

***Chlorophorus annularis* (Fabricius)**

Coleoptera: Cerambycidae

Bamboo borer

Hosts	CAPS-Approved Survey Method
<p>Major/Primary hosts <i>Bambusa</i> spp. (Bamboo), <i>Bambusa multiplex</i> (Hedge bamboo), <i>Bambusa polymorpha</i> (Polymorph bamboo), <i>Bambusa tulda</i> (Bengal bamboo), <i>Bambusa vulgaris</i> (Common bamboo) <i>Citrus</i> spp. (Citrus), <i>Dendrocalamus strictus</i> (Male bamboo), <i>Dipterocarpus tuberculatus</i> (Eng Gurjuntree), <i>Gossypium</i> spp. (Cotton), <i>Indosasa crassiflora</i>, <i>Phyllostachys reticulata</i> (Giant timber bamboo), <i>Saccharum officinarum</i> (Sugarcane), <i>Sinocalamus</i> spp. (Wideleaf bamboo), <i>Vitis</i> spp. (Grape), <i>Zea mays</i> (Corn)</p> <p>Minor hosts <i>Bambusa spinosa</i> (Thorny bamboo), <i>Derris microphylla</i> <i>Liquidambar</i> spp. (Sweetgum), <i>Liquidambar formosana</i> (Beautiful sweetgum, Formosan), <i>Pyrus malus</i> (European crabapple), <i>Shorea</i> spp. (Shorea), <i>Shorea robusta</i> (Sal Tree) <i>Sinobambusa gibbosa</i> (Da Yan Zhu), <i>Spondias</i> spp. (Mombin), <i>Tectona</i> spp. (Tectona), <i>Tectona grandis</i> (Teak)</p> <p>*The insect has been reported in sugarcane, citrus, pear, apple, teak, cotton, corn, and, in the Chinese literature, maple. For many of these hosts, though, it's uncertain whether reports of associations are for larval damage or simply observations of flower-feeding by adults (which is common in this genus) (Pierce, n.d.).</p> <p>(CABI, 2008; USDA, 2000; Pierce, n.d.)</p>	<p>Visual</p>

Reason for Inclusion in Manual

Chlorophorus annularis is a PPQ Plant Program pest and is therefore a CAPS target.

Pest Description

Larvae:

Larvae of *C. annularis* are milky white and have a max width of 4 mm (approx. $\frac{3}{16}$ in) at the prothorax and length of 23 mm (approx. $\frac{7}{8}$ in) (CABI, 2007). Larvae have a smooth surface and brown mouthpiece (CABI, 2007).

Pupae:

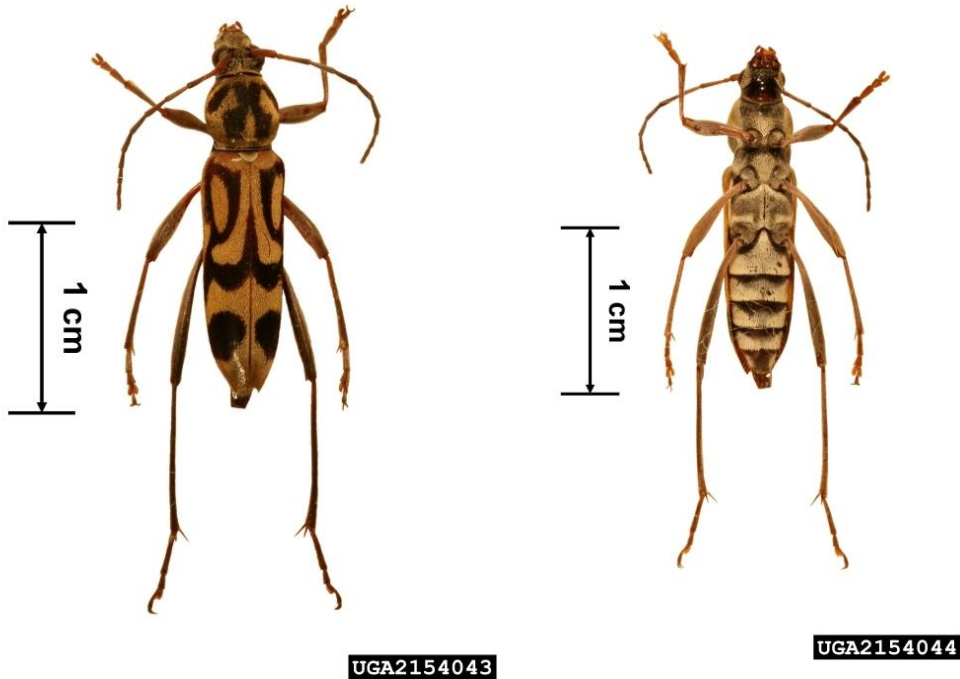
Pupae range from 7 to 15 mm (approx. $\frac{1}{4}$ to $\frac{9}{16}$ in) long and are 4.5 mm (approx. $\frac{3}{16}$ in) wide. Short transverse spines are found on the first through sixth tergites on the abdomen.

Adults:

From "Multimedia Album of the Subfamily Cerambycinae of Sarawak." (Koon, 1999):

"Head pitchy with dense flavo-lacteous pubescence on mandible, frons, gena and temple, less dense on vertex, neck and gula; antennae fuscous, entirely close with even and dense ashey pubescence except scape that is only thinly clothed; prothorax fuscous, with yellowish pubescence; latero-dorsal with an oval fuscous tomentose patch and another similar one but with greyish tinge at posterior of side; pronotum with a bifurcate, more like a inverted Y-letter fuscous tomentose patch at median, sometimes the lateral oval patches converge in anterior with the arm of median Y-shaped patch; scutellum flavo-lacteous; elytra fuscous as background color, markings and bands made of yellowish and fuscous pubescence; undersurfaces entirely clothed with silky pale lemon yellow pubescence; legs fuscous with thin whitish pubescence on femora, even less pubescent on tibiae.

Head very much narrower than prothorax; labrum and clypeus combined triangular-shaped; the latter extended to half of mandible; gena as wide as neck, parallel-sided; pubescence on frons arranged so as pointing towards a median groove; vertex with a median groove flanked by 2 carinulae; gula subglabrous, irregularly striate. **Antenna** shorter than broad, extended to half of elytra; scape cylindrical; 3 as long as scape; 4 - 11 gradually shorter. **Prothorax** as long as wide; cydariform to subglobular; base acutely constricted; apex narrower than base with an glabrous annular ring; disc same level as elytra; side convex, rounded; fuscous tomentose patches on pronotum coarsely puncto-striate. **Scutellum** large; wider at base; apex semicircular. **Elytron** 5 X as long as broad; parallel-sided, gradually curved from $\frac{1}{4}$ of apex; truncate at apex, emarginate with a produced angular cusp and acute sutural spine; yellowish marking denser compared to fuscous stripes, that is closely punctulate; yellowish markings on disc are as follow :- (i) a transverse fascia at base that extended to outer margin, acutely produced at humeral angle, continue posteriorly and attenuated slightly behind middle, this fascia also produced from scutellum along side of suture, feebly oblique and dilated into a club-like end; (ii) almost cover entire apical half, anterior border acutely sinuate, preapical with a roundish fuscous patch that reach outer margin; the brownish tomentose patch on left elytron look like a distorted number "2". **Legs:** mid femora carinate on ventral of its entire length."



C. annularis adult, dorsal view (Christopher Pierce, USDA APHIS PPQ, Bugwood.org)

C. annularis adult, ventral view
(Christopher Pierce, USDA APHIS PPQ, Bugwood.org)

Biology and Ecology

“Oviposition usually occurs on cut bamboo that is fairly dry (Beeson and Bhatia, 1939). The first-instar larvae bore into the walls of bamboo canes and excavate irregular chambers, which are then packed with frass and pieces of bamboo. Weidner (1982) suggests the life cycle can be completed in 1 year although due to the poor nutritional quality of dry bamboo, development will usually be slow, taking 2 or more years (Duffy, 1963). The mature larvae pupate within the bamboo and the adults can emerge a considerable time after the bamboo has been utilised in the construction of furniture, scaffolding, roofing and telegraph poles or whilst the bamboo is in use as plant supports in agriculture and horticulture.

In China, the adults emerge between April and July with peak emergence during May (Duffy, 1968). Elsewhere, the adults emerge from May to September with the peak in June” (CABI, 2008).

Countries of Origin

Chlorophorus annularis is native to Asia, specifically Brunei Darussalam, China, Cocos (Keeling) Islands, Timor, India, Japan, Korea, Laos, Myanmar, Philippines, Singapore, Sri Lanka, Taiwan, Thailand, and Vietnam (CABI, 2008).

Current Distribution

This species is present in: Australia, Brunei Darussalam, Cambodia, China, Cocos (Keeling) Islands, Hawaii, India, Indonesia, Japan, Korea, Laos, Malaysia, , Micronesia [Guam, Bonin Island, Marianas], Myanmar, Nepal, New Guinea, Philippines, Singapore, Sri Lanka, Taiwan, Thailand, Timor, and Vietnam (USDA, 2000; CABI, 2008; Friedman et al., 2008).

Distribution in United States

Guam: known to be established (K. Handy, personal communication, 2009).

Hawaii: known to be established (K. Handy, personal communication, 2009).

Minnesota: positive NAPIS data reported in 2003, not known to be established (K. Handy, personal communication, 2009).

Pathway

This cerambycid is primarily a borer of dry bamboo (Duffy, 1968). International movement may occur through movement of host material (bamboo) and bamboo products.

The United States has intercepted this pest multiple times in bamboo material; beetles have been intercepted in bamboo stakes in Florida (Halbert, 2005) and Minnesota (USDA, 2000) and in bamboo warehouses in Florida (Halbert, 2005) and California (USDA, 2000).

Pathogens Vectored

C. annularis is not a known vector and does not have any associated organisms.

Damage

The beetle infests dry bamboo and feeds internally within stems (CABI, 2007). Larvae may be located in the sap wood, just below the bark (Pierce, n.d.). Larvae excavate irregular chambers that are packed with frass and bamboo pieces (CABI, 2007).

Survey

CAPS-Approved Method

Visual inspection. There are no known attractants for *C. annularis*. Visual surveys of bamboo are recommended for locating larvae and pupae.

When visually inspecting bamboo canes, look for 2 to 3 mm diameter circular-oval exit holes (CABI, 2007). To dislodge frass, tap both ends of the canes firmly on a hard surface. Infested material can be cut open to search for frass, pupae or larvae just below the epidermis in the cortex (CABI, 2007).

Time of year to survey

Adults are present from April to September (Anonymous, n.d.).

Identification

CAPS-Approved Method

Morphological. Segments of antennae are particularly important to distinguish this species from close relatives.

Mistaken Identities

This pest is similar to *Chlorophorus strobilicola* and *C. varius*, neither of which is currently present in the United States.

Resources and High Resolution Images

Images

<http://www.forestryimages.org/browse/subthumb.cfm?sub=7399&Start=1&display=60&sort=2>

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