INTEGRATED PEST MANAGEMENT IN PLANTATION CROPS

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The system of integrated pest population management by adoption of the compatible techniques in an organised way has been attempted in agricultural plantation crops such as coconut, cashew, pepper and cacao.

COCONUT

For the management of the rhinoceros beetle, Oryctes rhinoceros, *the integrated system of treatments included extraction of beetles during the peak period of pest abundance on the crowns of palms (July-September), treatment of all the possible breeding sites of the beetle such as cattle dung, compost, dead coconut logs and stumps and other decaying organic debris in and around the plantations, prophylactic crown treatment of the main border palms with insecticide and sand mixture during the pre- and post-monsoon periods and maintenance of field sanitation. A large scale field experiment conducted in farmers' fields during 1964-1971 revealed that there was remarkable reduction in percentage leaf attack, spathe attack and fresh incidence on spindles after effecting these treatments. At the latest round of observations the percentage leaf attack had come down to 7.15 from 26.25, spathe attack to 3 from 38 and fresh incidence to 13 from 45 of the pre-treatment condition.*

Release of the laboratory reared exotic predator, Platymeris laevicollis *(Dist.) can also be combined with the above mentioned operations after excluding insecticide treatment.*

The green muscardine fungus, Metarhizium anisopliae *produces epizootics in* Oryctes *population when the climatic factors like low temperature and high relative humidity prevail. The fungal spores cultured in the laboratory could be applied to the breeding sites of the pest where the pathogen was observed to survive for longer periods.*

Baculovirus of Oryctes *is one of the most successful microbial control agents employed for biological suppression of coconut rhinoceros beetle in several countries. Recent studies revealed the occurrence of baculovirus disease in the natural population of beetles in Kerala. This viral pathogen was successfully introduced into Minicoy, Lakshadweep in April, 1983 and biological suppression of the beetle population could be achieved. An overall reduction in leaf damage, spathe damage and fresh incidence to the extent of 82.12%, 98.07% and 96.04% respectively was recorded, 37 months after introduction of viral pathogen to the island habitat.*

Biological suppression of the coconut caterpillar Opisina arenosella *Wlk.* (=Nephantis serinopa *Meyr.) with the indigenous larval and pupal parsitoids and predators is possible. These include the larval parasitoids* Apanteles taragamae, Bracon hebetor *and* Goniozus nephantidis, *the prepupal parasitoid* Elasmus nephantidis, *the pupal parasitoids* Trichospilus pupivora, Brachymeria nosatoi, B. nephantidis, B. lasus, B. hime atteyae, Antrocephalus hakonensis, Xanthopimpla punctata, X. nana nana, Xanthopimpla *sp. (undet.) etc. and the predators like* Parena nigrolineata, Calleida splendidula, Sphedanolestes aurescens *and a large number of species of spiders. Regular monitoring of the pest population and release of the appropriate species of lab reared parasitoids in adequate numbers are essential for the success of the biological suppression of the pest.*

In cases of epidemic outbreaks of the pest an integrated approach involving cutting and burning badly infested leaves, spraying the palms with a suitable chemical which is less toxic to the beneficials (eg: dichlorvos 0.02%) and subsequent release of appropriate species of parasitoids would effect pest suppression.

Prevention of entry of red palm weevil Rhynchophorus ferrugineus *F. is possible by treatment of wounds, cut ends of petioles etc., with BHC or BHC + coal tar, or by cutting the petioles of young palms, if necessary only, at a distance of 120 cm away from the stem. Prophylactic leaf axil filling with insecticide — sand mixture, curative treatment of infested palms with pyrethrins piperonyl butoxide 1% or carbaryl 1% or endosulfan 0.1% suspension and trapping the floating population of weevils in tender coconut logs treated with fresh toddy fermented with yeast granules and acetic acid could be adopted in an integrated manner. An electronic sensor devised recently could be put to use for detection of red palm weevil infestation in the early stage itself.*

For the management of white grubs, Leucopholis coneophora *Burm. infesting coconut and other intercrops in coconut plantations an integrated approach involving cultural operations such as deep ploughing or tilling the gardens to expose the grubs to predation by birds or desiccation, collection and destruction of beetles at the time of their mass emergence from the soil during the pre-monsoon period (May-June) and soil application of heptachlor at the rate of 1.4 kg a.i./ha (i.e. 28 kg 5% dust) in June or BHC at the rate of 5 kg a.i./ha (i.e. 100 kg 5% dust) in June and once again in September is effective.*

CASHEW :

The longicorn beetle, Placaederus ferrugineus *L. is a serious pest of cashew tree and associated with this stem-borer infestation there would be subsequent infestations by other stem-borer like* P. obesus *and* Batocera rufomaculata *and the bark and sap wood borers such as* Xylothrips flayipes, Lampetis fastuosa, Belionota prasina, Xystrocera globosa *and* Coptops aedificator *which also contribute much to aggravate the condition of the infested trees.*

The success of the curative treatment against the borer depended much on the stage and intensity of infestation. If the infestation is detected in the early stage itself swabbing with BHC 0.1% suspension after removal of the affected tissues with immature stages of the pest was quite effective. Adoption of phytosanitary measures is quite im-

perative in minimising stem and root borer infestation. Padding method of treatment with monocrotophos at the rate of 30 ml/tree was reported to be an effective control measure. Trials involving padding method of monocrotophos treatment coupled with 10% BHC dust at the rate of 500 g/tree applied to the soil and raked around the base of infested trees gave 78.3-90.0% control of pest infestation.

The tea mosquito bug Helopeltis antonii *Sigmoret is the most serious pest of cashew. Based on the trends in population build up of the pest and the crop damage it causes three rounds of spraying at the time of emergence of new flushes, panicles and fruit setting are recommended. The first round of spray would take care of not only tea mosquito, but also the leaf miner, leaf webber and other foliage and shoot infesting pests. The second round would control blossom blight caused by tea mosquito, blossom webber and flower thrips. The third round would be effective in reducing immature fruit-drop caused by tea mosquito, flower thrips, apple and nut borer and the nut crinkler (coreid bug).*

PEPPER :

Among the pests of pepper the "pollu" beetle Longitarsus nigripennis *Mots. is the most important one. Raking up the soil around the bases of vines, soil application of insecticides and lopping of shades of standards are some of the methods which would reduce 'pollu' beetle infestation. Spraying the vines with insecticides (endosulfan/quinalphos 0.05%) in late July and early October, depending on the trends in population density of the pest, is also recommended.*

CACAO :

Spot application of insecticide (fenthion or monocrotophos at 0.05%) on the initial foci of infestation during the post-monsoon period (October-November) suppresses the build up of mealybugs (Pseudococcus lilacinus *and* P. citri) *infesting cacao. Removal of the infested pods and control of attendant ants are the other methods adopted for the management of mealybugs. Release of the coccinellid predator,* Cryptolaemus montrouzieri *for the biological suppression of mealybugs and the use of baits for trapping the symbiont ants are also beneficial.*