

**NPAG DATA: *CHLOROPHORUS ANNULARIS*
BAMBOO LONGHORN BEETLE**

DRAFT - AUGUST 28, 2000

TAXONOMY:

Phylum: Arthropoda
Class: Insecta
Order: Coleoptera
Family: Cerambycidae
Subfamily: Cerambycinae

Full Name: *Chlorophorus annularis* Fabricius
Synonym: *Callidium annulare* Fabricius (Koon, 1999)
Caloclytus annulare (Koon, 1999)
Common Name: Bamboo tiger longicorn (Shiraki, 1952)
Bamboo longhorn (Hill, 1983)

POTENTIAL THREAT TO THE UNITED STATES:

The pest is *not* known to be established in the United States but *may* be a potential threat as a number of recent interceptions indicate.

INTERCEPTION DATA:

Initial Interception in Wisconsin:

Location: Madison, WI
Date: Dec99
Host: *Bambusa?Unknown?* (Found at large in store)
Collector: Unknown
Identifier: Systematic Entomology Laboratory (SEL)
Beltsville, MD 20705-2350
Iden. Date: 1999 (?)

Interception in Minnesota:

Location: Eagan, MN (Found in bamboo stakes from Home Depot)
Date: 31Jul00
Host: *Bambusa?* (Bamboo stakes from China by way of Bencia, CA)
Collector: Professor, University of Minnesota
(Purchased bamboo stakes)
Identifier: Systematic Entomology Laboratory (SEL)
Beltsville, MD 20705-2350 (?)
Iden. Date: 2000 (?2000-0X-XX datasheet)

Note: The bamboo at the Home Depot in Minnesota came from a warehouse in Bencia, California owned by Bond Manufacturing. Information on trapping at the California warehouse is below. Under an Emergency Action Notification (EAN), the bamboo in Eagan, MN was destroyed on August 8, 2000.

Subsequent Detection(s) in California:

Location: ?, California (Bamboo in Bond Manufacturing warehouse)
Date: 17Aug00
Host: ? (?Light traps in warehouse; examination of host material, Chinese bamboo)
Collector: California Department of Food and Agriculture (CDFA)
(?)
Identifier: CDFA Laboratory (Name of expert identifier ?)
(Sent to CDFA laboratory?)
Iden. Date: 2000 (?)

Subsequent Detections:

Bamboo shipped from the Bond Manufacturing resulted in subsequent detections in other locations:

| | | | |
|---------|--------------------|-----------------|--------------------------------------|
| 17Aug00 | Springville, NY. | Nursery | Confirmed by SEL, shipment destroyed |
| 17Aug00 | Bridgehampton, NY. | Marters Nursery | Confirmed by SEL, shipment destroyed |
| 20Aug00 | Bloomington, MN | Home Depot | Confirmed by SEL (? from Bond Mfg.) |

QUARANTINE DATA:

Apparently, because of its wide distribution in Asia (and *possibly* its lack of ability to damage to living material or its status as a “Minor Pest”), this cerambycid is *not* listed as a pest of quarantine significance.

Prior USDA publications (source) states that the only genera in the Family Cerambycidae that are of quarantine concern are those that attack living plants. The pest interception network database (PIN309) does *not* show interceptions of *Chlorophorus annularis*, although this pest is in the “reportable file.”(Check) Interceptions of *Chlorophorus* sp. are in the PIN309 database.

Rapid dispersion is likely because of easy movement in exported bamboo and, possibly, other hosts (Duffy, 1968; Weidner, 1982). The larvae are frequently shipped to North America and Europe within bamboo and products from bamboo (Weidner, 1982).

Note: Baker (1972) lists *Chlorophorus annularis* in “a list of species known to have been introduced into the Eastern United States.” Baker also states that the principal food plant is stored bamboo.

LIFE HISTORY:

A typical life cycle for a beetle is the following: Egg → Larva → Pupa → Adult

According to Weidner (1982), development usually occurs in one year; however, because of drying of the bamboo, development may be extended to two or more years.

Egg Stage: Egg laying occurs on cut, air-dried bamboo (Weidner, 1982).

Larval Stage: The larvae burrow under the protection of the outer layer, essentially along the length. The tunnels are densely filled with frass (Weidner, 1982).

Pupal Stage: Pupation occurs near the surface. The exit holes are round-oval in shape (Weidner, 1982).

Adult Stage: The natural emergence of the young beetles occurs from May to September with the greatest emergence in June (Weidner, 1982).

The adult beetle is 10.0 to 15.0 mm in length and 2.2 to 4.0 mm in breadth. The body is densely clothed with yellowish pubescence. The elytra have dark brownish or black markings (Koon, 1999).

Habitat: In Laos, this cerambycid occurs throughout the country in clearings and burned forest (Koon, 1999).

HOSTS:

| Scientific Name | Common Name | Pest Status | Reference |
|---------------------------------|-------------------------|--------------|----------------------------|
| <i>Bambusa multiplex</i> | A bamboo | (Not stated) | Beller, 1948 |
| <i>Bambusa polymorpha</i> | A bamboo | (Not stated) | Beller, 1948 |
| <i>Bambusa spinosa</i> | Thorny bamboo | (Not stated) | Beller, 1948 |
| <i>Bambusa tulda</i> | A bamboo | (Not stated) | Beller, 1948 |
| <i>Bambusa vulgaris</i> | Common bamboo | “Minor Pest” | Hill, 1983 |
| <i>Bambusa</i> spp. | Bamboo | (Not stated) | Duffy, 1968 |
| <i>Dendrocalamus strictus</i> | Male bamboo | (Not stated) | Duffy, 1968 |
| <i>Citrus</i> sp. | A citrus | (Not stated) | Duffy, 1968; Shiraki, 1952 |
| <i>Dipterocarpus</i> sp. | (Not in <i>Hortus</i>) | (Not stated) | Koon, 1999 |
| <i>D. tuberculatus</i> | (Not in <i>Hortus</i>) | (Not stated) | Duffy, 1968 |
| <i>Gossypium</i> sp. | Cotton | (Not stated) | Duffy, 1968; Shiraki, 1952 |
| <i>Liquidambar formosana</i> | Sweetgum | (Not stated) | Duffy, 1968 |
| <i>Liquidambar</i> sp. | A sweetgum | (Not stated) | Koon, 1999; Shiraki, 1952 |
| <i>Phyllostachys reticulata</i> | A bamboo | (Not stated) | Duffy, 1968 |
| <i>Pyrus malus</i> | Apple | (Not stated) | Duffy, 1968; Shiraki, 1952 |
| <i>Pyrus</i> sp. | A pear (Apple?) | (Not stated) | Koon, 1999 (See above) |
| <i>Saccharum officinarum</i> | Sugarcane | (Not stated) | Hill <i>et al.</i> , 1982 |
| <i>Shorea</i> sp. | (Not in <i>Hortus</i>) | (Not stated) | Koon, 1999 |
| <i>Shorea robusta</i> | (Not in <i>Hortus</i>) | (Not stated) | Duffy, 1968 |
| <i>Sinobambusa gibbosa</i> | (Not in <i>Hortus</i>) | (Not stated) | Duffy, 1968 |
| <i>Sinocalamus</i> sp. | (Not in <i>Hortus</i>) | (Not stated) | Duffy, 1968 |
| <i>Tectona grandis</i> | Teak | (Not stated) | Duffy, 1968 |
| <i>Spondias</i> sp. | Mombin or relative | (Not stated) | Duffy, 1968; Koon, 1999 |
| <i>Vitis</i> sp. | A grape | (Not stated) | Duffy, 1968; Shiraki, 1952 |
| <i>Zea mays</i> | Corn | (Not stated) | Beller, 1948 |

Notes: Hill (1983) lists this cerambycid as a “Minor Pest” of bamboo, *Bambusa vulgaris* and other species. Koon (1999) states that “various bamboos” are hosts; in addition, the hosts given as “sp.” by Koon may only be restatements of previous, more precise reports.

DISTRIBUTION:

- Australia:** Australia (Imported; Duffy, 1968)
- Pacific Islands:** Guam (Beller, 1948); Marianas (Koon, 1999); Micronesia (Koon, 1999)
Hawaii (Duffy, 1968)
- Asia:** China (Hainan Island - Koon, 1999; Hong Kong area - Hill *et al.*, 1982;
North-east China - Koon, 1999; South China - Hill, 1983;
Taiwan - Koon, 1999, Makihara *et al.*, 1989); India (Assam, Punjab -
Duffy, 1968; Koon, 1999); Indonesia (Java, Sumatra - Duffy, 1968);

Japan (Koon, 1999; Shiraki, 1952); Korea (Duffy, 1968; Korean Soc. of Plant Protection, 1972); Laos (Koon, 1999); Malaysia (Duffy, 1968; Koon, 1999); Myanmar (Burma - Duffy, 1968; Koon, 1999); New Guinea (Duffy, 1968; Koon, 1999); Phillipines (Hill, 1983; Koon, 1999); Sarawak (Duffy, 1968) Singapore (Duffy, 1968); Sri Lanka (Koon, 1999); Thailand (Koon, 1999); Timor (Duffy, 1968); Vietnam (Koon, 1999)

DAMAGE WHERE ESTABLISHED:

Indicators of Significant Damage: In *Agricultural Insect Pests of the Tropics and Their Control*, Hill (1983) mentions this cerambycid as a “Minor Pest” of bamboo, *Bambusa vulgaris* and other species. Hill lists insects pests in two categories: “Major Pests” and “Minor Pests.”

According to Duffy (1968), this cerambycid is primarily a borer of dry bamboo. Due to its particular type of habitat, development is often considerably retarded; as a result, emergence often occurs long after the bamboo has been utilized in the construction of furniture, thatching, and so forth. A consignment of ski-staves were found to be infested with larvae of this species. In India, the bamboo structure of thached roofs and field telegraph posts are frequently extensively attacked.

In the *Catalogue of Injurious Insects in Japan*, Shiraki (1952) lists this cerambycid .

Weidner (1982) refers to this cerambycid as a damaging pest of bamboo (*gefährlicher Bambusschadling*).

Indicators of Insignificant Damage: In the monograph *Insects Injurious to Agriculture in Japan*, Clausen (1931) does *not* mention this cerambycid as a pest of bamboo.

In China near Hong Kong, this cerambycid “is found boring in dead stems where the larvae eat out the nodes and emerge through small holes at intervals along the stem.” This cerambycid also “bores in sugarcane stems” (Hill *et al.*, 1982).

In *Diseases and Pests of Economic Plants of Central and South China, Hong Kong, and Taiwan*, Hanson (1963) does *not* mention this cerambycid.

In the *List of Economic Pests, Host Plants, Parasites, and Predators in West Malaya (1920-1978)*, Yunas and Hua (1980) do *not* mention this cerambycid.

In *Agricultural Insect Pests of Temperate Regions and Their Control*, Hill (1987) does *not* mention this cerambycid.

METHODS OF CONTROL:

Cultural Control: Cultural control, at least to some degree, may be possible by the removal of infested material in the fall and winter. The infested bamboo may be recognized by exit holes and ?.

Physical Control: Duffy (1968) states that heat treatment is recommended.

Chemical Control: Chemical treatment of the larvae and adults is a possibility (Duffy, 1968; EPPO, 1994). However, fumigation is costly, and chemical treatment may be of little or no value because of the expense.

For complete protection of bamboo, Duffy (1968) gives the following procedure: immersing in water for five days, followed by drying in a covered shed for several days, and finally by soaking in crude petroleum (“Rangoon oil”) for two days.

Natural Enemies: According to Duffy (1968), parasites in the Order Hymenoptera are *Duportia initiator*, *Promiscolus sesquistriatus*, *Doryctes tristriatus*, *D. stroliger*, *D. picticeps*, *D. bistrriatus*, *D. brevipetiolus*, *Sclerodermus domesticus*, and *Eurytoma xylotrichi*.

According to Duffy (1968), several hymenopterous parasites of Indo-China may be of use in controlling this cerambycid: *Sclerodermus domesticus*, *Doryctes stroliger*, *D. picticeps*, and *D. tristriatus*.

PERTINENT POINTS/PREDICTED CONSEQUENCES:

Background on Bamboo: Based on the nature of their rhizomes (underground stems), most bamboos can be classified as either clump-forming bamboos (*e. g. Bambusa*) or running bamboos (*e. g. Phyllostachys*). The clump-forming bamboos are usually tropical. The running bamboos are usually temperate. The clump-forming bamboos form a single dense clump of stems. The running bamboos form rather open colonies or grooves (Bailey & Bailey, 1976; Marden, 1980).

In the United States, hardy bamboos are used for ornamental plantings (Marden, 1980; Wyman, 1977). The Genus *Arundinaria* and the Genus *Phyllostachys* contain several ornamental bamboos (see following Table of Ornamental Bamboos).

Two “bamboos” (in the Tribe Bambusa) are native in the United States (Wyman, 1977). The two species are *Arundinaria gigantea*, giant cane, and *A. tecta*, switch cane. Giant cane forms extensive colonies in low woods, on river banks, and on moist ground. Giant cane occurs from Missouri to North Carolina and Texas to Florida. Switch cane forms colonies in swampy woods, in moist pine barrens, and in live oak woods. Switch cane occurs on the Coastal Plain from southern Maryland to Mississippi (Hitchcock & Chase, 1950).

According to Neal (1965) several bamboos are grown in Hawaii. For example, the golden bamboo (*Bambusa vulgaris* var. *aureo-varigata*) is grown as an ornamental because of its yellow stems striped with green.

Identification: Koon (1999) gives a very detailed description of the adult.

Duffy (1968) gives a key to the larvae of Oriental timber beetles, a key to the pupae of Oriental timber beetles, a figure showing the adult beetle, and figures showing the damage caused by this cerambycid.

Makihara (1989) lists fourteen species of *Chlorophorus* as present in Taiwan.

Potential Damage: Because the this cerambycid occurs in Hawaii (Duffy, 1968) and because suitable hosts also occur in Hawaii (Neal, 1965), information on damage should be available from Hawaii.

Potential Distribution: This cerambycid is found in various locations which vary from the Typical-temperate Climatic Zone (Zone VI) to the Equatorial Climatic Zone (Zone I). (The usual preferred hosts, various bamboos, are present in a number of Climatic Zones.)

| | | |
|-----------|---------------------------------|------------------------------|
| Zone VI | Typical-temperate Climatic Zone | China, Japan (Honshu), Korea |
| Zone V-VI | An intermediate Climatic Zone | Japan (Honshu) |
| Zone V | Warm-temperate Climatic Zone | China, Japan (Shikoku) |
| Zone V-II | An intermediate Climatic Zone | South China |
| Zone II | Subtropical Climatic Zone | Myanmar, Thailand |
| Zone II-I | An intermediate Climatic Zone | Vietnam |
| Zone I | Equatorial Climatic Zone | Indonesia |

If established in the United States, the similar Climatic Zones would be climatically suitable for this cerambycid. (See attached maps showing Climatic Zones in Asia and North America.)

Movement in Trade: Several references indicate international movement of this cerambycid (Bain, 1977; Duffy, 1968; Weidner, 1982). There is a possibility that the movement of ornamental bamboos as nursery stock may transport this cerambycid.

Movement by Aerial Dispersal: Various cerambycids are capable of long-distance aerial transport. If capable of long-distance aerial transport, this cerambycid may have the ability to move beyond infested sites.

Potential Identification Problems: *Chlorophorus varius* is a cerambycid which Hill (1987) lists as a "Minor Pest" of grape; the larvae bore in the stems.

TABLE OF ORNAMENTAL BAMBOOS

From Wyman, 1977

| Scientific name | Common name | Hardiness Zone |
|-----------------------------------|--------------------------------|---|
| <i>Arundinaria simonii</i> | Simon bamboo | Zone 7 |
| <i>A. variegata</i> | Dwarf whitestripe bamboo | Zone 6; grown as far north as Boston; Japanese origin |
| <i>A. viridi-striata</i> | Variegated ground-cover bamboo | Zone 7; Japanese species |
| <i>Phyllostachys aureosulcata</i> | Yellowgroove bamboo | Zone 7; Chinese species |
| <i>P. nuda</i> | Naked bamboo | Zone 7; Chinese species |
| <i>P. viridis</i> | (Not in <i>Hortus</i>) | Zone 7; Chinese species |
| <i>Sasa disticha</i> | Dwarf fernleaf bamboo | Zone 7; 2-3' ground cover |
| <i>S. palmata</i> | Palmate bamboo | Zone 5; hardy in Boston |
| <i>Semiarundinaria fastuosa</i> | Narihira bamboo | Zone 7; Japanese species |

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