

# Tremex woodwasp

*Tremex fuscicornis*



# Tremex woodwasp

- Native of Europe and Asia where it feeds only on dead or diseased trees.
- Found in Chile in 2000.
- Attacks healthy trees.
- Agricultural loss of lumber and windbreaks.
- Wasps infect trees with phytotoxic fungus (*Cerrena unicolor*)



Image credits: *T. fuscicornis*—United States Department of Agriculture—[http://www.aphis.usda.gov/import\\_export/plants/manuals/online\\_manuals.shtml](http://www.aphis.usda.gov/import_export/plants/manuals/online_manuals.shtml)



The scientific name of this insect is *Tremex fuscicornis* (Fabricius). It has previously been known under the names *Sirex camelogigas* Christ, *Sirex fuscicornis* F., *Sirex struthiocamelus* Villers, *Tremex juxicornis* Walker, *Tremex simulacrum* Takeuchi, *Urocerus fuscicornis* Latreille, *Xyloecematium fuscicornis* Heyden, *Xyloterus fuscicornis* Boie. The wasp's common name is Tremex woodwasp, but is also known as Tremex wasp and avispa taladradora de la madera. It is of the family Siricidae (4).

Tremex woodwasp is a native of Europe and Asia (4). It is not a pest there, because the wasp only infests dead or sick trees and is generally only seen in small numbers. In its native range, the wasp has never been known to attack healthy trees. Little is known about the species, as it was not considered significant until it was discovered in Chile in 2000 (3). In Chile, it was found to be feeding on healthy poplar trees. There has been no documentation on other trees in Chile, since the loss of poplar was an agricultural loss from the killing of windbreak trees. All attacked trees have been killed. One tree is capable of harboring 2000 adult wasps (5). Female wasps inoculate trees with a fungus. The fungus, *Cerrena unicolor*, is pytotoxic (8). The fungus breaks down cellulose in the tree and accelerates the tree's decay. High presence of larva and adult wasps, along with the fungus, makes the trees useless for lumber or wood products (5). Tremex woodwasp could become a significant pest of forests.

# Global Distribution of the Tremex woodwasp

- Widely distributed in Europe and Asia.
- Introduced to Australia (1996) and Chile (2000)



- Introduced to Chile in 2000
- Caused agricultural damage from windbreak and lumber loss.

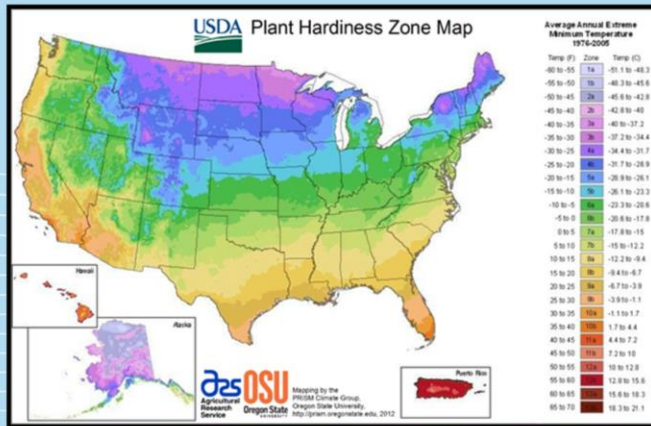
Image credits: Distribution map - <http://www.cabi.org/isc/datasheet/54516>



Countries where Tremex woodwasp is established: Armenia, Austria, Bulgaria, Croatia, Czech Republic, Danish mainland, Denmark, Estonia, Finland, France, Germany, Hungary, Italy, Latvia, Norway, Poland, Romania, Russia, Slovakia, Sweden, Switzerland, The Netherlands, Ukraine, China, Japan, Korea, Taiwan, Australia, Iran, and Chile (4).

*T. fuscicornis* was introduced to Australia and found in 1996. It was also found to be introduced to Chile in 2000 (3).

# Distribution of the Tremex woodwasp in the U.S.



- Could be introduced/not currently present.
- Estimated survival in Plant Hardiness Zones 3 to 11
- Most of the U.S. within this range



From the 2011 USDA-APHIS-PPQ New Pest Response guidelines, it is estimated that Tremex woodwasp can survive in USDA Plant Hardiness Zones 3 to 11, based on distribution in Eurasia (4).

In 2012, Tremex woodwasp was found during a warehouse trapping in Elberton, Georgia. Early detection traps were placed in the area. There were no specimens collected in 2013 or 2014, so it does not appear to have established in the area yet (2).

# Pest of Broadleaf Trees

A very wide range of trees are hosts, including:

- oak
- poplar
- Eastern cottonwood
- apple
- pear
- maple
- willow

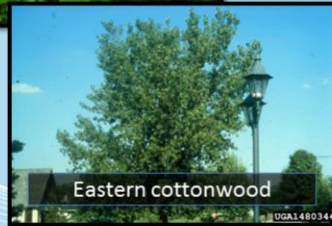


Image credits: Oak-Encyclopaedia Britannica-<http://www.britannica.com/plant/oak>; Poplar-Encyclopaedia Britannica-<http://www.britannica.com/plant/poplar>; Eastern cottonwood-Richard Webb-<http://www.forestyimages.org/browse/detail.cfm?imgnum=1430344>; Weeping willow-Encyclopaedia Britannica-<http://www.britannica.com/plant/willow>



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There is a very broad range of host plants identified that are present in North America (4).

## Asteraceae

- Boxelder (*Acer negundo* L.)
- Norway maple (*Acer platanoides* L.)
- Maple (*Acer* spp.)
- Sugar maple (*Acer saccharum* Marsh.)

## Betulaceae

- Alder (*Alnus* spp.)
- Japanese alder (*Alnus japonica*)
- Birch (*Betula* spp.)
- Downy birch (*Betula pubescens*)
- European hornbeam (*Carpinus betulus* L.)

## Fabaceae

- Black locust (*Robinia pseudoacacia* L.)

## Fagaceae

- Beech (*Fagus* spp.)
- European beech (*Fagus sylvatica* L.)
- American beech (*Fagus grandifolia* Ehrh.)
- Oak (*Quercus* spp.)

## Juglandaceae

- English walnut (*Juglans regia* L.)
- Chinese walnut (*Pterocarya stenoptera* C.)
- Hickory (*Carya* spp.)

## Plantanaceae

- American sycamore (*Platanus occidentalis* L.)

## Rosaceae

- Apple (*Malus* spp.)
- Pear (*Pyrus* spp.)
- Prunus* × *yedoensis* Matsum.

## Salicaceae

- Poplar (*Populus* spp.)
- White poplar (*Populus alba* L.)
- Eastern cottonwood (*Populus deltoides* Bartram ex Marsh.)
- Lombardy poplar (*Populus nigra* L.)
- European aspen (*Populus tremula* L.)
- Willow (*Salix* spp.)
- Weeping willow/Babylon willow (*Salix babylonica* L.)
- Humboldt's willow (*Salix humboldtiana* Willd.)

## Ulmaceae

- Japanese/Chinese hackberry (*Celtis sinensis* Pers.)
- Elm (*Ulmus* spp.)
- Japanese elm (*Ulmus davidiana* Planch. var. *japonica*)
- Zelkova spp.
- Japanese zelkova (*Zelkova serrata* Makino)
- Sugarberry (*Celtis laevigata* Willd.)

# Damage



Look for:

- Holes 5-6mm
- Die back
- Yellow, wilted, or dying leaves
- Tree death

Image credits: Whitney Cranshaw, Colorado State University, Bugwood.org



Adult wasp emergence from trees causes holes about 5 to 6mm in diameter (3). Boring larva damage the wood from feeding. The fungal symbiont of Tremex woodwasp causes wood decay. Trees may have dark patches on the bark from sap production caused by larval feeding. (7). Infected trees exhibit many symptoms such as reduced growth, yellowing leaves, wilting leaves, branch and crown dieback, loose bark, sapwood discoloration, leaf and trunk necroses, structural weakening, and tree death (1 and 4).

## Identification

- Larvae
  - Inside of tree in galleries
  - Cream colored
  - 3-4cm long
  - Spine at the end of abdomen



Image credits: Charley Eisenman -T. columbariana - <http://bugguide.net/node/view/36832/bgimage?from=24>



Larvae are cylindrical and cream colored. They have a semi-spherical head with mandibles, one-segmented antennae, and three pairs of prothoracic legs (7). They can be 3 to 4cm in length (3). The larva also have a distinctive spine at the end of the abdomen (1). Once hatched, the larva will burrow into the tree, creating galleries and feeding on the fungus *Cerrena unicolor* (8).

# Identification

- Adults

## Males:

- 11-29mm long
- Solid black
- Metallic sheen
- Brown wings
- Thorn-like tergite

## Females:

- 14-40mm long
- Dark head and thorax
- Orange-yellow abdomen with black banding
- Light brown wings
- Stout ovipositor



Image credits: <http://www.cabi.org/isc/datasheet/54516>



Adults emerge from trees by chewing through the bark, creating circular exit holes (4). The males are completely black with dark brown wings (1). Their bodies have a metallic sheen and range from 11 to 29mm long. The end of the abdomen has a short, thorn-like tergite. Female wasps are larger than the males. They range from 14 to 40mm long (7). They have dark heads and thoraxes and light brown wings. The abdomen is an orange-yellow color with black banding (4). Females also have a long ovipositor at the end of the abdomen (1).



## Lookalikes - Adults

*Tremex columba* –  
Pidgon Tremex

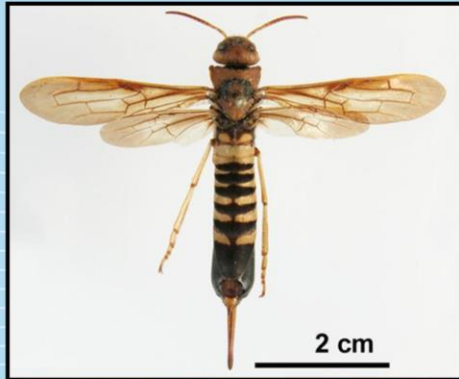
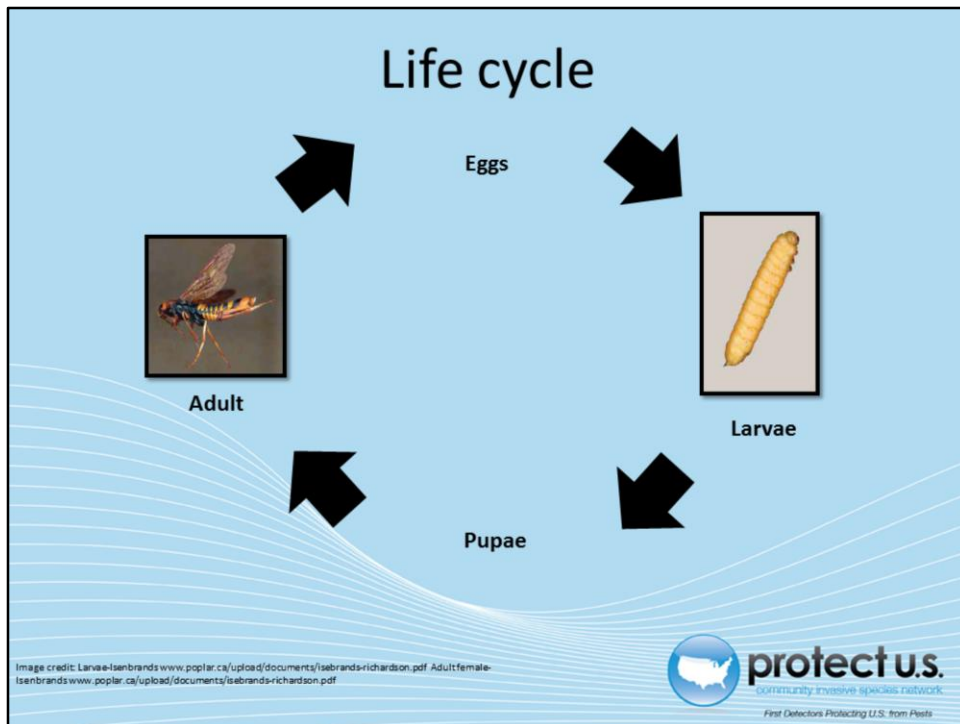


Image credits: Pest and Diseases Image Library, Bugwood.org Image 2: Pennsylvania Department of Conservation and Natural Resources - Forestry, Bugwood.org




The wasp *Tremex fuscicornis* is most similar in appearance to *Tremex columba*. *T. columba*, or Pidgon Tremex, is a common wood wasp that is native to North America. As both wasps are in the same genus, they can be difficult to tell apart. The key identifier to the species level is the distance ratio between posterior ocelli. Since this is difficult to determine, positive identification to species should be left to experts (4).



Not much is known about the *Tremex* woodwasp because most of the life cycle occurs within the trunk of a tree. In its native habitat, wasps select weakened or dying trees to oviposit. In Chile it was found to be capable of attacking healthy trees (4). Once females select a tree, they oviposit in the cambium layer. This also inoculates the tree with a phytotoxin and a white rot fungus, *Cerrena unicolor*. The females will lay between 300 to 400 eggs and will usually die in oviposition (7). The eggs are off-white and cylindrical (1). They are 1 to 1.2mm long and 0.2 to 0.25mm wide. Eggs are placed perpendicularly and at an oblique angle, so that they are separate in the wood, but grouped together. The larvae will hatch in 3 to 4 weeks and will feed on the hyphae of *C. unicolor*. Later, they will tunnel into the tree toward the xylem, creating galleries. When the larvae reaches the final instar, they will tunnel to the edge of the tree to pupate (7). They usually pupate about 4cm from the bark surface. The pupae are about 3cm long (1). They begin cream colored, but darken as they mature. Eventually they take on adult colorations (7). Wasps are univoltine, have a single generation a year, but may complete their life cycle in 5 months under optimal environmental conditions. The sex ratio is usually 1:1 (7). Adult wasps often mate in the upper branches of trees (4). Based on other wasps in the same family, adults do not feed, and live only long enough to mate and lay eggs (1).


Larvae will pupate inside the tree within the galleries (4). The pupae are about 3 cm long (1). They begin cream colored, but darken as they mature. Eventually they take on adult colorations (7).

# Monitoring



Watch out: Tree yellowing and death

Watch out: 5-6mm holes



Watch out: Larvae galleries and exit holes





Image credits: Whitney Cranshaw, Colorado State University, Bugwood.org Poplar tree windrow damage-P. Parra  
www.poplar.ca/upload/documents/isebrands-richardson.pdf Larvae galleries- lisanbrands www.poplar.ca/upload/documents/isebrands-richardson.pdf



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Adults are strong fliers, though not much is known on the exact distance they can travel. Most likely, introduction will occur by contaminated wood products. Larvae and pupae can be unintentionally transported by wood products. Things such as wood pallets or firewood should be monitored for insects and signs such as holes and larval galleries. Bait trees or trap trees can be used to monitor for adults. These trees are injected with herbicides or are girdled to stress the tree and attract the wasp. Trap trees should be placed in areas that are at a high risk for infestation, as trap trees are labor intensive. Recently dead or dying trees should be inspected for insects. At risk trees, or trees that are close to shipping and trade ports, should be monitored for signs of infestation. Signs to look for include: yellowing of leaves near the crown, presence of wasps near the crown, detached ovipositors on the bark, 5 to 6 mm exit holes in the bark, and poor or stunted tree growth. Suspect insects should be submitted for identification (4).

# Biological Control

## Nematodes

### Neotylenchidae

- *Deladenus proximus*
- *Deladenus siricidicola*



## Hymenoptera

### Ibalidae

- *Ibalia drewseni*
- *Ibalia leucospoides*
- *Ibalia jakowlewi*

### Ichneumonidae

- *Megarhyssa* spp.



Image credits: I. leucospoides wasp - Brandon Woo <http://bugguide.net/node/view/567306> Megarhyssa - Jim Occi, BugPics, Bugwood.org



As there are no known chemical controls for *Tremex fuscicornis*, biological controls are more effective. One method is the use of nematodes (4). For example, *Deladenus proximus* is a nematode native to the United States that controls the Eastern wood wasp *Sirex nigricornis*. This wood wasp is a relative of *Tremex*, so similar controls may be effective (9). Ongoing research is assessing nematode efficacy against *T. fuscicornis*. Other controls for *Tremex* are Ibalidae *Ibalia drewseni*, Ibalidae *Ibalia leucospoides*, Ibalidae *Ibalia jakowlewi*, Ichneumonidae *Megarhyssa* spp., and Neotylenchidae *Deladenus siricidicola* (4).

# Cultural Control

- Keep trees healthy
- Destroy infected plants and materials
- Treat infected wood
- Prevent wood from becoming infected



Debark trees to prevent insect infestation



Remove dead trees to prevent infestation

Remove and destroy infected trees.

Prevent infestation by rapid processing and water sprays



Image credits: Debarked tree - USDA [http://www.nrs.fs.fed.us/disturbance/invasive\\_species/eab/control\\_management/debarking/](http://www.nrs.fs.fed.us/disturbance/invasive_species/eab/control_management/debarking/) Fallen trees - Wikipedia [https://en.wikipedia.org/wiki/Large\\_woody\\_debris](https://en.wikipedia.org/wiki/Large_woody_debris) Logs for processing - Wikipedia <https://en.wikipedia.org/wiki/Lumber>



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There are multiple cultural controls for *Tremex* wood wasp. Preventative measures include keeping trees and plants healthy by watering and thinning. Infected plants should be destroyed. Infected lumber materials should be treated or removed and destroyed. Treatments of wood products include fumigation or exposure to high temperatures to kill eggs, larvae, and pupae. Preventative practices such as debarking, rapid processing, and storage under water sprays should be used to prevent wasp attacks in saw mills (1).

# Suspect Sample Submissions

- Contact your State Department of Agriculture or University Cooperative Extension laboratory
  - <http://www.npdn.org/home>
- PPQ form 391, Specimens for Determination
  - [https://www.aphis.usda.gov/library/forms/pdf/PPQ\\_Form\\_391.pdf](https://www.aphis.usda.gov/library/forms/pdf/PPQ_Form_391.pdf)

The image shows a detailed PPQ form for sample submissions. It includes sections for:
 

- Specimens for Determination:** Fields for collector name, date, and location.
- Reason for Certification:** Multiple choice options for why the sample is being submitted.
- Host Information:** Fields for host name and quantity.
- Plant Distribution:** Checkboxes for various plant parts like leaves, stems, and roots.
- Plant Part Distribution:** Checkboxes for specific plant parts like fruit, seed, and wood.
- Shipping Method:** Fields for shipping method and tracking number.
- Signature and Date:** Fields for the submitter's name and date.

An example of a PPQ form for sample submissions

Image credits: [https://www.aphis.usda.gov/library/forms/pdf/PPQ\\_Form\\_391.pdf](https://www.aphis.usda.gov/library/forms/pdf/PPQ_Form_391.pdf)



If a suspect pest has been located in the United States, a sample should be submitted for proper identification. Contact your local diagnostic lab to ship in a sample for identification. Information regarding your local diagnostic lab is available at National Plant Diagnostic Network (NPDN) website. The diagnostic lab information and available contacts are divided by state.

<http://www.npdn.org/home>

The sample specimen should be submitted along with accompanying documentation using the PPQ form 391.

[https://www.aphis.usda.gov/library/forms/pdf/PPQ\\_Form\\_391.pdf](https://www.aphis.usda.gov/library/forms/pdf/PPQ_Form_391.pdf)

Your local diagnostic lab is part of your local cooperative extension service or your state department of agriculture. Your local lab will also have a specific form. All local labs may not be a member of NPDN. However, all labs should report new pest and pathogen detections to local regulatory officials.

## Communications



- Contact your State Plant Health Director
  - [https://www.aphis.usda.gov/aphis/ourfocus/planthealth/ppq-program-overview/ct\\_sphd](https://www.aphis.usda.gov/aphis/ourfocus/planthealth/ppq-program-overview/ct_sphd)



- Contact your State Plant Regulatory Official
  - <http://nationalplantboard.org/membership/>

image credits: <http://www.usda.gov/wps/portal/usda/usdahome>; <http://nationalplantboard.org/>



Remember that new pest and pathogen records must be reported to your State Plant Health Director (SPHD) and your State Plant Regulatory Official (SPRO). The SPRO is a State Department of Agriculture Employee and the SPHD is a USDA-APHIS-PPQ employee.

The link to your SPRO is on the National Plant Board (NPB) website. It has an interactive map and when you click on your state it will take you to another page with contact information. The NPB is a cooperative organization that includes membership from all State Departments of Agriculture.

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- United States Department of Agriculture, National Institute of Food and Agriculture (USDA NIFA)
- United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine (USDA APHIS PPQ)
- Cooperative Agriculture Pest Survey (CAPS) Program
- National Plant Board (NPB)
- States Department of Agriculture
- Extension Disaster Education Network (EDEN)
- Center for Invasive Species and Ecosystem Health (Bugwood)
- National Plant Diagnostic Network (NPDN)
- U.S. Department of Homeland Security (DHS)
- U.S. Forest Service (USFS)



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