Coconut leaf beetle (*Brontispa longissima*) - An invasive pest of concern

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Blockading and cutting of coconut palms up to three kilometers from the infestation spot are done to prevent the beetle from spreading. The pest is also controlled by pruning, clean culture and proper disposal of infested palms and plant parts thereof.

The coconut leaf beetle (CLB) [*Brontispa longissima* (Gestro)] (Chrysomelidae : Coleoptera) is one of the most serious and devastating insect pests of coconut and other palms. The possible entry of this invasive coconut hispine is another imminent threat to coconut industry in India, Sri Lanka and Bangladesh. Grubs and adult spiny beetles inhabit the developing unopened leaves of the coconut palm and feed on leaf tissues. Severe attack results in complete defoliation of the palm. Prolonged attack particularly to young palms or those which are in poor growing conditions, may result in death of palm. The productivity of the palms is drastically affected due to sub lethal attack by the pest.

Hosts

The beetle attacks more than 20 palm species of which coconut (*Cocos nucifera*) is the most favoured host. Other hosts include Royal palm (*Roystonea* sp.), Alexandria palm (*Archontophoenix alexandrae*), Sago palm (*Metroxylon sagu*), California fan palm (*Washingtonia filifera*), Mexican fan palm (*W. robusta*), Bottle palm (*Hyophorbe lagenicaulis*), Chinese fan palm (*Livistonia chinensis*), Madagascar palm (*Chrysalidocarpus lutescens*) and Arecanut palm (*Areca catechu*).

Distribution

CLB was originally described in 1885 from Aru Islands in Indonesia and from Papua New Guinea. Over a period of 124 years, it has widely spread over 25 countries in Asia, Australia and Pacific Islands attacking a number of cultivated and wild ornamental palm species in addition to coconut palm. It is currently distributed in Australia (Darwin, Broome, Mao Island, Cooktown, Cairns, Innisfail, Marcoola and Townsville), Pacific Island, Malaysia, Singapore, Cambodia, Laos, Thailand, Veitnam, Maldives, Philippines, Myanmar and China (Hainna, Guangdong and Taiwan provinces, with Hainan Islands, the worst affected).

Biology

Adult beetles measure 7.5-10.0 mm long and 1.5-2.0 mm wide, with a conspicuous orange to reddish pronotum. The anterior part of elytra is also orange to reddish in colour. The eggs are laid in longitudinal rows in the unopened leaflets of both young and mature palms. The incubation period is 3-7 days. The emerging grubs are cream coloured and complete their larval period in 30-50 days. The full grown grubs measure 8-10mm. Pupae are

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yellowish white in colour measuring 8-10 mm and pupal period lasts for 4-6 days. The whole life cycle of the pest is completed in coconut palm itself and takes about 5-7 weeks. The adult beetles are nocturnal in habit.

Symptoms of damage

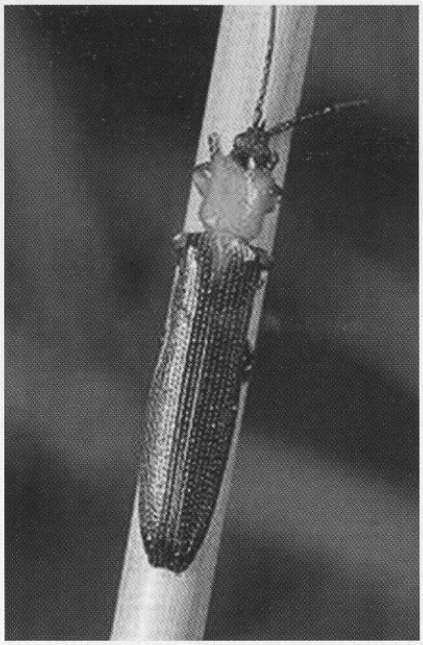
The grubs and adults live in the still folded heart leaf preferably that of young palms and seedlings and feed on mesophyll of both surfaces of the closely oppressed leaflets. They gnaw long incisions parallel to one another leaving longitudinal white streaks. As the frond opens, the leaf looks a characteristic scorched, rugged appearance. The unopened fronds of palms up to 10 years are most heavily attacked. Severe attacks destroy palm leaves, restrict growth and significantly reduce the yield. Fruit production is significantly reduced if eight or more leaves per palm are destroyed. In many cases all central leaves of affected palms turn brown and fruit shedding is common in such palms. Stunted palms with less compact spear leaves are more susceptible to leaf beetle attack. CLB outbreak has caused extensive damage in many countries.

Mode of spread

The spread of *B. longissima* is mainly through the movement of infested seedlings. Since the flight range of the beetles is low the natural spread is at a very slow pace. Shipments of ornamental palms from countries having the pest infestation have been the main source of spread within the Asia-Pacific region.

Possible threat

The outbreak of the pest in Myanmar and Maldives in recent years poses a great threat and concern to the nearby countries such as India, Sri Lanka and Bangladesh. It is feared that the pest will find its way from Maldives to Sri Lanka and Southern parts of India to derail the economy of these important coconut growing regions of the world. The countries to the West of Myanmar, Bangladesh and India are at a very high level of risk, since the beetle will not be stopped at land borders. For all those countries, where coconut and coconut based industries support millions of people, the pest incursion would be catastrophic.



The pest

Outbreaks

In Solomon Islands, it is estimated that about 5% CLB infested palms die annually. In 1980, coconut palms grown in more than 10,000 ha area in seven provinces in Indonesia were attacked by this beetle. In Maldives, pest outbreaks occurred on several islands of South Ariatoll causing extensive damage to coconut production in inhabited and uninhabited islands. Coconut is not only an important food crop, but is perhaps even more important for the tourism industry. An estimated total loss of USD 270,000 is reported in this Island due to the decline in tourism, shift in labour from productive activities to pest management and also loss in revenue on coconut sales and drinks during 2000-2003. The pest has since spread to 10 nearby areas in the atoll, and was discovered (April 2004) at Hulhule Island, near Mali causing extensive damage. The imposition of internal quarantine restrictions on the export of leaves for roof thatch or other tourist product made from leaves from CLB infested islands further affects the income of local population. CLB is therefore a serious threat to the continued income generation from tourism industry and as such, the country's food security. Similar conditions exist in other countries like Vietnam and Thailand.

Control

Mechanical

Blockading and cutting of coconut palms up to three kilometers from the infestation spot are done to prevent the beetle from spreading. The pest is also controlled by pruning, clean culture and proper disposal of infested palms and plant parts thereof.

Chemical

Several insecticides including imidacloprid, diclorvos, fenthion, monocrotophos, quinalphos, delta-methrin, dimethoate, cypermethrin and diazinon are being used to

control the coconut leaf beetle. Some insecticides are also injected in to the trunk of infested palms. However, the effect of these treatments lasts only for 3-4 months. Repeated applications may be impractical and uneconomic and cannot be used as a long-term control measure. In China, hanging insecticide bags on infested palms has been attempted successfully to check the spread of the beetle.

Biological

Two parasitoids of coconut leaf beetle *viz.*, *Tetrastichus brontispae* Ferriere (Hymenoptera: Eulophidae), a pupal parasitoid and *Asecodes hisparum* Boucek (Hymenoptera: Eulophidae), a larval parasitoid have been successfully used in several countries to control the beetle. Use of entomopathogenic fungus, *Metarhizium anisopliae* is also promising.

Strategies for preventing the introduction of pest in India

1) Control strategies of the pests in affected countries

The Food and Agricultural Organization of the United Nations provided assistance to help developing control strategies of the pest in the affected countries through Bilateral Technical Cooperation projects (TCP). These projects were implemented in Vietnam (2003-2005), Maldives (2003-2005) and Nauru (2003-2004). Similar project proposals were prepared for Thailand and China. The larval parasitoid *A. hispinarum* was collected in Samoa in 2003 and introduced, reared and released in Vietnam, the Maldives, and Nauru to combat *B. longissima*. The parasitoid got established in all the three countries with promising prospects for achieving control of the beetle. FAO is helping countries that lack expertise in biological control to develop integrated pest management programmes that suit each country's unique environment. This support has assisted countries in identifying the coconut beetle to species level, in collecting and importing natural enemies of the beetle, rearing them in captivity for evaluation and releasing on infested palms.

A coconut palm affected by the pest

2) Quarantine measures

Establishment of strict quarantine laws on the movement of all types of coconut materials and other hosts of this pest from CLB infested countries should be envisaged. Various developmental stages of the pest such as eggs, grubs, pupae or adult can be carried by transport of infested planting materials (both coconut seedlings and ornamental plants) across the countries. Hence, strict quarantine measures should be undertaken in the import of ornamental plant materials from the CLB endemic tracts. When exporting agriculture produces out of designated CLB infested areas, it is important not to pack them in any materials which have coconut leaves. Shifting of soil and organic materials also should be passed through strict quarantine. All planting materials should accompany phytosanitary certificate from the exporting country. Quarantine should be strictly followed in the collection of germplasm materials and exchange of genetic resources between countries. Passengers traveling from beetle-infested countries should be encouraged to examine their baggage for the presence of the beetle / eggs / larvae.

3) Surveillance

As the spread of the pest from Maldives to India can happen at any time, regular surveillance for the pest

should be undertaken in the southern states of India where most of the coconut cultivation is centered. Since plants and planting materials are imported through prescribed sea ports and air ports, areas nearby these should be monitored at regular intervals for locating the pest. In the surveillance work, the unopened spindle leaves of coconut seedlings and young plants should be examined for any possible infestation and if doubtful cases located, it should be immediately reported to the competent authority.

4) Awareness and vigilance

There is a need for educating the coconut growers and development workers about the pest and its bioecology so that they will be able to monitor the pest effectively in their areas of operation. Organizing seminars, awareness programmes, pest alert notifications, presentation of bulletin of information on all aspects of *B. longissima* are all helpful in building up an awareness and vigilance of the pest among the farmers and agricultural developmental staff. Raising awareness and capacity building through training programmes is essential to contain the problem. Countries already afflicted by the beetle may adopt intensive biocontrol programmes to minimize losses due to infestation and to check further spread of the beetle.

Can monolaurin crack the shell of flu virus and keep it from and replicating if taken at first symptom?

According to news reports, there are so many children travelers, that are coming down with the new H1N1 summer-spread flu. But can monolaurin, a nutrient from coconut oil, lauric acid also keep the H1N1 flu virus as well as herpes simplex (facial herpes virus) from reproducing/ replicating? For some it's a sore on the lip or in the mouth. For others, getting ocular herpes (in the eye) or encephalitis due to a herpes infection in the brain requires emergency medical attention. Although Herpes simplex type 1 most often causes mild symptoms like cold sores and fever blisters, it can occasionally travel to the brain and cause encephalitis, but a brain infection from a mouth sore is rare. Maybe monolaurin, a food supplement extracted from lauric acid in coconut oil might be of help in preventing certain virus-related diseases from worsening. Here are the results of some studies on monolaurin and flu viruses as well as monolaurin studies on other viruses. Monolaurin won't work on the rhinovirus, that is, the common cold. The book, "The High Blood Pressure Hoax", by Sherry A. Rogers, M.D. (2005) has several interesting sections on how monolaurin has been "able to dissolve the protective mebrane from 14 types of human viruses." One of those 14 viruses mentioned is the flu virus. Another source on swine flu breaking news is the Science Insider blog on science agencies reporting the latest news on swine flu that's not in the usual mass media. Lauric acid also is found in mothers milk. Nature puts antibodies in mother's milk. And monolaurin from coconut oil has a substance in it that works similarly to mother's milk to crack open the shell of several viruses. The book notes, "Monolaurin actually disintegrates the lipid envelope or membrane of viruses, destroying their main defense." Rogers cites the study, "In vitro effects of monolaurin compounds on enveloped RNA and DNA viruses," by Hierholzer, JC, Kabara, Journal of Food Safety, 4:1, 1982. It's the lauric acid in monolaurin that binds to the virus's lipid (fat)-protein envelope. That's how monolaurin inactivates the virus. Monolaurin binds to the membrane that covers the virus and prevents the virus from 'uncoating.' At this point, there's no way the virus is able to reproduce itself. The shell or "viral envelope" of the virus is disintegrated. The study suggests that "monolaurin requires access to the cytoplasmic membrane and/or the cytoplasm to exert its antimicrobial activity." Monolaurin kills cytomegalovirus and flu viruses as well as the Epstein-Barr virus, named as the culprit in chronic fatigue syndrome, by turning the fatty coat of both the flu and Epstein Barr viruses into a liquid and then flushing which then disintegrates the bits of virus particles that had been inside their fatty shells or membranes that had enveloped those viruses. Viruses can live in your stored fat and in the fat in your liver.

Courtesy: The Cocommunity