

## **Biosecurity and Quarantine of Plants: Insects**

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Insects are small organisms that can spread as pests to many areas of the world by flying, carried by jet streams, typhoon, cyclone and human beings (migration of host plants by trade and tourism, hitchhike in container, box and packaging materials). Expansion in international trade has increased human involvement in introducing new insect pests into the country. Arrival of these new species should be concerned with care because they can rapidly develop into destructive proportions in the absence of natural enemies in the new environment. Plant biosecurity and quarantine plays an important role to prevent introduction and spread of insect pests from other countries and regions and it can be identified as the first important defense because once an exotic pest or disease is established it is difficult or impossible to eradicate.

According to the Plant Protection Act No. 35 of 1999 of Sri Lanka, any biotic agent capable of causing injury or damage or loss to plants or plant products including certain insects, nematodes, bacteria, fungi, phytoplasma, virus, and weeds should be identified as quarantine pests and Minister may declare by a gazette notification the quarantine pests which should not be imported to Sri Lanka as themselves or as infestations of any plant or plant product. The list of quarantine pests may vary from time to time and new species

can be added to the list by a gazette notification in concurrence with the Minister.

### **Objectives of plant biosecurity and quarantine**

- 1) Control, prevention and eradication of plant pests, plant diseases and noxious plants (weeds)
- 2) Reduce damage to crop and yield loss caused by pest
- 3) Facilitate trade of agricultural produce
- 4) Prevent high quality/ threatened crop materials from being brought out of the country
- 5) Protect agricultural industries
- 6) Extend cooperation in the control of the movement of pests in international trade as well as to facilitate the trade

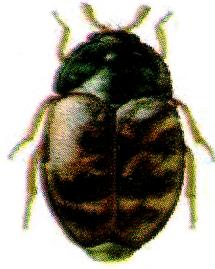
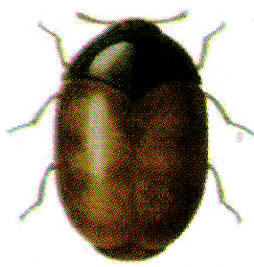
### **Main responsibilities in plant biosecurity and quarantine**

- 1) Inspection of consignment  
The consignment should be inspected by a plant quarantine officer and or a representative from the Seed Certification and Plant Protection Center of the Department of Agriculture.
- 2) Surveillance of pest status and pest reporting.
- 3) Issue of Phytosanitary Certificate  
This is issued to indicate that consignments of plants, plant products or other regulated articles meet specified phytosanitary import requirements at importing / exporting to or from the country.
- 4) Action on non-compliance & notification.
- 5) Disinfestations / disinfection treatment

If deemed necessary by the plant quarantine officer, the consignment will be subjected to treatment or other suitable method of disposal. This will depend on the pest infestations detected in the consignment. Phytosanitary treatments for regulated pests should meet in accordance with international standards for phytosanitary measures -ISPM No. 28. Hot water bath, dry heat, vapor heat, cold treatment, chemical dip, micronized dust and fumigation (export consignment fumigation and import consignment fumigation) are the disinfection treatments used at the port of entry in Sri Lanka.

### **Export Consignments for insects**

In Sri Lanka, this responsibility has been entrusted to the quarantine officers of the Seed Certification and Plant Protection Centre of the Agriculture Department. In order to export tea, coir products, wooden items, food items or wheat pellets we should ensure that these commodities are free from Khapra beetle (*Trogoderma granarium*). Other than that export commodities should be free from any regulated insect pests (some insect pests present in Sri Lanka may cause serious outbreaks and hence continuous control programs must be carried out) such as *Stegobium paniceum* and from timber pests.



Khapra Beetle (*Trogoderma granarium*) male and female adult



*Stegobium paniceum* adult

### **Import consignments for insects**

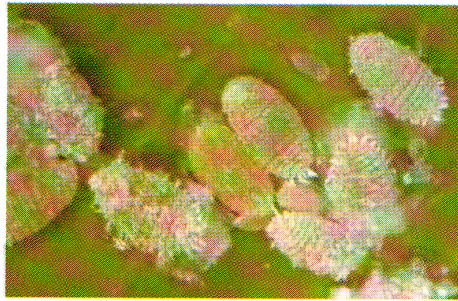
In the recent past, a number of insect pests, suspected of entering the country from outside, have damaged local agriculture. Vegetables, fruits, seeds and part of plants to be imported should be free from quarantine insects as well as from quarantine bacteria, fungi, nematodes, phytoplasma, and weeds. The Plant Protection Act No. 35 of 1999 lists quarantine species to be inspected for importation goods under different product categories.

For example, in fruit importation, fruits should be produced in an area free from fruit flies of genera *Anastrepha*, *Bactrocera neohumeralis*, *Bactrocera papayae*, *Bactrocera philippinensis* and *Bactrocera tryoni*.

Some examples of the insects that are considered for quarantine at the port of entry to Sri Lanka are described below.

✳ **The Papaya mealybug** (*Paracoccus marginatus*)

**Biology:** This is a small, yellowish insect pest attacking papaya leaves and fruits. Its body is generally covered with thick waxy secretion which serves as meal for mainly small and big black ants, therefore, termed as mealybug. The papaya mealybug feeds on the sap of plants by inserting its stylets into the epidermis of the leaf, as well as into the fruit and stem while injecting a toxic substance into the leaves.



*Paracoccus marginatus*



Papaya mealybug infected papaya fruits

**Symptoms:** Chlorosis, plant stunting, leaf deformation, early leaf and fruit drop, a heavy buildup of honeydew, and death. Heavy infestations are capable of rendering fruit inedible due to the buildup of thick white wax. Papaya mealybug has only been recorded feeding on areas of the host plant that are above ground, namely the leaves and fruit.

**Host plants:** Papaya, hibiscus, avocado, citrus, cotton, tomato, eggplant, peppers, beans and peas, sweet potato, mango, cherry, and pomegranate. The papaya mealybug has been recorded on more than 55 host plants in more than 25 genera.

✳ **Japanese Maple Scale (*Lopholeucaspis japonica*)**

**Biology:** The adult female lay 35-60 eggs and the crawler larvae affixes themselves on the upper surface of the leaves, along the veins and leaf margin. *L. japonica* hibernates under the bark and leaves of trees in its second larval stage. Scales are also found on the bark of branches and sometimes on fruits.



*Lopholeucaspis japonica*



*Lopholeucaspis japonica*  
infected plant

**Damage symptoms:** Dieback and premature leaf fall. In the case of light attacks, the scales may be found in cracks in the bark, and are difficult to detect on superficial examination.

**Host Plants:** Citrus spp., apple (*Malus pumila*), cherry (*Prunus avium*), pears (*Pyrus pyrifolia*), persimmon (*Diospyros kaki*), figs (*Ficus* spp.), outdoor woody ornamentals (*Acer*, *Betula*,

*Cytisus*, *Laurus*, *Magnolia*, *Rosa*, *Syringa*, *Tilia*) and some glasshouse ornamentals (*Camellia*).

✱ **Cacao-mosquito (*Helopeltis bergrothi*)**

**Damage symptoms:** Discoloured, necrotic area or lesion around the point of entry of the labial stylets into the plant tissue. The lesion can be elongate or spherical and becomes darker with age as tissue around the stylet puncture dies as a result of salivary secretion by the insect. Curl and deformed leaves and dieback of young shoots. The damage on pods appears as dark, circular lesions that usually harden as scars on the husk.



*Helopeltis bergrothi*



*Helopeltis bergrothi* infected fruit

**Host Plants:** *Anacardium occidentale* (cashew nut), *Camellia sinensis* (tea), *Cinchona*, *Gossypium* (cotton), *Ipomoea*

(morning glory), *Manihot esculenta* (cassava), *Psidium guajava* (guava), *Ricinus communis* (castor bean), *Theobroma cacao* (cocoa).

✱ **Bayberry whitefly (*Lopholeucaspis japonica*)**

**Biology:** The adult is a small whitish-yellow moth-like insect that flits about when disturbed. The adults have a strong ovipositional preference for very young foliage in the "feather" stage. The adult will frequently place white eggs along the leaf margin and eggs will turn black in a few days.



*Lopholeucaspis japonica*



*Lopholeucaspis japonica* infected plant

**Host Plants:** *Camellia sinensis*, *Chiococca alba*, *Citrus* spp., *Diospyros kaki*, *Elaeocarpus serratus*, *Ficus carica*, *Gardenia jasminoides*, *Machilus* sp., *Maesa japonica*, *Morus alba*, *Myrica rubra*, *Prunus mume*, *Prunus persica*, *Prunus triflora*, *Psidium guajava*, *Quercus serrata*, *Rhododendron* sp., *Salix babylonica*,



and *Salix gracilistyla*. The most favored hosts are *Citrus* spp. and *Gardenia*.

✳ **Banana spotting bug (*Amblypelta lutescens*)**



*Amblypelta lutescens* adult

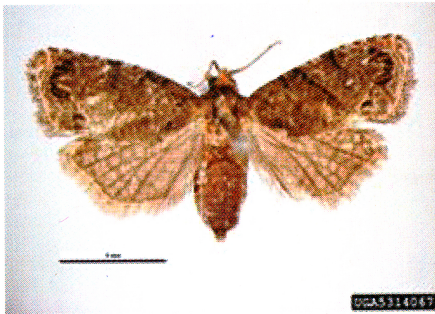
**Damage symptoms:** Feeds mainly on fruit, but also on the terminal growth of some of its host plants. Fruit damage is generally more common. Green, immature fruits are targeted from just after fruit-set until the fruit starts to mature and accumulate juice or oil. Very young fruit of most crops fall within a few days of being attacked.

Visible external symptoms are black spots and external marks. Fruit must be dissected to detect the lesions formed where the bugs have fed on the seed. As the fruit matures, these lesions may lead to many infections with fungus. This ensures that the fruit will be unmarketable even if bug damage was relatively minor and the fruit might have been damaged at the least edible part.

**Host Plants:** *Anacardium occidentale* (cashew nut), *Annona squamosa* (sugar apple), *Carica papaya* (papaw), *Citrus*, *Cocos nucifera* (coconut), *Dimocarpus longan* (longan tree),

*Eriobotrya japonica* (loquat), *Glycine max* (soyabean), *Litchi chinensis* (lichi), *Macadamia integrifolia* (macadamia nut), *Mangifera indica* (mango), *Manihot esculenta* (cassava), *Musa* (banana), *Passiflora edulis* (passionfruit), *Persea americana* (avocado), *Phaseolus* (beans), *Psidium guajava* (guava)

✱ **False codling moth (*Thaumatotibia leucotreta*)**



*Thaumatotibia leucotreta* adult



*Thaumatotibia leucotreta*  
infected Citrus fruit

**Biology:** Eggs are laid on the fruit surface, singly or in small numbers. Shortly after hatching, young larvae enter the fruit and feed internally. Fully grown larvae emerge from the fruit and pupate in the soil, in a cocoon of silk and soil fragments. Adult moths have variegated brown and grey forewings with a white spot in the centre, while hind wings are light brown to grey. In most areas of its distribution, the pest is present all year-round with overlapping generations feeding on the available fruits of its wild or cultivated host plants.

**Damage symptoms:** Damage is caused by larvae feeding inside fruits, nuts, maize ears or cotton bolls. Feeding damage

can also lead to the development of secondary infections by fungi or bacteria

**Host Plants:** Avocado (*Persea americana*), cacao (*Theobroma cacao*), carambola (*Averrhoa carambola*), citrus species (particularly *C. sinensis* and *C. paradise*), coffee (*Coffea* spp.), guava (*Psidium guajava*), litchi (*Litchi sinensis*), macadamia (*Macadamia ternifolia*), peach (*Prunus persica*), pepper (*Capsicum* spp.), persimmon (*Diospyros kaki*), pomegranate (*Punica granatum*). It is also a pest of field crops such as, beans (*Phaseolus* spp.), cotton (*Gossypium hirsutum*), castor bean (*Ricinus communis*), and maize (*Zeamays*).

*T. leucotreta* is a polyphagous pest which can feed on more than 70 host plants within 40 plant families.

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