation and 40 per cent of cost, which clearly indicated the role of women in technology facilitation and refinement.

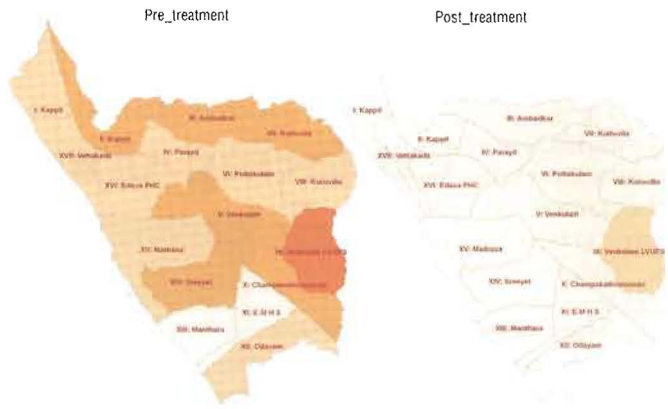
An area-wide community based strategy was evolved involving Central Plantation Crops Research Institute as technology provider and capacity building of social units, Department of Agriculture (Krishibhavan)/ ATMA for networking and linkage with Local Self Government for technical support and up scaling, coconut farmers' groups (Coconut producers clusters/society), Department of Animal Husbandry/ Milk co-operative societies for campaign mode treatment of pest breeding sites at efficient, focused and faster rate.

As per the CPCRI technology, the fungus could be multiplied at farm level by simple and cheap methodology in rice grains, tapioca chips or coconut water. The *Metarhizium* fungus production was decentralized through farm level GMF multiplication units by trained farm women groups. The capacity building and skill up gradation of the units were done by the CPCRI scientists, as a continuous process of confidence building. Another strategy was effective building up of network and linkages with relevant stake holders like Department of Agriculture, coconut farmers' groups, Veterinary Department, Milk co -operative societies, farmers, Mass media especially All India Radio, local panchayath etc. for rapid spread of the technology and multiple level of interventions. This model project was implemented in Edava Grama panchayath, Thiruvananthapuram Dst., Kerala in 520 ha of coconut area during 2010-13 which proved to be very effective in field situations and enabled rapid spread and utilization of technology in other areas.

Farm Level Production of GMF

By ensuring hygienic conditions, anyone with training support can start a unit in an ordinary room. The initial cost of setting up of the unit comes to only ₹8,000 to ₹10,000. The basic items required are a pressure cooker (20 litre capacity), culture of GMF, polypropylene covers, quality rice and other accessories like cotton, aluminium foil, thick candles, hand gloves etc. The rice is half cooked and after cooling, filled in polypropylene covers and they are sterilized in pressure cooker. Thick candles are lighted in the work table to keep the area free of contaminants

and culture of GMF is added into the cover and thoroughly mixed. Such covers are kept at room temperature for about a week for the fungus to multiply. The production cost of one packet (100 g of GMF) works out to ₹20. The application method is very simple; one packet of GMF is to be mixed with one litre of water and sprinkled over the cow dung pits, compost pits and decayed coconut logs etc. which are the breeding sites of rhinoceros beetles. Make two to three holes using a twig and pour the rest of suspension in to it. The grubs could be found dead by five to seven days. This rhinoceros breeding sites may be treated with GMF only once in a year. While planning for panchayath wise community adoption programmes, initially all the potential breeding sites of rhinoceros beetles in each ward of the panchayath may be mapped and treated with GMF as a one week campaign with the active involvement of various stake holders. It requires only ₹20,000–25,000/ panchayath for this programme.



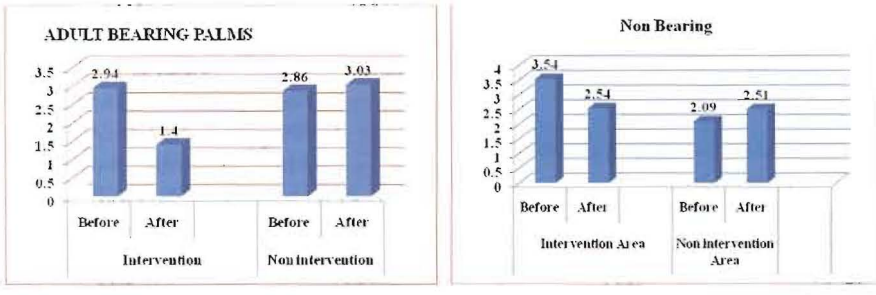
Reduction in Rhinoceros beetle incidence after interventions (Edava Panchayath - 17 wards) (colours indicate the severity of pest incidence)

Edava women farmers group with CPCRI scientist displaying metarhizium packets

Impact of Interventions

The impact analysis of this programme indicates 70–80% reachability to the potential adopters, i.e. farmers' plots with breeding sites of the implementation area and 75% reduction in fresh incidence of rhinoceros beetle attack especially in the bearing palms, thus reducing the yield loss to farmers. Participation and functional linkages at grassroot level could influence the technology utilization in a positive and effective manner and that is the message of the activities facilitated by CPCRI, Regional Station Kayamkulam.

The participatory interventions resulted in significant improvement in training attented (43%), social participation (58% improvement) and extension participation, extension contact (66%) and mass media exposure (51%) of the farmers when compared to pre-intervention period.



Impact of technology and social interventions in reduction of pest damage at farmers' field

Technology Access and Women Farmers

In this approach, the access of women farmers on the technology improved as technology facilitators in quality critical input supply and technology disseminators as master trainers to farmers of other districts in FLP of GMF and farm level value-addition of jack, coconut, tubers, fruits to 2,300 farmers. Edava Womens' Association (EWA) was formed for integrating activities like FLP, mushroom cultivation, value-addition, compost preparation and marketing. Women farmers were involved in survey, technology adoption and they have established linkages with NGOs, Women Self-Help Groups (WSHG), State Departments, Kerala Agricultural University, CTCRI, CIFT, KVKs, farmer innovators and progressive farmers for technology access and exchange.

The learning indicated that area wide community adoption reduces the variability in efficacy, cost of adoption, drudgery, time for diffusion and adoption of technology across the system of intervention and improves labour efficiency, compared to household / individual level technology utilisation, especially in case of perennial coconut palms cultivated in small and marginal holdings.

For further interaction, please write to:
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