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Another invasive pest, coconut leaf beetle, *Brontispa longissima* (Gestro), an imminent biosecurity threat at the doorsteps of India

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Coconut, *Cocos nucifera* L. popularly known as *Kalpavriksha*, supports livelihood securities to more than 10 million people in 18 States and 3 Union Territories of India. It has been providing food, drinks, nutrition, health, shelter, income and wealth for mankind from time immemorial. The crop occupies an area of 1.894 million ha with a production of 15,729 million nuts (2008-2009) and is a source of permanent income to 5 million farm families (Mathew, 2008; DES, 2010). Coconut palm is attacked by a number of insects at all stages of its growth. A total of 547 insects and mite species were reported as infesting coconut palm and copra in various coconut growing countries of the world (Kurian *et al*., 1979). A recent incidence of coconut leaf beetle, *Brontispa longissima* Gestro (Chrysomelidae: Coleoptera) in Maldives and Union of Myanmar, attacking the tender leaves of young coconut palms and its possible entry poses an imminent threat to coconut industry in India (Rethinam and Singh, 2004). 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 a country like India, where coconut and coconut based industries support millions of people, the pest incursion would be catastrophic.

Invasions by alien species imbalance native ecosystems and many of them cause considerable economic loss in the initial phase of entry. Such intruders are likely to breed profusely in the absence of natural enemies in the newly found environment and cause biotic upsets out-competing native species. According to International Union for Conservation of Nature and Natural Resources, alien invasive species (AIS) is one which becomes established in natural or semi-natural ecosystems or habitat, and threatens native biological diversity. The spread of AIS is now recognized as one of the greatest threats to the ecological and economical well being of the country. AIS have invaded native biota in virtually every ecosystem of earth causing economic damage to biodiversity and the valuable natural agricultural system we depend upon (Sujay *et al*., 2010). Such outbreaks of exotic pests *viz*., coffee berry borer *Hypothenemus hampei* Ferrari (Kumar *et al*., 1990), serpentine leaf miner *Liriomyza trifolii* (Burgess) (Viraktamath *et al*., 1993), spiralling whitefly *Aleurodicus dispersus* Russell (Palanisamy *et al*., 1995), coconut eriophyid mite *Aceria guerreronis* Keifer (Sathiamma *et al*., 1998), erythrina gall wasp, *Quadrasticus erythrinae* Kim (Faizal *et al*., 2006), the eucalyptus gall wasp *Leptocybe invasa* Fisher & La Salle (Kumar *et al*., 2007), cotton mealy bug *Phenacoccus solenopsis* (Tinsley) (Jhala *et al*., 2008) and the papaya mealy bug, *Paracoccus marginatus* Williams and Granara de Willink (Muniappan *et al*., 2008) reported in India caused severe economical loss to crops despite several efforts made to combat them. A similar experience should not be triggered by this alien pest which has almost reached the doorsteps of our country, thereby pinpointing the necessity for strict quarantine measures.

The introduction of new pests into a locality can be through: (1) a host as the carrier, (2) inert

packing materials carrying the quiescent stages of the pest, (3) insect vectors, birds, air currents and (4) deliberate, illegal introduction as bio-weapons. Though the first two modes of distribution are curtailed by quarantine measures, the latter two are beyond the limitations of pest control by exclusion. This creates a need for bio-security involving integrated approach that encompasses the policy and regulatory frameworks to analyze and mange the risks in the sectors of food safety and other environmental risks. Bio-security covers the introduction of plant and animal pests and diseases, introduction of genetically modified organisms and their products and introduction and management of invasive alien species and genotypes (Shetty *et al*., 2008). As such it is a holistic concept having direct relevance to the sustainability of agriculture, food safety and protection of the environment including biodiversity. It is in this context the likely advent of invasive insect pest like *B. longissima* in India would be devastating and more likely an issue of bio-security in our country.

Coconut leaf beetle is one of the most serious and devastating insect pests of coconut and other palms. Grubs and adult spiny beetles inhabit the developing unopened leaves of the palm and feed on leaf tissues (Rethinam and Singh, 2004; Howard *et al*., 2001). As the pest continuously affects developing leaves, the inner whorl of leaves totally dry up. 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. The whole life cycle of the pest is completed on coconut palm itself and takes about 5-7 weeks. Adult beetles are small, measuring 7.5-10.0 mm long and 1.5-2.0 mm wide, with a conspicuous orange to reddish pronotum. The full grown grubs measure 8-10 mm. Pupae are yellowish- white in colour measuring 8-10 mm with distally U-shaped hooks. Symptoms and various stages of the pest are illustrated in Fig. 1 (Courtesy APCC/FAO). 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*),

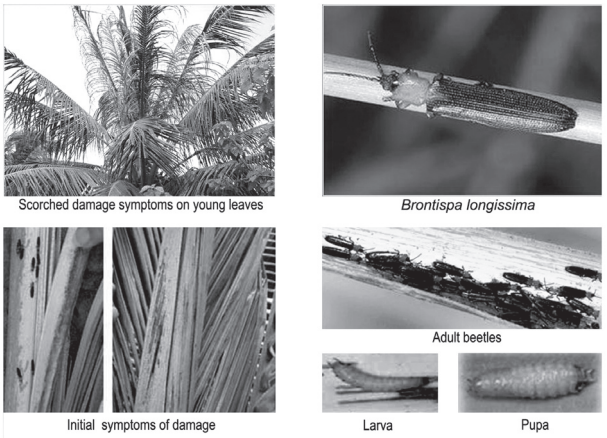

Fig. 1. Coconut leaf beetle (*Brontispa longissima*) - different growth stages and damage symptoms

California fan palm (*Washingtonia filifera*), Mexican fan palm (*W. robusta*), bottle palm (*Hyophorbe lagenicaulis*), Chinese fan palm (*Livistonia chinensis*), Madagascar palm (*Chrysalidocarpus lutescens*), arecanut palm (*Areca catechu*), toddy palm (*Caryota urens*), dwarf date palm (*Phoenix roebelenii*), nipa palm (*Nypa fruiticans*), Samoa palm (*Clinostigma* sp.), spear palm (*Balaka* sp.) and oil palm (*Elaeis guineensis*). The pest was also reported from an ornamental cycad fern, *Cycas* sp. in Vietnam (Rethinam and Singh, 2004; FAO, 2004).

B. longissima 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 in 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, Pacific Islands, Malaysia, Singapore, Cambodia, Laos, Thailand, Veitnam, Maldives, Philippines, Myanmar and China (Rethinam and Singh, 2004).

In Solomon Islands, it was estimated that about 5% of 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 (FAO, 2004). Coconut leaf beetle had caused serious threats to the income generation from tourism industry as well as food security in countries like Maldives, Thailand and Vietnam (FAO, 2004).

Regular and periodic surveillance surveys since 2007 by Central Plantation Crops Research Institute (CPCRI), Regional Station, Kayamkulam have not revealed the incidence of *B. longissima* in any close proximal air port regions of Thiruvananthapuram, Kochi, Chennai, Kolkatta, Mumbai, Rajmundry, Vijayawada as well as seaport regions of Kochi, Vishakapatnam and Tuticorin during the past three years. Systematic surveys had been conducted by the Institute in all possible ports of entry and their immediate local niches so as to locate its incidence if any. So far in our studies, we could not locate its presence in any of these localities (CPCRI, 2008; CPCRI, 2009). Coconut palms in Minicoy, Kavaratti and Kalpeni Islands (Union Territory of Lakshadweep) on account of its close proximity to Maldives were also thoroughly examined recently and the survey could not identify any damage symptoms or the presence of *B. longissima*. Awareness about the pest and its damage potential on coconut were imparted to Officials from Department of Agriculture, Kavaratti, Minicoy and Kalpeni as a measure of pest alertness.

Entry of this leaf beetle in new areas can be checked possibly through mechanical blockading, need based application of insecticides and augmentative release of natural enemies. Two parasitoids of coconut leaf beetle *viz*., *Tetrastichus brontispae* Ferriere (Hymenoptera : Eulophidae), a pupal parasitoid and *Asecodes hispinarum* Boucek (Hymenoptera: Eulophidae), a larval parasitoid have been successfully used in several countries to control the beetle. Use of entomopathogenic fungus, *Metarhizium anisopliae* against the pest is also documented (FAO, 2004).

Strict quarantine laws curbing the movement of all types of coconut materials and other host palms particularly ornamental palms from pest infested countries should be enforced, as the main source of spread of this pest within the Asia-Pacific region is through shipment of ornamental palms from countries having the pest infestation. Shifting of soil and organic materials also should be passed through strict quarantine measures. In the collection of germplasm materials and exchange of genetic resources between countries rigourous quarantine steps are to be meticulously followed (Rajan *et al*., 2009a; 2009b). Passengers traveling from beetle-infested countries should be encouraged to examine their baggage for the presence of the beetle / eggs / larvae to avoid accidental introduction of the pest.

As the spread of the pest from Maldives and Union of Myanmar to India can happen at any time, regular surveillance for the pest should be undertaken in the Southern and North-Eastern states of India. 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 (Rajan *et al*., 2009a; 2009b).

There is a need for educating the coconut farmers and developmental workers about the pest and its bio-ecology 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 bulletins on *B. longissima* would be helpful in building up an awareness and vigilance on the pest. Awareness creation and capacity building through training programmes is essential to contain the problem at this point of time. Both aerial and marine trans-shipment have to be covered under the umbrella of quarantine measures. Necessary phytosanitary certification by authorized agencies must be strictly enforced for the import of planting materials especially various palm species from pest affected countries. The possible ports of entry in South and North-East part of the country must exert strict measures on these aspects.

In the present context, utmost importance should be given to prevent the spread of coconut leaf beetle to new areas and countries which are hitherto not infested through rigorous quarantine measures and continuous surveillance programmes (Changchui, 2007). For this to happen it is important for countries to work in synergy particularly when they share common land borders. In this respect, FAO/APCC can take a leading role to facilitate co-operation between countries and to provide technical assistance to build capacity to tackle this invasive pest. India should take a lead to form a consortium for preventing the spread of the pest into new areas,

emergency preparedness to deal with accidental entry and pest-risk analysis for effective management of this invasive pest.

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