Trichoferus campestris (Faldermann)

syn. *Hesperophanes campestris* (Faldermann)
Coleoptera: Cerambycidae
Velvet longhorned beetle

Host(s)	CAPS-Approved Survey Method
Trichoferus campestris has been reported on both living trees and dead wood from many different host species. The list of living hosts is relatively short (below). From the literature, it appears that when *T. campestris* utilizes dry wood hosts, almost any woody species may be suitable, as long as there is bark present during the first few months (L. Newton, personal communication, 2013). **Living hosts** *Betula* spp. (Birch), *Broussonetia* spp. (Paper mulberry), *Gleditsia* spp. (Honeylocust), *Malus* spp. (Apple/Crabapple) **[preferred host]**, *Morus* spp. (Mulberry) **[preferred host]**, *Picea* spp. (Spruce), *Pinus* spp. (Pine), *Salix* spp. (Willow), *Sorbus* spp. (Mountain-ash, rowan); **Dry wood hosts:** *Betula* sp. (birch), *Chamaecyparis obtuse* (Hinoki false cypress), *Fagus crenata* (Japanese beech), *Juglans mandshurica* ssp. *sieboldiana* (Manshurian walnut), *Morus bombycis* (Mulberry), *Picea* spp. (Spruce), *Pinus* spp. (Pine), *Pinus densiflora* (Japanese red pine), *Robinia pseudoacacia* (Black locust), *Zelkova serrata* (Japanese zelkova), *Vitis vinifera* (Grape) **Other hosts (likely dry wood hosts):** *Abies* spp. (Fir), *Acer* spp. (Maple), *Alnus* spp. (Alder), *Aralia* spp. (Devil's walking stick),	One of the following: 1) Black light traps or 2) Visual.

Camellia japonica (Camellia), *Carpinus* spp. (Hornbeam), *Citrus* spp., *Cornus* spp. (Dogwood), *Diospyros* spp. (Persimmon, ebony), *Euonymus* spp. (Spindle trees), *Fraxinus* spp. (Ash), *Ilex* spp. (Holly), *Larix* spp. (Larch), *Malus* spp. (Apple), *Picea* spp. (Spruce), *Populus* spp. (Poplar), *Pyrus* spp. (Pear), *Rhus* spp. (Sumac), *Salix* spp. (Willow), *Syzygium* spp., *Tilia* spp. (Lime, linden), *Ulmus* spp. (Elm), *Wisteria* spp. *Quercus* (Oak), *Zanthoxylum* spp. (Prickly ash), *Ziziphus* spp. (Buckthorn). (Orlinski, 2006; CABI, 2008; EPPO, 2008; Wang, 2011; L. Newton, personal communication, 2013)	

Reason for Inclusion in Manual

Trichoferus campestris was a target species in the original EWB/BB National Survey Manual.

Taxonomy

For APHIS, Lingafelter (personal communication, 2010) has chosen to adopt the usage of Bense (1995) and treat *campestris* as *Trichoferus*. In the 2006 version of the Exotic Wood Borer/ Bark Beetle National Survey Guidelines, *T. campestris* was listed as *Hesperophanes (Trichoferus) campestris*.

Previously, there had been differences of opinion in the cerambycid worker community regarding the nomenclature of this species (CABI, 2008).

Pest Description

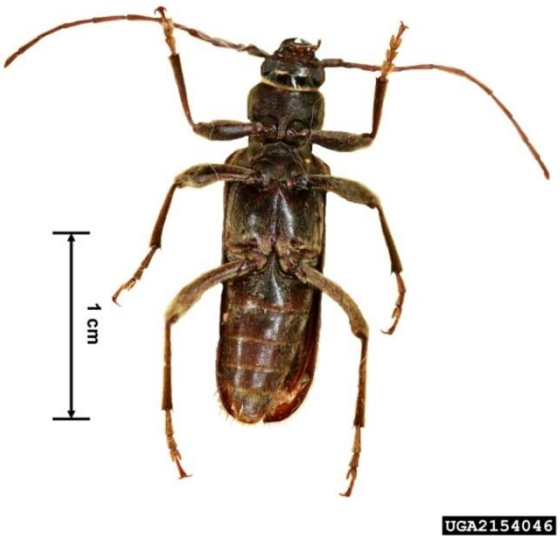
From "Data Sheets on Forest Pests" (EPPO, n.d.):

Eggs:
"Egg of *T. campestris* white, slightly elongated, narrowed and rounded at both ends, 1.9 mm long [approx. $^{1}/_{16}$ in], and 0.6 mm wide. The chorion mat with thin sculpture (Cherepanov, 1981)."

Larvae:
"Larva of *T. campestris* generally yellowish-white, up to 25 mm [approx. 1 in] long, with slightly developed legs, prominent skinny (non-sclerotized) ambulatory warts on I – VII abdominal segments. Head brown, up to 3 mm [approx. $^{1}/_{8}$ in] wide, slightly flattened dorso-ventrally, narrowed in the front part, strongly retracted into the prothorax, with three ocelli in transversal line on the vertex. Epistoma concave in the front part. Antennae long, with 4 segments. First antennal segment is thick, narrowed at the top, as long as other 3 segments together. Clypeus short, much widened at the base. Mandibles massive, black, rounded at the top. Prothorax slightly longer than mesothorax and metathorax together. Width of the pronotum twice as long as its length, rounded and narrowed in the front part, covered with long light hairs on the lateral sides, with orange transversal stripe broken in the middle. Scutum prominent, without hairs. Prosternum covered with orange hairs. Abdomen narrowed at the top, covered with light hairs. VIII abdominal sternite with mat spots on lateral sides at the top. Big larva may weight around 170 mg (Cherepanov, 1981)."

Pupae:
"Pupa of *T. campestris* white, 20 mm [approx$^{13}/_{16}$ in] long and 4.5 mm [approx. $^{3}/_{16}$ in] wide (in the abdomen part), elongated. Easily recognised by transversal wrinkles on vertex of head and on pronotum, and by small acute thorns on I – VI abdominal tergites and big thorns on the VII abdominal tergite. Head has no bristles. Antennae curved. Pronotum rounded at front part, narrowed to base, covered with small thorns forming a transversal stripe and a spot on the front part. Metanotum has a longitudinal stripe in the middle. Thorns on I – VI abdominal tergites form 3 transversal rows: 4- 8 thorns on each side of central line in back row, 2 thorns in middle row and 3-5 thorns in front row. Big thorns on VII abdominal tergite curved toward centre of the disk. VIII abdominal tergite covered with several long bristles (Cherepanov, 1981)."

Adults: "Adult of *T. campestris* elongated, with parallel sides of elitrae, 11-20 mm [approx. $^{7}/_{16}$ to $^{13}/_{16}$ in] long. All body, elitrae and legs from dark brown to brownish-orange, legs and antennae usually more light than body. Specific protuberances at the base of antennae. Beetle easily recognised by irregularly distributed hairs on elitrae forming spots. Head not very big, has a dense irregular punctuation and covered with small hairs inclined toward the front and centre. Front has a deep longitudinal fissure. Antennae long and covered with long cilia. They reach 2/3 (♀) or 3/4 (♂) of elitrae. 3rd antennal segment longer than 4th one and equal to 5th one. Pronotum rounded at both ends, covered with dense punctuation and light hairs inclined toward centre of disk. Scutellum rounded and covered with dense grey hairs. Back femora don't reach top of elitrae, back tarsi shorter than tibiae (Plavilshchikov, 1940; Cherepanov, 1981; Danilevskii & Miroshnikov, 1985; Ler, 1996)."



T. campestris adult ventral view (Christopher Pierce, USDA APHIS PPQ, Bugwood.org)

T. campestris adult dorsal view. (Christopher Pierce, USDA APHIS PPQ, Bugwood.org)

Biology and Ecology

This species is found in forests and orchards. Adults are active at night and attracted to bright lights (translation of Makhnovskii, 1996). Mass flight takes place from the end of June to the beginning of August (EPPO, 2008).

Eggs are laid on the bark of trunks or large branches. Host material can be healthy, stressed, dying, or cut trees. Larvae enter the bark, making galleries between the bark and sapwood, eventually moving into the wood. Larvae prefer feeding on the wood near the cambium; they have a high resistance to log dryness into which they bore. As they bore, larvae destroy most of the bark except the upper layer. Galleries can be 5 to 15 cm (approx. 2 to 6 inches) large. Overwintering occurs either under the bark or in pupation cells (EPPO, 2008).

The life cycle of *T. campestris* can take two or more years to complete (Svacha, 1987). It appears that the presence of bark surrounding the xylem is necessary for larvae to complete development (Iwata and Yamada, 1990).

Countries of Origin

This pest is native to most of China, Japan, the Korean peninsula, Mongolia and Russia (including the Russian Far East, the southeastern part of European Russia, and the southern Ural Mountains) (Grebennikov et al., 2010).

Current Distribution

This species is present in: Armenia, Canada (Montreal area),* China, Japan, Kazakhstan, Korea, Kyrgyzstan, Mongolia, Russia, Tajikstan, Turkmenistan and Uzbekistan (Krivosheina and Tokgaev, 1985; CABI, 2008; EPPO, 2008; Grebennikov et al., 2010).

*Two specimens of *T. campestris* were hand-collected in a residential area of Montreal, Quebec in 2002 and 2006 (Grebennikov et al., 2010). Follow up black light surveys did not detect additional beetles. Grebennikov et al. (2010) hypothesize that *T. campestris* is established in Canada.

Distribution in United States

T. campestris has been detected in small numbers in several states. It was detected on the exterior of a high-risk warehouse site in New Jersey in 1999 (USDA, 1999); in Illinois in 2009, 2010, and 2011; in Minnesota in 2010; in Ohio in 2009 and 2010; and in Utah in 2010.

Rhode Island: positive NAPIS data from 2006 (K. Handy, personal communication, 2009).

Pathway

T. campestris may travel to new areas on bonsai plants as well as other wood products of host plants in international trade. This pest may also move through wood packing materials or planting material as a hitchhiker pest.

Pathogens Vectored

T. campestris is not a known vector and does not have any associated organisms.

Damage

From "Data sheets on quarantine pests: *Trichoferus campestris"* (EPPO, n.d.):

> "Females lay eggs on the bark of trunks and big branches of healthy, stressed or dying trees or cut wood. Neonate larvae enter the bark and make galleries between the bark and the sapwood, then in the wood. Of all xylem, the wood near the cambium is preferred by growing larvae. Larvae have a high resistance to dryness of the logs into which they bore. Most of the bark except the upper layer is destroyed. Galleries made by big larvae are 5–12 cm large."
>
> "Characteristic symptoms [of attack] are: large entrance and emergence holes in trunks, peeling bark, borings at the basis of infested trees and tunnels made by big larvae. The leaves of attacked trees often show yellowing and wilting."

T. campestris is a pest of living trees and of timber, lumber, and dry wood (Iwata and Yamada, 1990; translation of Kostin, 1973). Living hosts are fruit trees, particularly wild and cultivated apples and mulberries (translation of Kostin, 1973; translation of Makhnovskii, 1996). *T.*

campestris attacks large trees, mostly apples, but also sometimes attacks other pome fruit (translation of Kostin, 1973). *T. campestris* attacks timber, lumber, dry wood, particularly fir and pine (translation of Kostin, 1973). The insect is a pest in construction and in buildings, similar to *Hylotrupes bajulus* (old house borer) and *Stromatium fulvum* (translation of Kostin, 1973). It is considered an important drywood borer in Japan and China (Iwata and Yamada, 1990).

In China, *T. campestris* has only been reported attacking weakened, dying, or newly dead trees (Wang, personal communication, 2011). In Russia, *T. campestris* has been reported to attack "apparently healthy" trees (Makhnovskii, 1996).

Survey

CAPS-Approved Method

There are two CAPS-Approved survey methods: 1) visual inspection and 2) black light traps (S. Lingafelter, personal communication; V. Mastro, personal communication). Additional guidance on how to use black light traps will be developed in 2013.

There are no known attractants for *T. campestris*. Individual *T. campestris* specimens have been caught in the U.S. in several different standard lure combinations; however, there is no pattern as to which lure is the most effective. The insect is nocturnal, is attracted to lights, and often gets into buildings (translation of Kostin, 1973).

1. Visual Survey

A species-specific visual protocol has not been developed at this time. Survey hosts for signs of damage (see above).

2. Trapping

2.1 Survey Site Selection

U.S. detections have occurred at the following types of sites:

- Warehouses in imported wood products;
- Rail-intermodal sites;
- Importers with multiple EANs for non-compliant SWPM of Asian and Western European origin;
- Pallet remanufacturing operations;
- Inside the warehouse of an auto glass importer;
- Inside the warehouse of an importer of metal parts including screws and bolts;
- Rail yard with wood recycling material;
- Importers of tile, stone, and plumbing fixtures; and
- Redistribution site of imported containers.

2.2 Trap and Lure

The CAPS-approved survey method (trapping) for *Trichoferus campestris* is a blacklight trap without a lure.

IPHIS Survey Supply Ordering System Product Names:
Black Light Trap and one of the following bulb kits:

1) Black Light Trap, 22 Watt, AC
2) Black Light Trap, 22 Watt, DC
3) Black Light Trap, 12 Watt, AC
4) Black Light Trap, 12 Watt, DC

2.3 Trap Placement

Traps should be placed as far away from other light sources as possible.

Ideally, traps would be run one night per week over a three to four week period to ensure overlap with the beetle's flight period (V. Mastro, personal communication). Ideally, traps would be checked within 24 hours, as specimens may be consumed by predatory insects also caught by the trap.

Summarized from Steve Lingafelter, (personal communication):

> Any lights with the UV spectrum are very good for attracting many species of nocturnal Cerambycidae, including the same tribe that *Trichoferus campestris* is part of, Hesperophanini.
>
> The most successful approach for this group is to run a mercury vapor (MV) bulb and two blacklights simultaneously and use a white sheet hung vertically to collect the beetles. The MV bulb will provide a much more intense, broad illumination that attracts species from a larger area. However, it illuminates such a large area that you have to "rotate" it on and off every 30 minutes or so. The cerambycids that are attracted to the vicinity may stop at the trees, etc. on the periphery until you turn the MV off. Then, they are brought in closer by the more localized blacklights. By turning the MV on and off every 30 minutes or so, you get periodic waves of Cerambycidae that you might otherwise miss since they wouldn't otherwise make it all the way to the sheet.

Additional guidance on how to use black light traps will be developed in 2013.

2.4 Time of year to survey

Flight occurs from the end of June to the beginning of August (EPPO, n.d.). U.S. detections have occurred between June and August. In Kazkhstan, the flight is reported as mid-summer, from July through August.

Identification

CAPS-Approved Method

Morphological.

Mistaken Identities

This pest is similar to *Hesperophanes pubescens* which is present in the United States.

Resources and High Resolution Images

Images
http://www.barkbeetles.org/browse/subject.cfm?SUB=9336

Resources and High Resolution Images

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