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Department of
Agriculture

Animal and
Plant Health
Inspection
Service

Plant Protection
and Quarantine

New Pest Response Guidelines

Tremex Wood Wasp (*Tremex fuscicornis*)



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Cover Image

Image of *Tremex fuscicornis* courtesy of Torbin Nielson, Denmark.

Acknowledgements

Introduction

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Introduction

Use *New Pest Response Guidelines: Tremex Wood Wasp* (*Tremex fuscicornis* (*F.*)), when designing a program to detect, monitor, control, contain, or eradicate an infestation of this insect in the United States and collaborating territories.

The United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine (USDA–APHIS–PPQ) developed the guidelines through discussion, meeting, or agreement with staff members at the USDA-Agricultural Research Service and advisors at universities.

Any new detection may require the establishment of an Incident Command System to facilitate emergency management. This document contains the necessary information to launch a response to a detection of the tremex wood wasp.

If the tremex wood wasp is detected, PPQ personnel will produce a site-specific action plan based on the guidelines. As the program develops and new information becomes available, the guidelines will be updated.

Users

The guidelines is intended as a reference for the following users who have been assigned responsibilities for a plant health emergency for tremex wood wasp:

- ◆ PPQ personnel
 - ◆ Emergency response coordinators
 - ◆ State agriculture department personnel
 - ◆ Others concerned with developing local survey or control programs
-

Contacts

When an emergency program for tremex wood wasp has been implemented, the success of the program depends on the cooperation, assistance, and understanding of other involved groups. The appropriate liaisons and information officers should distribute news of the program's progress and developments to interested groups, including the following:

- ◆ Academic entities with agricultural interests
- ◆ Agricultural interests in other countries
- ◆ Commercial interests
- ◆ Grower groups such as specific commodity or industry groups
- ◆ Land-grant universities and Cooperative Extension Services
- ◆ National, State and local news media
- ◆ Other Federal, State, county, and municipal agricultural officials
- ◆ Public health agencies
- ◆ The public
- ◆ State and local law enforcement officials
- ◆ Tribal governments

Initiating an Emergency Pest Response Program

An emergency pest response program consists of detection and delimitation, and may be followed by programs in regulation, containment, eradication and control. The New Pest Advisory Group (NPAG) will evaluate the pest. After assessing the risk to U. S. plant health, and consulting with experts and regulatory personnel, NPAG will recommend a course of action to PPQ management.

Follow this sequence when initiating an emergency pest response program:

- 1.** A new or reintroduced pest is discovered and reported
- 2.** The pest is examined and pre-identified by regional or area identifier
- 3.** The pest's identity is confirmed by a national taxonomic authority recognized by USDA–APHIS–PPQ–National Identification System
- 4.** Published New Pest Response Guidelines are consulted or a new NPAG is assembled in order to evaluate the pest
- 5.** Depending on the urgency, official notifications are made to the National Plant Board, cooperators, and trading partners
- 6.** A delimiting survey is conducted at the site of detection
- 7.** An Incident Assessment Team may be sent to evaluate the site
- 8.** A recommendation is made, based on the assessment of surveys, other data, and recommendation of the Incident Assessment Team or the NPAG, as follows:
 - A.** Take no action
 - B.** Regulate the pest
 - C.** Contain the pest
 - D.** Suppress the pest
 - E.** Eradicate the pest
- 9.** State Departments of Agriculture are consulted
- 10.** If appropriate, a control strategy is selected
- 11.** A PPQ Deputy Administrator authorizes a response
- 12.** A command post is selected and the Incident Command System is implemented
- 13.** State departments of agriculture cooperate with parallel actions using a Unified Command structure

14. Traceback and trace-forward investigations are conducted
 15. Field identification procedures are standardized
 16. Data reporting is standardized
 17. Regulatory actions are taken
 18. Environmental Assessments are completed as necessary
 19. Treatment is applied for required pest generational time
 20. Environmental monitoring is conducted, if appropriate
 21. Pest monitoring surveys are conducted to evaluate program success
 22. Programs are designed for eradication, containment, or long-term use
-

Preventing an Infestation

Federal and State regulatory officials must conduct inspections and apply prescribed measures to ensure that pests do not spread within or between properties. Federal and State regulatory officials conducting inspections should follow the sanitation guidelines in the section *Preparation, Sanitization, and Clean-Up* on page 4-2 before entering and upon leaving each property to prevent contamination.

Scope

The guidelines is divided into the following chapters:

1. *Introduction* on page 1-1
2. *Pest Information* on page 2-1
3. *Identification* on page 3-1
4. *Survey Procedures* on page 4-1
5. *Regulatory Procedures* on page 5-1
6. *Control Procedures* on page 6-1
7. *Environmental Compliance* on page 7-1
8. *Pathways* on page 8-1

The guidelines also includes appendixes, a references section, a glossary, and an index.

The Introduction contains basic information about the guidelines. This chapter includes the guideline's purpose, scope, users, and application; a list of related documents that provide the authority for the guidelines content; directions about how to use the guidelines; and the conventions (unfamiliar or unique symbols and highlighting) that appear throughout the guidelines.

Authorities

The regulatory authority for taking the actions listed in the guidelines is contained in the following authorities:

- ◆ Plant Protection Act of 2000 (Statute 7 USC 7701-7758)
 - ◆ Executive Order 13175, Consultation and Coordination with Indian and Tribal Governments
 - ◆ Fish and Wildlife Coordination Act
 - ◆ National Historic Preservation Act of 1966
 - ◆ Endangered Species Act
 - ◆ Endangered and Threatened Plants (50 CFR 17.12)
 - ◆ National Environmental Policy Act
-

Program Safety

Safety of the public and program personnel is a priority in pre-program planning and training and throughout program operations. Safety officers and supervisors must enforce on-the-job safety procedures.

Support for Program Decisionmaking

USDA–APHIS–PPQ–Center for Plant Health, Science and Technology (CPHST) provides technical support to emergency pest response program directors about risk assessments, survey methods, control strategies, regulatory treatments, and other aspects of pest response programs. PPQ managers meet with State departments of agriculture in developing guidelines and policies for pest response programs.

How to Use the Guidelines

The guidelines is a portable electronic document that is updated periodically. Download the new version from its source, and then use Adobe Reader® to view it on your computer screen. You can print the guidelines for convenience. However, links and navigational tools are only functional when the document is viewed in Adobe Reader®. Remember that printed copies of the guidelines are obsolete once a new version has been issued.

Conventions

Conventions are established by custom and are widely recognized and accepted. Conventions used in the guidelines are listed in this section.

Advisories

Advisories are used throughout the guidelines to bring important information to your attention. Please carefully review each advisory. The definitions have been updated so that they coincide with the America National Standards Institute (ANSI) and are in the format shown below.

EXAMPLE Example provides an example of the topic.

Important Important indicates information that is helpful.

CAUTION

CAUTION indicates that people could possibly be endangered and slightly hurt.

DANGER

DANGEROUS indicates that people could easily be hurt or killed.

NOTICE

NOTICE indicates a possibly dangerous situation where goods might be damaged.

 WARNING

WARNING indicates that people could possibly be hurt or killed.

Boldfacing

Boldfaced type is used to highlight negative or important words. These words are: never, not, do not, other than, prohibited.

Lists

Bulleted lists indicate that there is no order to the information being listed. Numbered lists indicate that information will be used in a particular order.

Disclaimers

All disclaimers are located on the unnumbered page that follows the cover.

Table of Contents

Every chapter has a table of contents that lists the heading titles at the beginning to help facilitate finding information.

Control Data

Information placed at the top and bottom of each page helps users keep track of where they are in the guidelines. At the top of the page is the chapter and first-level heading. At the bottom of the page is the month, year, title, and page number. PPQ-Emergency and Domestic Programs-Emergency Programs is the unit responsible for the content of the guidelines.

Change Bar

A vertical black change bar in the left margin is used to indicate a change in the guidelines. Change bars from the previous update are deleted when the chapter or appendix is revised.

Decision Tables

Decision tables are used throughout the guidelines. The first and middle columns in each table represent conditions, and the last column represents the action to take after all conditions listed for that row are considered. Begin with the column headings and move left-to-right, and if the condition does not apply, then continue one row at a time until you find the condition that does apply.

Table 1-1 How to Use Decision Tables

If you:	And if the condition applies:	Then:
Read this column cell and row first	Continue in this cell	TAKE the action listed in this cell
Find the previous condition did not apply, then read this column cell	Continue in this cell	TAKE the action listed in this cell

Footnotes

Footnotes comment on or cite a reference to text and are referenced by number. The footnotes used in the guidelines include general text footnotes, figure footnotes, and table footnotes. General text footnotes are located at the bottom of the page.

When space allows, figure and table footnotes are located directly below the associated figure or table. However, for multi-page tables or tables that cover the length of a page, footnote numbers and footnote text cannot be listed on the same page. If a table or figure continues beyond one page, the associated footnotes will appear on the page following the end of the figure or table.

Heading Levels

Within each chapter and section there can be four heading levels; each heading is green and is located within the middle and right side of the page. The first-level heading is indicated by a horizontal line across the page, and the heading follows directly below. The second-, third-, and fourth-level headings each have a font size smaller than the preceding heading level. The fourth-level heading runs in with the text that follows.

Hypertext Links

Figures, headings, and tables are cross-referenced in the body of the guidelines and are highlighted in boldface type. These appear in blue hypertext in the online guidelines.

Italics

The following items are italicized throughout the guidelines:

- ◆ Cross-references to headings and titles
- ◆ Names of publications
- ◆ Scientific names

Numbering Scheme

A two-level numbering scheme is used in the guidelines for pages, tables, and figures. The first number represents the chapter. The second number represented the page, table, or figure. This numbering scheme allows for identifying and updating. Dashes are used in page numbering to differentiate page numbers from decimal points.

Transmittal Number

The transmittal number contains the month, year, and a consecutively-issued number (beginning with -01 for the first edition and increasing consecutively for each update to the edition). The transmittal number is only changed when the specific chapter sections, appendixes, or glossary, tables, or index is updated. If no changes are made, then the transmittal number remains the unchanged. The transmittal number only changes for the entire guidelines when a new edition is issued or changes are made to the entire guidelines.

Acknowledgements

Writers, editors, reviewers, creators of cover images, and other contributors to the guidelines, are acknowledged in the acknowledgements section. Names, affiliations, and Web site addresses of the creators of photographic images, illustrations, and diagrams, are acknowledged in the caption accompanying the figure.

How to Cite the Guidelines

Cite the guidelines as follows: U. S. Department of Agriculture, Animal Plant Health Inspection Service, Plant Protection and Quarantine. 2011. *New Pest Response Guidelines: Tremex Wood Wasp (Tremex fuscicornis (F.))*. Washington, D.C.: Government Printing Office. http://www.aphis.usda.gov/import_export/plants/manuals/online_manuals.shtml

How to Find More Information

Contact USDA–APHIS–PPQ–EDP-Emergency Management for more information about the guidelines. Refer to *Resources* on page [A-1](#) for contact information.

Pest Information

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Introduction

Use *Chapter 2 Pest Information* to learn more about the classification, history, host range, and biology of *Tremex fuscicornis* (F.).

Classification

The tremex wood wasp belongs in the phylum Arthropoda, class Insecta, order Hymenoptera, sub-order Symphyta, superfamily Siricoidea, family Siricidae, species *Tremex fuscicornis*. Use [Table 2-1](#) as a guide to the classification of the tremex wood wasp and the names used to describe it in the guidelines.

Table 2-1 Classification of *Tremex fuscicornis*

Phylum	Arthropoda
Class	Insecta
Order	Hymenoptera
Sub-Order	Symphyta

Table 2-1 Classification of *Tremex fuscicornis* (continued)

Superfamily	Siricoidea
Family	Siricidae
Genus	<i>Tremex</i>
Full Name	<i>Tremex fuscicornis</i> (Fabricius)
Preferred Common Name	tremex wood wasp
Synonyms ¹	<i>Sirex camelogigas</i> Christ, <i>Sirex fuscicornis</i> F., <i>Sirex struthio-camelus</i> Villers, <i>Tremex juxicornis</i> Walker, <i>Tremex simulacrum</i> Takeuchi, <i>Urocerus fuscicornis</i> Latreille, <i>Xyloecematium fuscicornis</i> Heyden, <i>Xyloterus fuscicornis</i> Boie
Other Common Names ²	avispa taladradora de la madera (Spanish), tremex wasp (English)

1 Smith, 1978.

2 Ciesla, 2003.

Ecological Range

Tremex fuscicornis is native to Asia and Europe (Hedgren, 2010). In its native habitat, it is not considered to be an economic pest because it only infests dead or sick trees (Ciesla, 2003). Due to its negligible impact on human resources and furtive lifestyle, little is known about the ecology of this species.

Recent concern in 2000, from an introduction into Chile from China, has since shown *Tremex fuscicornis* to be capable of feeding on healthy poplar (*Populus* spp.) trees. This has resulted in agricultural damage due to loss of windbreaks and lumber. The infestation of the wood wasp also results in inoculation of a fast growing symbiotic fungus. The phytotoxic fungus is a food source for the larvae and also rapidly causes the trees to be unmarketable (Ciesla, 2003; Food and Agriculture Organization of the United Nations (FAO), 2007).

Refer to [Table 2-2](#) on page 2-3 and [Table 2-3](#) on page 2-3 for two lists of countries in which *Tremex fuscicornis* is reported to be established.

Table 2-2 European Countries in Which *Tremex fuscicornis* is Established

Country	Source
Armenia	Smith, 1978
Austria	EUNIS, 2010; Smith, 1978
Bulgaria	EUNIS, 2010
Croatia	EUNIS, 2010
Czech Republic	EUNIS, 2010; Smith, 1978
Danish mainland	EUNIS, 2010
Denmark	Smith, 1978
Estonia	EUNIS, 2010
Finland	EUNIS, 2010; Smith, 1978
France	EUNIS, 2010; Smith, 1978
Germany	EUNIS, 2010; Smith, 1978
Hungry	EUNIS, 2010; Smith, 1978
Italy	EUNIS, 2010; Faccoli, 2000; Smith, 1978
Latvia	EUNIS, 2010; Smith, 1978
Norway	EUNIS, 2010; Smith, 1978; Witmond, 1999
Poland	EUNIS, 2010; Smith, 1978
Romania	EUNIS, 2010
Russia	EUNIS, 2010; Smith, 1978
Slovakia	EUNIS, 2010
Sweden	EUNIS, 2010; Hedgren, 2010
Switzerland	EUNIS, 2010
The Netherlands	EUNIS, 2010; Witmond, 1999
Ukraine	EUNIS, 2010; Smith, 1978

Table 2-3 Non-European Countries in Which *Tremex fuscicornis* is Established

Region	Country	Source
Asia	China	Smith, 1978
	Japan	Smith, 1978
	Korea	Lee et al., 1998; Smith, 1978
	Russia	Smith, 1978
	Taiwan	Smith, 1978
Australasia & South Pacific	Australia	Ciesla, 2003; Hedgren, 2010
Middle East	Iran	Shamohammadi et al., 2008
South America	Chile	Baldini, 2001; Baldini 2002

Hosts

Tremex fuscicornis larvae feed on deciduous trees, primarily on *Populus* and *Salix* spp. Other prospective hosts include species of the genera *Malus*, *Pyrus*, *Fagus* and *Acer* (Table 2-4 on page 2-4) (Ciesla, 2003; Parra Sanhueza, 2005). The host plants are common in the United States and can occur at high densities. The native pigeon tremex wood wasp *T. columba* L. utilizes closely related and widely distributed genera across North America (Table 2-5 on page 2-5) (Smith and Schiff, 2002).

Table 2-4 Documented Hosts of *Tremex fuscicornis*

Family	Species	Common Name	U. S. ¹	Source
Aceraceae	<i>Acer negundo</i> L.	boxelder	Yes	Smith, 1978
Aceraceae	<i>Acer platanoides</i> L.	Norway maple	Yes	Smith, 1978
Betulaceae	<i>Alnus</i> spp.	alder	Yes	Smith, 1978
Betulaceae	<i>Alnus japonica</i> (Thunb.) Steud.	Japanese alder	Yes	Smith, 1978
Betulaceae	<i>Betula</i> spp.	birch	Yes	Smith, 1978
Betulaceae	<i>Betula pubescens</i> Ehrh.	downy birch	Yes	CABI, 2011
Betulaceae	<i>Carpinus betulus</i> L.	European horn-beam	Yes	Smith, 1978
Fabaceae	<i>Robinia pseudoacacia</i> L.	black locust	Yes	Baldini, 2002; Smith, 1978
Fagaceae	<i>Fagus</i> spp.	beech	Yes	Smith, 1978
Fagaceae	<i>Fagus sylvatica</i> L.	European beech	Yes	Smith, 1978
Fagaceae	<i>Quercus</i> spp.	oak	Yes	Smith, 1978
Juglandaceae	<i>Juglans regia</i> L.	English walnut	Yes	Smith, 1978
Juglandaceae	<i>Pterocarya stenoptera</i> C. DC.	Chinese wingnut	Yes	Smith, 1978
Rosaceae	<i>Prunus</i> × <i>yedoensis</i> Matsum. (pro sp.) [<i>subhirtella</i> × <i>speciosa</i>]	none	Yes	Smith, 1978
Salicaceae	<i>Populus</i> spp.	poplar	Yes	Baldini, 2002; Francke-Grosmann, 1939; Smith, 1978
Salicaceae	<i>Populus alba</i> L.	white poplar	Yes	Baldini, 2002; Smith, 1978
Salicaceae	<i>Populus deltoides</i> Bartram ex Marsh.	Eastern cottonwood	Yes	Baldini, 2002
Salicaceae	<i>Populus nigra</i> L.	Lombardy poplar	Yes	Baldini, 2002; Smith, 1978
Salicaceae	<i>Populus tremula</i> L.	European aspen	Yes	Smith, 1978

Table 2-4 Documented Hosts of *Tremex fuscicornis*

Family	Species	Common Name	U. S. ¹	Source
Salicaceae	<i>Salix</i> spp.	willow	Yes	Baldini, 2002; Smith, 1978
Salicaceae	<i>Salix babylonica</i> L.	Babylon willow; Weeping willow	Yes	Baldini, 2002
Salicaceae	<i>Salix humboldtiana</i> Willd.	Humboldt's willow	Yes ²	Baldini, 2002
Ulmaceae	<i>Celtis sinensis</i> Pers.	Japanese or Chinese hackberry	No	Smith 1978
Ulmaceae	<i>Ulmus</i> spp.	elm	Yes	Smith, 1978
Ulmaceae	<i>Ulmus davidiana</i> Planch. var. <i>japonica</i> (Rehder) Nakai	Japanese elm	No	Smith, 1978
Ulmaceae	<i>Zelkova</i> spp.	none	Yes	Smith, 1978
Ulmaceae	<i>Zelkova serrata</i> (Thunb.) Makino	Japanese zelkova	Yes	Smith, 1978

1 Establishment in the United States.

2 Puerto Rico.

Table 2-5 Additional Documented Hosts of *Tremex columba* Not Listed in Table 2-4

Family	Species	Common Name	Source
Aceraceae	<i>Acer</i> sp.	maple	Smith, 1978
Aceraceae	<i>Acer saccharum</i> Marsh.	sugar maple	Smith, 1978
Fagaceae	<i>Fagus grandifolia</i> Ehrh.	American beech	Smith and Schiff, 2002
Fagaceae	<i>Quercus</i> spp.	Oak	Smith and Schiff, 2002
Juglandaceae	<i>Carya</i> spp.	hickory	Smith and Schiff, 2002
Palatanaceae	<i>Palatanus occidentalis</i> L.	American sycamore	Smith and Schiff, 2002
Rosaceae	<i>Malus</i> spp.	apple	Smith and Schiff, 2002
Rosaceae	<i>Pyrus</i> spp.	pear	Smith and Schiff, 2002
Ulmaceae	<i>Celtis laevigata</i> Willd.	sugarberry	Smith and Schiff, 2002

Potential Distribution

Tremex fuscicornis is distributed throughout Eurasia and has been introduced into Chile and Australia (Hedgren, 2010). Based on the reported global distribution, it is estimated that *T. fuscicornis* can survive in Plant Hardiness Zones 3 through 11 in the United States. The availability of some important primary hosts (Table 2-4 on page 2-4) was used to describe the potential for establishment of *T. fuscicornis* in the continental United States.

Life Cycle

The hosts of *Tremex fuscicornis* are only broadleaf trees (Witmond, 1999). The wood wasp requires the symbiotic phytotoxic fungus *Cerrena unicolor* (Bull.) Murrill as a larval food source (Francke-Grossman, 1939; Pažoutová and Šrutka, 2007). The oidia of the fungus are carried in specialized abdominal glands called mycangia and inoculated with the egg (Palma et al., 2005). The fungus destroys the wood, allowing the larvae to feed and tunnel in the tree (Pažoutová and Šrutka, 2007). The number of instars, length of the developmental cycle and number of generations per year for *T. fuscicornis* are undetermined (Ciesla, 2003).

Eggs

The female inserts eggs into the cambium layer of the tree along with the oidia of the symbiotic fungus (Francke-Grosmann, 1939).

Larvae

Upon hatching, the larvae burrow deeper into the tree and feed on the hyphae of the fungus (Francke-Grosmann, 1939; Pažoutová and Šrutka, 2007). This feeding creates galleries in the bark which can reach up to one meter long and gradually become wider as the larva grows (Baldini, 2002).

Pupae

The larvae pupate within the galleries inside the tree, resting a few centimeters from the surface (Baldini, 2002).

Adults

The adults emerge from the trees by chewing their way through the bark. The circular exit holes are 5 to 6 mm in diameter (Ciesla, 2003). Based on knowledge of other siricids such as *Sirex noctilio* F., the adults do not feed and only live long enough to mate and lay eggs (Taylor, 1981; USDA-APHIS, 2008). The emergence of adults can span from summer into the fall.

Behavior

Little is known about the biology and behavior of this insect because the majority of its life cycle occurs in the interior trunk of a tree. In its native habitat, *Tremex fuscicornis* is primarily found attacking weakened trees or those already dying of other causes. Although not considered to be an economic pest across its natural range, as an introduced pest in Chile it has been found attacking healthy trees.

Mating behaviors within the Siricidae family have been described as occurring in the upper branches of trees, with males emerging earlier than females and swarming above the trees (Morgan, 1968).

Dispersal

There is no specific information available about the ability of *Tremex fuscicornis* to disperse. Adult siricids are generally strong fliers and are known to fly distances of several kilometers in search of suitable hosts or mates (Ciesla, 2003, Bruzzone et al., 2009). Transportation of immatures can occur through trade in wood products; the introduction into Chile is believed to have been the result of wood crates from China (Baldini, 2002).

Damage

Emergence holes of adult *Tremex fuscicornis* consist of round exit holes 5 to 6 mm in diameter (Ciesla, 2003). Other indications of damage to infected trees caused by *T. fuscicornis* and associated fungi appear similar to the effects of other siricids, including: branch and crown dieback, reduced growth; yellowing leaves; wilted leaves; leaf and trunk necroses; tyloses formation; loosed bark sapwood discoloration; and structural weakening (Davis et al., 2006, Revised 2010).

Economic Impact

In its native range, *Tremex fuscicornis* is not reported to cause economic damage, possibly due to natural enemies (Smith and Schiff, 2002) and because it normally infects only unhealthy trees. The behavior of the insect appears to have changed with the recent introduction into Chile. Reports note that *T. fuscicornis* in Chile is damaging healthy *Acer negundo* and trees of the genus *Populus*. In these cases, the wood wasp begins its attack by ovipositing in the branches of the tree, consequently weakening the tree (Baldini, 2002; Ciesla, 2003). Infested trees cannot be used for lumber because the symbiotic fungus is introduced into the tree along with the eggs, resulting in wood decay (Ciesla, 2003; Palma et al., 2005; CABI, 2011). In addition to lumber damage, the Chilean introduction has caused agricultural damage resulting from destruction of windbreaks that shelter agricultural fields (Baldini, 2002).

Environmental Impact

There are four plants on the Federally Registered Threatened and Endangered Species list that should be considered potentially vulnerable to attack by *Tremex fuscicornis* (Table 2-6 on page 2-8) (USFWS, 2010). The listed trees are in the same family as those considered to be a host to *T. fuscicornis*. The potential damage to U. S. forests upon the introduction of *T. fuscicornis* is considerable given the distribution of known hosts and the ability of an introduction to have been established undetected for several years (Baldini, 2002).

In economic, aesthetic and environmental terms, this pest could have a devastating impact on forests in the continental United States. Control programs already defined for *Sirex noctilio* may be initiated in the event of an introduction of *Tremex fuscicornis* in the United States. Some of the approaches may negatively impact non-target insects and the environment as a part of the strategy, but these are generally considered minimal in comparison to cumulative impacts of exotic wood wasp infestations (USDA–APHIS, 2008).

Table 2-6 Potential Threatened or Endangered Hosts of *Tremex fuscicornis* Included in List of Endangered and Threatened Plants (50 CFR 17.12)

Family	Species	Common Name	Status ¹
Betulaceae	<i>Betula uber</i> (Ashe) Fernald	Virginia round-leaf birch	T
Fagaceae	<i>Quercus hinckleyi</i> C. H. Mull.	Hinckley's oak	T
Juglandaceae	<i>Juglans jamaicensis</i> C. DC.	Nogal or West Indian walnut	E
Rosaceae	<i>Cercocarpus traskiae</i> Eastw.	Catalina Island mountain-mahogany	E

¹ T = threatened. E = endangered.

Identification

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Introduction

Use *Chapter 3 Identification* as a guide to recognizing the tremex wood wasp, *Tremex fuscicornis* (F.). Accurate identification of the pest is pivotal to assessing its potential risk, developing a survey strategy, and determining the level and manner of control. Because *T. fuscicornis* and *Sirex noctilio* F. share a similar biology, this chapter closely follows the unpublished draft of the New Pest Response Guidelines for *S. noctilio*.

Authorities

Qualified State, County, or cooperating University, personnel may perform preliminary identification and screening of suspect *Tremex fuscicornis*. Before survey and control activities are initiated in the United States, an authority recognized by USDA–APHIS–PPQ–National Identification Services must confirm the identity of such pests. Submit specimens to the USDA–National Identification Services (NIS).

Reporting

Forward reports of positive identifications by national specialists to PPQ–National Identification Service (NIS) in Riverdale, Maryland, according to Agency protocol. NIS will report the identification status of these tentative and confirmed records to PPQ–Emergency and Domestic Programs (EDP). EDP will report the results to all other appropriate parties.

For further information on reporting and submitting samples, refer to [How to Submit Insect Specimens](#) on page F-1 and [Taxonomic Support for Surveys](#) on page G-1.

Diagnostic Aids

For further information on identification of *Tremex fuscicornis* and several similar species, refer to the diagnostic methods in Davis *et al.* (2006, Revised 2010).

Description

Use the morphological characteristics described in this section to identify *Tremex fuscicornis*. Adult Siricidae, commonly called horntails or wood wasps, are large insects typically over 20 mm long. Some females reach 45 mm in length, including their long, slender ovipositors. The wood wasps have a broad waist and females have a long, non-retractable ovipositor that is adapted for piercing wood to deposit eggs. Siricid larvae feed on wood-decaying fungi that females carry in specialized abdominal glands called mycangia (Smith and Schiff, 2002).

The host tree is important in differentiating genera within Siricidae. The subfamily Tremicinae, containing the genus *Tremex*, is only found on broadleaf, deciduous trees while the Siricinae subfamily is only found on conifers (Benson 1943). *Tremex* can be differentiated from others in the family Siricidae since they only have 14 to 15 antennal segments and their body lacks long yellow hairs (Smith and Schiff, 2002).

Adults

Adult males are completely black with brown wings (Ciesla, 2003). Females have lighter colored wings and are larger than the males (Precupetu and Negru, 1961). The females are orange-yellow with dark stripes on the abdomen (Precupetu and Negru, 1961) (*Figure 3-1* on page 3-3).

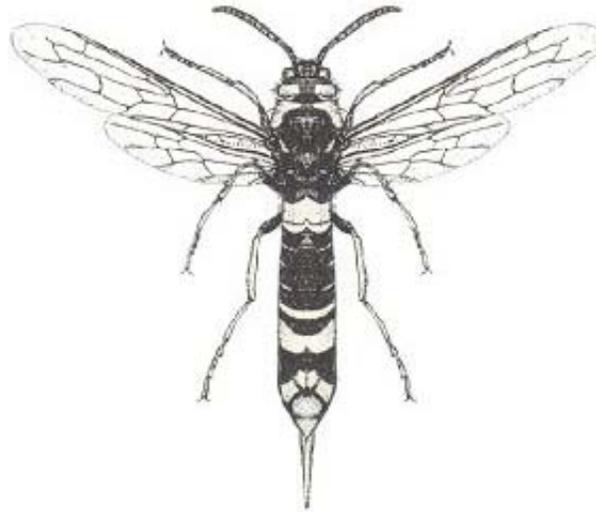


Figure 3-1 Adult *Tremex fuscicornis* (CSIRO, 2004)

Eggs

Eggs are off-white, cylindrical, and deposited in the cambium layer of the tree (CABI, 2011).

Larvae

The larvae can vary in length (3 to 4 cm) depending on nutritional availability of their food source (Ciesla, 2003). They are soft and off-white with short antennae. Their mandibles allow them to feed on their fungal food source while creating galleries in the tree (Ciesla, 2003). A small spine, common in siricids, is located at the posterior of their abdomen.

Pupae

The larvae pupate inside the trunk of the host tree. The pupa is about 3 cm long and begins as a light tan color, gradually turning darker with maturity (Ciesla, 2003).

Similar Species

Benson (1943) reported that *Tremex fuscicornis* appears most similar to *T. columba* L. in the Nearctic region. Schiff et al. (2006) includes a guide to common wood wasp in North America. Size and coloration can vary dramatically within species (Schiff et al., 2006), with the primary differentiating characters between species of *Tremex* being difficult to identify for untrained observers.

Survey Procedures

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Introduction

Use *Chapter 4 Survey Procedures* as a guide when conducting a survey for the tremex wood wasp, *Tremex fuscicornis* (F.). Because *T. fuscicornis* and *Sirex noctilio* F. share a similar biology, this chapter closely follows the unpublished draft of the New Pest Response Guidelines for *S. noctilio* (USDA–APHIS, 2006).

Preparation, Sanitization, and Clean-Up

This section provides information that will help personnel prepare to conduct a survey, and procedures to follow during a survey.

1. Conduct the survey at the proper time. *Tremex fuscicornis* is only active from spring through fall.
 2. Obtain permission from the landowner before entering a property.
 3. Mark the tree or sampled location with flagging whenever possible, and draw a map of the immediate area and indicate reference points so that the areas can be found in the future if necessary. Do not rely entirely on the flagging or other markers to re-locate a site because they may be removed. Record the GPS coordinates for each infested host plant location so that the area or plant may be re-sampled if necessary.
 4. Survey task forces should consist of an experienced survey specialist or entomologist familiar with *T. fuscicornis* and the symptoms of its presence.
-

Survey Types

Plant regulatory officials will conduct detection, delimiting, and monitoring surveys for *Tremex fuscicornis*. Conduct a detection survey to determine the presence or absence of *T. fuscicornis* in an area in which it is not known to occur. After a new U. S. detection, or when a detection in a new area is confirmed, conduct a delimiting survey to define the extent of an infestation. Conduct a monitoring survey to determine the success of control or mitigation activities conducted against a pest ([Table 4-1](#) on page 4-2).

Table 4-1 Surveying Methods for *Tremex fuscicornis*

If you:	Then use this survey:	And the following tools:
Are unsure the pest is present	Detection	Visual inspection, and/or traps trees to capture specimens.
Know the pest is present and need to define its geographic location	Delimiting	Trap tree sampling at specific locations and densities to capture specimens according to the plan outlined below.
Have applied a control and need to measure its effectiveness	Monitoring	Visual inspections and/or traps to capture specimens. Place traps or inspect plants at suspect locations.

Visual inspection or use of a trap tree is the only survey method available.

Detection Survey

The purpose of a detection survey is to determine whether a pest is present in a defined area. This can be broad in scope, as when assessing the presence of the pest over large areas, or it may be restricted to determining if a specific pest is present in a focused area (USDA–APHIS, 2006).

Statistically, a detection survey is not a valid tool to claim that a pest does not exist in an area, even if results are negative. Negative results can be used to provide clues about mode of dispersal, temporal occurrence, or industry practices. Negative results are also important when compared with results from sites that are topographically, spatially, or geographically similar (USDA–APHIS, 2006).

In 2006, trapping for *Sirex noctilio* included traps with host volatiles, including cross-vane, intercept panel, log, and multiple funnel traps placed in the tree canopy. The lure included a mixture of host volatiles alpha-pinene and beta-pinene (Dodds, 2006). Contact the USDA-Forest Service for the most up to date detection methods.

A baited tree or a trap tree may be used in a detection survey. In Chile, researchers are studying this monitoring technique for *Tremex fuscicornis* (Parra Sanhueza, 2005). Trap trees have been used as a monitoring tool for *Sirex noctilio* (Verleur, 2009).

Trap trees should be placed in forest stands that are at high risk for infestation by *Tremex fuscicornis*. Forest stands that contain susceptible host species, are overstocked, or contain stressed or damaged trees should be targeted for trap tree deployment. The operation of the trap tree technique is labor intensive. They must be monitored, and should be removed before pupation occurs.

Procedure

Use the following tools singly or in any combination to detect *Tremex fuscicornis*:

- ◆ Focus on high risk areas in which *T. fuscicornis* is likely to be found. Refer to [Visual Inspection](#) on page 4-6 for further information.
- ◆ Establish regular sites to inspect along your normal surveying route.
- ◆ Check plants for pest presence and damage.

Delimiting Survey

Delimiting Survey Following Initial Detection

If *Tremex fuscicornis* is detected in the United States, surveys will need to be conducted in the area to determine the distribution of the pest. In large areas, locating the source of an infestation could be difficult. Siricids are strong fliers and able to fly many miles (Bruzzone et al., 2009). The delimiting activities should include aerial and ground inspection of trees that may be potential hosts.

Haugen et al. (1990) established protocols for delimiting *Sirex noctilio*. Without specific knowledge of successful survey programs, similar protocols should be followed for delimiting *Tremex fuscicornis*. This includes delimiting activities in areas that are known to harbor the invasive wood wasp and should include aerial observation combined with ground inspection of potential host trees. All known detections from aerial and ground surveillance should be mapped.

Procedure

Use visual inspection of host plants and other nearby plants to determine the presence of *Tremex fuscicornis*. Once *T. fuscicornis* has been confirmed in an area, more surveys should continue in nearby areas in order to determine the full extent of the infestation. Inspections should encompass continually larger areas particularly where hosts are known to occur.

Surveys should be most intensive around the known positive detections and any discovered through traceback and trace-forward investigations.

Traceback and Trace-Forward Surveys

Traceback and trace-forward investigations help determine priorities for delimiting survey activities after an initial detection in the United States. Traceback investigations attempt to determine the source of infestation. Trace-forward investigations attempt to define further potential dissemination through means of natural and artificial spread (commercial or private distribution of infested plant material). Once a positive detection is confirmed, investigations are conducted to determine the extent of the infestation or define suspected areas in which to conduct further investigations.

Procedure

After an initial detection of *Tremex fuscicornis*, a traceback investigation will most likely require checking heavy equipment importers' warehouses in the area of the detection. A site visit should include a review of records and origins of imported goods from Eurasia, Australia or Chile. Importers, warehousemen or distributors of other commercial or consumer wood products from those origins are other sources that must be checked.

Use wind and field maps to plot the possible path of *Tremex fuscicornis*. Calculate the estimated day and time of arrival (based on the circumstances at the site and likely air mass movements) and work backward in time and space to construct a logical path. Site circumstances that provide clues to the estimated time of arrival include detections with the following characteristics:

- ◆ Associated with the arrival of a weather system
- ◆ Adults with no evidence of larval feeding
- ◆ Located inland at locations away from obvious ports of entry
- ◆ Populations that end abruptly outside a given area
- ◆ New generation or stage in the life cycle
- ◆ Sudden outbreaks or increases in numbers not associated with local breeding populations

Once the path of the wasp is plotted, carry out surveys along the path until the likely introduction site is located. Likely origins include port environs, areas where over-wintering is possible, or agricultural areas where hosts are abundant. Allowing for the imprecision of this method, surveys add weight to conjecture about the origin of an introduction.

Computer generated atmospheric trajectory analyses are available to help identify potential sources of infestation and to trace the probable movement of plant pests with air masses. One such program is the Branching Atmospheric Trajectory (BAT) available from the National Climatic Center.

Monitoring Survey

If *Tremex fuscicornis* is detected in the United States, a Technical Working Group will be assembled to provide guidance on using a monitoring survey to measure the effectiveness of applied treatments on the pest population.

Field Monitoring

The trap-tree technique, used to monitor for the presence of *Sirex noctilio*, should also be effective for *Tremex fuscicornis*. This involves the injection of an herbicide into suppressed trees, which stresses them and makes them attractive to attack (Verleur, 2009).

Targeted Survey

Conduct targeted surveys in areas where introduction of *Tremex fuscicornis* may be considered more likely. This may include orchards near ports of entry for wood crates and heavy equipment. Areas with regular traffic from countries with known infestations that may carry hitchhiker insects should also be targeted for regular surveys.

Visual Inspection

This section contains instructions for inspecting plants for infestation by *Tremex fuscicornis* (Table 4-2 on page 4-6). For forest surveillance, trained specialists with an understanding of the natural aspects within a forest should be alerted to the signs of *T. fuscicornis*. Information containing identification keys, pictures and the life cycle should be distributed.

For visual surveys, individuals and groups should walk through forests that include hosts and check for the visual symptoms of *Tremex fuscicornis* invasion. Recently injured and dead trees are most likely to be infested by *T. fuscicornis* and should be closely inspected. Aerial surveys can assist planning by locating habitats that have large areas of pine trees or in some cases pockets of mortality (Haugen and Underdown, 1990).

If adults or larvae are collected, the specimens should be submitted to a certified identifier as soon as possible. Dead females can sometimes be found with their ovipositors stuck in host trees and are easily collected. Handle adults gently.

Table 4-2 Advantages and Disadvantages of Visual Inspection

Advantages	Disadvantages
Locates pupae, eggs or larvae undetected by other survey methods	Labor intensive
Inexpensive and simple	Time intensive
	Search efficiency varies greatly by habitat

Procedure

1. Inspect deciduous trees, other potential host trees, and nearby resting places for aggregations of the wood wasp. Review the image of *Tremex fuscicornis* in [Description](#) on page 3-2 as well as the guidelines in Davis et al. (2006, Revised 2010).
 2. Collect samples of wood wasps while inspecting potential host plants. Review the image in [Description](#) on page 3-2. Do not move live insects from survey sites.
 3. Follow the instructions described in [Processing Samples](#) on page 4-9 when preparing specimens. Submit specimens and plant material to the proper authority. Refer to [How to Submit Insect Specimens](#) on page C-1 and [Taxonomic Support for Surveys](#) on page D-1.
 4. If *Tremex fuscicornis* is detected in an area, a Technical Working Group for this pest will be assembled; the group will provide further guidance concerning extra surveys.
-

What to Look For

Check host trees and look for visibly stressed hosts of *Tremex fuscicornis*. Areas with damaged or poorly growing trees should receive priority in the survey. The active period for adult emergence is from the spring to the fall.

Visual Symptoms for Wood Wasp Infection

- ◆ Yellowing of leaves in the crown (Davis et al., 2006, Revised 2010; Haugen, 2006)
 - ◆ Adult wasps flying near the crown (Davis et al., 2006, Revised 2010)
 - ◆ Presence of detached ovipositors (Davis et al., 2006, Revised 2010)
 - ◆ Exit holes in the bark (5 to 6 mm) (CAPS, Baldini, 2001; Davis et al., 2006, Revised 2010)
 - ◆ Poor growth of tree (Davis et al., 2006, Revised 2010)
-

Similar Pest Species

Adult *Tremex fuscicornis* are morphologically similar to *T. columba* and other siricids that occur in North America and may be easily confused. Members of *Tremex* have one apical spur on the hind tibia, 14 to 15 antennal segments, an ovipositor that is shorter than the length of the forewing and a body without long golden hairs (Smith and Schiff, 2002).

The key character for identification to species level consists of a ratio of the distance between the posterior ocelli (POL) and between a compound eye and the nearest posterior ocellus (OOL) (Benson, 1943). Others have pointed out that these ratios can be highly difficult to utilize without experience in the systematics of this group (Witmond, 1999). The ocelli are reportedly further apart for *Tremex fuscicornis* (POL:OOL is ca. 2) than for *T. columba* (POL:OOL < 1.5) (Davis et al., 2006, Revised 2010).

Pheromone Lures

No pheromone lures have been identified specifically for the attraction of *Tremex fuscicornis*. Based on research concerning *Sirex noctilio*, siricids may be attracted by host volatile components and are likely to use a contact cuticular chemical in mating (Boroczky et al., 2009). More research would be necessary to determine the effectiveness of these components in surveying for *T. fuscicornis*.

Trapping

Trap trees have been an effective monitoring tool in countries where *Sirex noctilio* (Dodds, 2006; USDA–APHIS, 2008; Verleur, 2009) and *Tremex fuscicornis* are established (Parra Sanhueza, 2005). However, in North America the effectiveness of this technique may depend on other wood boring and bark beetle fauna present in the area. Trap trees are usually stressed trees created by cutting or herbicide injection prior to the flight period of the wasp (Zylstra et al., 2010). Make sure to remove trap trees before adult emergence and to not use fire wood. There have been recent updates to trap tree surveys for monitoring of *S. noctilio* in the northeast United States. Contact the USDA-Forest Service for the most up-to-date monitoring methods.

If trap trees are used, the trees need to be placed in areas that are of risk to *Tremex fuscicornis* infestation. The targeted forest stands should contain susceptible host species, are overstocked, or contain stressed or damaged trees. The operation of the trap tree technique is labor intensive. They must be monitored, and should be removed promptly, certainly before pupation occurs.

Procedures

1. Adjust to local seasonal conditions. Plan to set up before adult emergence is expected. In the northeastern U. S., trap trees should be created in May. However, contact the USDA-Forest Service for the most up-to-date wood wasp monitoring method (USDA–APHIS, 2006).

-
2. Either girdle or inject trees with an herbicide such as dicamba (Zylstra et al., 2010). Leave the entire tree for drying to occur. This will make the downed trees more stressed, thus more attractive to *Tremex fuscicornis*.

Important

All treatments listed in the guidelines should only be used as a reference to assist in the regulatory decision making process. It is the National Program Manager's responsibility to verify that treatments are appropriate and legal for use. Upon detection and when a chemical treatment is selected, the National Program Manager should consult with PPQ's FIFRA Coordinator to ensure that the chemical is approved by EPA for use in the United States prior to application.

3. Flag or mark the trap tree locations because they become difficult to relocate once the foliage and vegetation reach their peak. Take GPS readings at each tree.
4. In late summer, begin inspecting the trap trees for signs of *T. fuscicornis* infestation such as drills, cambial staining, or presence of adults.
5. Trap logs should be removed from the forest before May of the next year prior to the emergence of the next generation of *T. fuscicornis*, preferably after adult flight terminates during the year trap trees were set. Trees should be cut into sections and either placed in rearing containers for adult emergence or split to determine the presence of siricid larvae. If siricid larvae are located, DNA sequencing can be conducted to determine species.
6. Do not cut and stack trap logs for use as firewood. Check trees near the trap tree plot for signs of active infestation. Once felled, reduce the movement of trap tree or trap logs as much as possible.

Destruction of Trap Trees

Burning

Incineration of the log must not be delayed (logs must not be stored, sold or transported as firewood).

Chipping

Grind logs into fine chips of ½ to 1-inch or less.

Processing Samples

This section contains instructions for preparing and shipping insect and plant specimens.

Preparing Samples

The insects should be preserved in 70 percent isopropyl alcohol and sent for identification and preservation. Adults should be wrapped in cotton to preserve morphological structures.

Shipping Samples

Call the laboratory prior to shipping the samples via overnight delivery service. Instructions and contact information are located in [How to Submit Insect Specimens](#) on page C-1 and [Taxonomic Support for Surveys](#) on page D-1.

Data Collection

Recording negative results in surveys is just as important as positive detections since it helps define an area of infestation. A system of data collection should include an efficient tracking system for suspect samples such that their status is known at various stages and laboratories in the confirmation process. If available, use pre-programmed hand-held units with GPS capability.

Data collected during surveys should include the following:

- ◆ Date of survey
 - ◆ Collector's name and affiliation
 - ◆ Full name of business, institution, or agency
 - ◆ Full mailing address including country
 - ◆ Type of property (commercial nursery, hotel, natural field, residence)
 - ◆ GPS coordinates of the host plant and property
 - ◆ Host species and cultivar
 - ◆ General conditions or any other relevant information
 - ◆ Positive or negative results from specimen collection
-

Cooperation with Other Surveys

Other surveyors regularly sent to the field should be trained to recognize infestations of *Tremex fuscicornis*.

Regulatory Procedures

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Introduction

Use *Chapter 5 Regulatory Procedures* as a guide to the procedures that must be followed by regulatory personnel when conducting pest survey and control programs against the tremex wood wasp, *Tremex fuscicornis* (F.).

Instructions to Officials

Agricultural officials must follow instructions for regulatory treatments or other procedures when authorizing the movement of regulated articles. Understanding the instructions and procedures is essential when explaining procedures to people interested in moving articles affected by the quarantine and regulations. Only authorized treatments can be used in line with labeling restrictions. During all field visits, ensure that proper sanitation procedures are followed as outlined in *Preparation, Sanitization, and Clean-up* on page 4-2.

Regulatory Actions and Authorities

After an initial suspect positive detection, an Emergency Action Notification may be issued to hold articles or facilities, pending positive identification by a USDA–APHIS–PPQ-recognized authority and/or further instruction from the PPQ Deputy Administrator. If necessary, the Deputy Administrator will issue a letter directing PPQ field offices to initiate specific emergency action under the Plant Protection Act until emergency regulations can be published in the *Federal Register*.

The Plant Protection Act of 2000 (Statute 7 USC 7701-7758) provides the authority for emergency quarantine action. This provision is for interstate regulatory action only; intrastate regulatory action is provided under State authority.

State departments of agriculture normally work in conjunction with Federal actions by issuing their own parallel hold orders and quarantines for intrastate movement. However, if the U. S. Secretary of Agriculture determines that an extraordinary emergency exists and that the States measures are inadequate, USDA can take intrastate regulatory action provided that the governor of the State has been consulted and a notice has been published in the Federal Register. If intrastate action cannot or will not be taken by a State, PPQ may find it necessary to quarantine an entire State.

PPQ works in conjunction with State departments of agriculture to conduct surveys, enforce regulations, and take control actions. PPQ employees must have permission of the property owner before entering private property. Under certain situations during a declared extraordinary emergency or if a warrant is obtained, PPQ can enter private property without owner permission. PPQ prefers to work with the State to facilitate access when permission is denied, however each State government has varying authorities regarding entering private property.

A General Memorandum of Understanding (MOU) exists between PPQ and each State that specifies various areas where PPQ and the State department of agriculture cooperate. For clarification, check with your State Plant Health Director (SPHD) or State Plant Regulatory Official (SPRO) in the affected State. Refer to [Resources](#) on page [A-1](#) for information on identifying SPHD's and SPRO's.

Tribal Governments

USDA–APHIS–PPQ also works with federally-recognized Indian Tribes to conduct surveys, enforce regulations and take control actions. Each Tribe stands as a separate governmental entity (sovereign nation) with powers and authorities similar to State governments. Permission is required to enter and access Tribal lands.

Executive Order 13175, Consultation and Coordination with Indian and Tribal Governments, states that agencies must consult with Indian Tribal governments about actions that may have substantial direct effects on Tribes. Whether an action is substantial and direct is determined by the Tribes. Effects are not limited to Tribal land boundaries (reservations) and may include effects on off-reservation land or resources which Tribes customarily use or even effects on historic or sacred sites in States where Tribes no longer exist.

Consultation is a specialized form of communication and coordination between the Federal and Tribal governments. Consultation must be conducted early in the development of a regulatory action to ensure that Tribes have opportunity to identify resources which may be affected by the action and to recommend the best ways to take actions on Tribal lands or affecting Tribal resources. Communication with Tribal leadership follows special communication protocols. For more information, contact PPQ's Tribal Liaison. Refer to [Table A-1](#) on page [A-1](#) for information on identifying PPQ's Tribal Liaison.

To determine if there are Federally-recognized Tribes in a State, contact the State Plant Health Director (SPHD). To determine if there are sacred or historic sites in an area, contact the State Historic Preservation Officer (SHPO). For clarification, check with your SPHD or State Plant Regulatory Official (SPRO) in the affected State. Refer to [Resources](#) on page [A-1](#) for contact information.

Overview of Regulatory Program After Detection

Once an initial U. S. detection is confirmed, holds will be placed on the property by the issuance of an Emergency Action Notification. Immediately put a hold on the property to prevent the removal of any host plants of the pest.

Traceback and trace-forward investigations from the property will determine the need for subsequent holds for testing and/or further regulatory actions. Further delimiting surveys and testing will identify positive properties requiring holds and regulatory measures.

Record-Keeping

Record-keeping and documentation are important for any holds and subsequent actions taken. Rely on receipts, shipping records and information provided by the owners, researchers or manager for information on destination of shipped plant material, movement of plant material within the facility, and any management (cultural or sanitation) practices employed.

Keep a detailed account of the numbers and types of plants held, destroyed, and/or requiring treatments in control actions. Consult a master list of properties, distributed with the lists of suspect nurseries based on traceback and trace-forward investigations, or nurseries within a quarantine area. Draw maps of the facility layout to located suspect plants, and/or other potentially infected areas. When appropriate, take photographs of the symptoms, property layout, and document plant propagation methods, labeling, and any other information that may be useful for further investigations and analysis.

Keep all written records filed with the Emergency Action Notification copies, including copies of sample submission forms, documentation of control activities, and related State issued documents if available.

Issuing an Emergency Action Notification

Issue an Emergency Action Notification to hold all host plant material at facilities that have the suspected plant material directly or indirectly connected to positive confirmations. Once an investigation determines the plant material is not infested, or testing determines there is no risk, the material may be released and the release documented on the EAN.

Regulated Area Requirements Under Regulatory Control

Depending upon decisions made by Federal and State regulatory officials in consultation with a Technical Working Group, quarantine areas may have certain other requirements for commercial or research fields in that area, such as plant removal and destruction, cultural control measures, or plant waste material disposal.

Any regulatory treatments used to control this pest or herbicides used to treat plants will be labeled for that use or exemptions will be in place to allow the use of other materials.

Establishing a Federal Regulatory Area or Action

Regulatory actions undertaken using Emergency Action Notifications continue to be in effect until the prescribed action is carried out and documented by regulatory officials. These may be short-term destruction or disinfestation orders or longer term requirements for growers that include prohibiting the planting of host crops for a period of time. Over the long term, producers, shippers, and processors may be placed under compliance agreements and permits issued to move regulated articles out of a quarantine area or property under an EAN.

Results analyzed from investigations, testing, and risk assessment will determine the area to be designated for a Federal and parallel State regulatory action. Risk factors will take into account positive testing, positive associated, and potentially infested exposed plants. Boundaries drawn may include a buffer area determined based on risk factors and epidemiology.

Regulatory Records

Maintain standardized regulatory records and databases in sufficient detail to carry out an effective, efficient, and responsible regulatory program.

Use of Chemicals

The PPQ *Treatment Manual* and the guidelines identify the authorized chemicals, and describe the methods and rates of application, and any special instructions. For further information refer to [Control Procedures](#) on page 6-1. Agreement by PPQ is necessary before using any chemical or procedure for regulatory purposes. No chemical can be recommended that is not specifically labeled for this pest.

Control Procedures

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Introduction

Use *Chapter 6 Control Procedures* as a guide to controlling the tremex wood wasp, *Tremex fuscicornis* (F.). There are few control options for *T. fuscicornis*. Chemical control options are not available, but the use of nematodes has offered some management opportunities. Consider the treatment options described within this chapter when taking action to eradicate, contain, or suppress this insect.

Overview of Emergency Programs

Plant Protection and Quarantine (APHIS–PPQ) develops and makes control measures available to involved States. United States Environmental Protection Agency-approved treatments will be recommended when available. If the selected treatments are not labeled for use against the pest or in a particular environment, PPQ’s FIFRA Coordinator is available to explore the appropriateness of developing an Emergency Exemption under Section 18, or a State Special Local Need under section 24(c) of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act), as amended.

The PPQ FIFRA Coordinator is also available upon request to work with EPA to rush the approval of a product that may not be registered in the United States, or to get labeling for a new use. The PPQ FIFRA Coordinator is available for guidance pertaining to pesticide use and registration. Refer to [Resources](#) on page [A-1](#) for information on contacting the Coordinator.

Treatment Options

Important All treatments listed in the guidelines should only be used as a reference to assist in the regulatory decision making process. It is the National Program Manager's responsibility to verify that treatments are appropriate and legal for use. Upon detection and when a chemical treatment is selected, the National Program Manager should consult with PPQ's FIFRA Coordinator to ensure that the chemical is approved by EPA for use in the United States prior to application. Refer to [Resources](#) on page [A-1](#) for information on contacting the Coordinator.

Treatments can include any combination of the following options described in this chapter:

- ◆ Sanitation and other methods of cultural control
 - ◆ Application of biological control organisms
-

Eradication

Eradication is the first action to consider when a new pest is introduced. Eradication may be feasible under some conditions, but if it fails other strategies will be considered. Eradication may be feasible when the following conditions exist:

- ◆ Pest population is confined to a small area
- ◆ Detection occurs soon after the introduction
- ◆ Pest population density is low

If an infestation of *Tremex fuscicornis* is discovered that is apparently limited in distribution, eradication will be attempted. Measures will include but may not be limited to the following:

- ◆ Removal and destruction of all infested plant material
- ◆ Removal of host material within 2 miles of the find
- ◆ Treatment of the soil and surrounding vegetation with an approved pesticide after removal of the infested plants.

Eradication has been attempted for a different wood wasp, *Sirex noctilio* upon introduction into Australia (Taylor, 1981). This wood wasp is able to subsist at low populations and has not been eradicated from plantations in the Southern Hemisphere. When *S. noctilio* was introduced into the northeastern United States, the USDA–APHIS determined that eradication was not feasible (Haugen, 2006). *Tremex fuscicornis* has a similar biology to *S. noctilio*. Therefore, an eradication program may also not be feasible for this species.

Suppression

Pest management includes steps taken to either contain or suppress a pest population. Damage attributed to *Tremex fuscicornis* is most effectively managed with the cultural and biological controls described below.

Sanitation

Sanitation and salvage is a management strategy currently being used in Chile to manage *Tremex fuscicornis* invasion (Baldini, 2002). Carry out sanitation in areas of establishment where hosts are present within the core and buffer areas. Depending on the circumstances and equipment available, use the following techniques:

- ◆ Burning of host plants
 - ◆ Sanitation
 - ◆ Shredding
-

Insecticides

None of the known chemical insecticides control *Tremex fuscicornis*. Fumigation with methyl bromide has been suggested for *Sirex noctilio* quarantine efforts, primarily in the fumigation of wood packing products to limit human-mediated spread (USDA–APHIS, 2008).

Biological Insecticides

The potential of using nematodes for control of *Tremex fuscicornis* is being researched in Chile (Baldini, 2002). The nematodes can be mass produced and are an effective control of *Sirex noctilio*. The USDA is currently researching the most effective nematode for the release to control *S. noctilio* and the results may impact control options for *T. fuscicornis*.

Pheromones

Siricids do not produce attractant pheromones, and instead appear to respond to volatile components of host semiochemicals (Simpson, 1976; Boroczky et al., 2009). Therefore, pheromonal control is not feasible for *Tremex fuscicornis*.

Biological Control

Biological control organisms help suppress and control pest populations, but do not eradicate them. The organisms can be effective when used in combination with other IPM techniques. They are characterized as predators, parasites, parasitoids, or pathogens.

Researchers are documenting parasitoids of *Tremex fuscicornis* in Chile (Baldini, 2001) ([Table 6-1](#) on page 6-5). Nematodes have also been successful at reducing wood wasp populations. The tylenchid nematode *Deladenus siricidicola* (Bedding) has been studied in Australia (Bedding and Akhurst, 1974), Brazil, and the United States (Dodds and Miller, 2010) for efficacy against *Sirex noctilio*, and is currently being studied in Chile for its efficacy against *T. fuscicornis* (Baldini, 2002). The nematode attacks the pupae and larvae in the tree galleries and sterilizes the females without killing them, permitting them to still deposit eggs. Upon hatching, the eggs release up to 200 nematodes that penetrate the tree tissue to search for *S. noctilio* larvae (Bedding, 1967; Bedding, 1972; Taylor, 1981).

While the use of nematodes has been one of the most important approaches toward *Sirex noctilio* control efforts (Bedding and Akhurst, 1974), there are some key differences between that system and the biology of *Tremex fuscicornis* that need to be better understood. The fungus *Amylostereum areolatum* (Chaillet ex Fr.) Boidin is a food resource and necessary component for both the nematode, *D. siricidicola*, and the *S. noctilio* wood wasp (Bedding, 1972). For both invertebrate organisms, the larvae undergo a mycetophagous phase as part of the life cycle, utilizing the fungi to break down the cellulose in wood to obtain nutrition. Both *T. fuscicornis* and native *T. columba* larvae are known to require *Cerrena unicolor* (Bull.) Murrill fungi for feeding and development (Pažoutová and Šrůtka, 2007).

This fungus species belongs to an entirely different order (Polyporales and Family *Polyporaceae*) within the phylum Basidiomycota, compared to *A. areolatum* (Order Russulales and Family *Amylostereaceae*) associated with *Sirex noctilio*. More investigation of the fungal-nematode system is needed in

order to determine the likelihood of successful biological control of *Tremex fuscicornis*.

Table 6-1 Documented Biological Control Agents for *Tremex fuscicornis*

Family	Species	References
Ibalidae	<i>Ibalia drewseni</i> Borries	Pfeffer, 1983
Ibalidae	<i>Ibalia leucospoides</i> Hochenw	Pfeffer, 1983
Ibalidae	<i>Ibalia jakowlewi</i> Jacobson	Parra Sanhueza, 2005; Pfeffer, 1983; Witmond, 1999
Ichneumonidae	<i>Megarhyssa</i> spp.	Hedgren, 2010; Parra Sanhueza, 2005
Neotylenchidae	<i>Deladenus siricidicola</i> (Bedding)	Bedding, 1972

Summary

The most effective control program for suppression of *Tremex fuscicornis* will likely incorporate the use of cultural control measures (e.g. removing and destroying infested plants) and biological control of the residual population.

If an established population is found in a forested or timber production area, a science advisory panel will be asked to determine the best course of action. If eradication is not possible, as determined by the science advisory panel, it will be the responsibility of university extension services to determine the best management practices.

Environmental Documentation and Monitoring

Get all required environmental documentation before beginning. Contact Environmental Services Staff for the most recent documentation. For further information, refer to [Environmental Compliance](#) on page 7-1.

Environmental Compliance

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Introduction

Use *Chapter 7 Environmental Compliance* as a guide to the environmental regulations concerning the tremex wood wasp, *Tremex fuscicornis* (F.).

Overview

Program managers of Federal emergency response or domestic pest control programs must ensure that their programs comply with all Federal Acts and Executive Orders pertaining to the environment, as applicable. Two primary Federal Acts, the National Environmental Policy Act (NEPA) and the Endangered Species Act (ESA), often require the development of significant documentation before program actions may begin.

Program managers should also seek guidance and advice as needed from Environmental and Risk Analysis Services (ERAS), a unit of APHIS' Policy and Program Development (PPD) staff. ERAS is available to give guidance and advice to program managers and prepare drafts of applicable environmental documentation.

In preparing draft NEPA documentation ERAS may also perform and incorporate assessments that pertain to other acts and executive orders described below, as part of the NEPA process. The Environmental Compliance Team (ECT), a part of PPQ's Emergency Domestic Programs (EDP), will assist ERAS in the development of documents, and will implement any environmental monitoring.

Leaders of programs are strongly advised to meet with ERAS and/or ECT early in the development of a program in order to conduct a preliminary review of applicable environmental statutes and to ensure timely compliance. Environmental monitoring of APHIS pest control activities may be required as part of compliance with environmental statutes, as requested by program managers, or as suggested to address concerns with controversial activities. Monitoring may be conducted with regards to worker exposure, pesticide quality assurance and control, off-site chemical deposition, or program efficacy. Different tools and techniques are used depending on the monitoring goals and control techniques used in the program. Staff from ECT will work with the program manager to develop an environmental monitoring plan, conduct training to carry out the plan, give day-to-day guidance on monitoring, and provide an interpretive report of monitoring activities.

National Environmental Policy Act

The National Environmental Policy Act (NEPA) requires all Federal agencies to examine whether their actions may significantly affect the quality of the human environment. The purpose of NEPA is to inform the decisionmaker before taking action, and to tell the public of the decision. Actions that are excluded from this examination, that normally require an Environmental Assessment, and that normally require Environmental Impact Statements, are codified in APHIS' NEPA Implementing Procedures located in 7 CFR 372.5.

The three types of NEPA documentation are Categorical Exclusions, Environmental Assessments, and Environmental Impact Statements.

Categorical Exclusion

Categorical Exclusions (CE) are classes of actions that do not have a significant effect on the quality of the human environment and for which neither an Environmental Assessment (EA) nor an environmental impact statement (EIS) is required. Generally, the means through which adverse environmental impacts may be avoided or minimized have been built into the actions themselves (7 CFR 372.5(c)).

Environmental Assessment

An Environmental Assessment (EA) is a public document that succinctly presents information and analysis for the decisionmaker of the proposed action. An EA can lead to the preparation of an environmental impact statement (EIS), a finding of no significant impact (FONSI), or the abandonment of a proposed action.

Environmental Impact Statement

If a major Federal action may significantly affect the quality of the human environment (adverse or beneficial) or the proposed action may result in public controversy, then prepare an Environmental Impact Statement (EIS).

Endangered Species Act

The Endangered Species Act (ESA) is a statute requiring that programs consider their potential effects on federally-protected species. The ESA requires programs to identify protected species and their habitat in or near program areas, and document how adverse effects to these species will be avoided. The documentation may require review and approval by the U. S. Fish and Wildlife Service and the National Marine Fisheries Service before program activities can begin. Knowingly violating this law can lead to criminal charges against individual staff members and program managers.

Migratory Bird Treaty Act

The statute requires that programs avoid harm to over 800 endemic bird species, eggs, and their nests. In some cases, permits may be available to capture birds, which require coordination with the U. S. Fish and Wildlife Service.

Clean Water Act

The statute requires various permits for work in wetlands and for potential discharges of program chemicals into water. This may require coordination with the Environmental Protection Agency, individual States, and the Army Corps of Engineers. Such permits would be needed even if the pesticide label allows for direct application to water.

Tribal Consultation

The Executive Order requires formal government-to-government communication and interaction if a program might have substantial direct effects on any federally-recognized Indian Nation. This process is often incorrectly included as part of the NEPA process, but must be completed before general public involvement under NEPA. Staff should be cognizant of the conflict that could arise when proposed Federal actions intersect with Tribal sovereignty. Tribal consultation is designed to identify and avoid such potential conflict.

National Historic Preservation Act

The statute requires programs to consider potential impacts on historic properties (such as buildings and archaeological sites) and requires coordination with local State Historic Preservation Offices. Documentation under this act involves preparing an inventory of the project area for historic properties and determining what effects, if any, the project may have on historic properties. This process may need public involvement and comment before the start of program activities.

Coastal Zone Management Act

The statute requires coordination with States where programs may impact Coastal Zone Management Plans. Federal activities that may affect coastal resources are evaluated through a process called Federal consistency. This process allows the public, local governments, Tribes, and State agencies an opportunity to review the Federal action. The Federal consistency process is administered individually by states with Coastal Zone Management Plans.

Environmental Justice

The Executive Order requires consideration of program impacts on minority and economically disadvantaged populations. Compliance is usually achieved within the NEPA documentation for a project. Programs are required to consider if the actions might impact minority or economically disadvantaged populations and if so, how such impact will be avoided.

Protection of Children

The Executive Order requires Federal agencies to identify, assess, and address environmental health risks and safety risks that may affect children. If such a risk is identified, then measures must be described and carried out to minimize such risks.

Pathways

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Introduction

Use *Chapter 8: Pathways* as a source of information on the pathways of introduction of *Tremex fuscicornis* (F.) into the United States. Officers with USDA–APHIS and the U. S. Department of Homeland Security have not reported an interception of *T. fuscicornis* at U. S. ports of entry from 1985 and 2011 (USDA, 2005). Due to a lack of specific information about the pathways for *T. fuscicornis*, general information given in this guideline was incorporated from other New Pest Response Guidelines on exotic wood-boring and bark insects.

Overview

The potential entry and establishment of *Tremex fuscicornis* poses a high risk to United States forestry commodities and unknown potential to impact agriculture. Several hosts with significant value for timber, pulp and other wood products are at risk with entry and establishment. This chapter discusses plausible pathways for entry of *T. fuscicornis* based on current distribution on commodities from infested countries. Pathways for spread are discussed in light of recent establishment in Chile.

Geographical Distribution

Tremex fuscicornis is native to South Asia and is present in Europe and Australia. The native distribution includes occurrences in China, Japan, Korea, Far Eastern Russia and Taiwan. Outbreaks have been reported in Australia (Hedgren, 2010) and Chile, where it was established for several years before detection (Baldini, 2002). For a complete list of countries, see [Table 2-2](#) on page 2-3. It would likely find suitable climatic conditions and hosts at many United States ports of entry (Ciesla, 2003).

Commodity Imports

Although the adults are strong fliers and capable of dispersing several kilometers per year, the potential pathway for entry and establishment has been demonstrated from transport in wood crates used for international shipping and trade (Baldini, 2001). The reproductive potential is high and the host range is broad, with many potential hosts having a contiguous distribution across large regions of North America (Ciesla, 2003). The primary hosts of *Tremex fuscicornis* are deciduous, broadleaf trees within the family Salicaceae, notably poplars, *Populus* spp., and willow, *Salix* spp. Other documented hosts include the Aceraceae, Betulaceae, Fabaceae, Fagaceae, Jugladaceae, Rosaceae, and Ulmaceae. Refer to [Table 2-4](#) on page 2-4 for a complete list of hosts reported for *T. fuscicornis*.

Normally, *Tremex fuscicornis* attacks only dead or dying trees in its native range. Damage is limited in economic impact for native countries and the biology is relatively understudied. Following introductions in Chile, it has been noted that severe infestations of *T. fuscicornis* have been observed on healthy trees of boxelder, *Acer negundo*, and poplar trees, *Populus nigra*, used as windbreaks for agriculture (Baldini, 2002). There have been reports of isolated instances of attacks on apple, pear and walnut trees (Baldini, 2002). The attacks are a concern for agricultural commodities, but the main threat is to wood products, shelter and ornamental trees, and forestry resources.

Commerce

The most likely pathway of introduction for *Tremex fuscicornis* is through international commerce. Eggs, larvae, and pupal stages would easily be transported in wood products (Ciesla, 2003). It is believed that immature stages were introduced into Chile from China on wood packing crates (Baldini, 2002).

Natural Spread

Adult *Tremex fuscicornis* are strong fliers and are able to fly many kilometers to find appropriate hosts (Ciesla, 2003). The known range of *T. fuscicornis* is throughout Europe, Asia and Chile. This range means that this pest cannot get to the United States on its own through migratory patterns or other natural means of spread. Natural spread into the United States is not expected unless *T. fuscicornis* becomes established elsewhere on the North American Continent and spreads from the initial introduction site.

References

Use the References section to learn more about the publications, Web sites, and other resources, that were consulted during the production of the guidelines.

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References

Glossary

Use this glossary to find the meaning of specialized words, abbreviations, acronyms, and terms used by PPQ–EDP. To locate where in the manual a given definition, term, or abbreviation is mentioned, refer to the Index.

Definitions, Terms, and Abbreviations

abdomen. third or terminal major body region of typical insect body containing primarily digestive and reproductive organs

apical. at the end, tip or outermost point

APHIS. USDA-Animal and Plant Health Inspection Service

ARS. USDA-Agricultural Research Service

broadleaf. referring to the Angiospermae or flowering, land plants

cambium. thin layer of non-specialized tissue in the stem of plants that produces new layers of secondary tissues including wood (xylem) and innermost bark (phloem)

CAPS. Cooperative Agricultural Pest Survey Program, a partnership between all 50 States and USDA to detect and monitor exotic pests of economic impact

CPB. U. S. Department of Homeland Security-Customs and Border Protection

CPHST. PPQ-Center for Plant Health Science and Technology

cuticular. relating to the cuticle or noncellular outer layer of an insect

deciduous. trees that shed or lose their leaves during certain portions of the year; contrast with evergreen

detection survey. survey conducted in an environmentally favorable area in which a pest is not known to occur

EDP. PPQ-Emergency and Domestic Programs

EM. PPQ-Emergency Management

eradication. measures taken to eliminate a pest from an area before it becomes too numerous or broadly dispersed for current technology to contain the spread

FIFRA. Federal Insecticide, Fungicide, and Rodenticide Act

gallery. internal chamber for residence during certain developmental periods, typically of the larvae

ICS. Incident Command System

instars. the developmental period between molts of an immature insect

IPM. integrated pest management

MOA. mode of action

monitoring survey. survey conducted at a site where a disease was found and where an eradication program is being performed; also known as evaluation survey

mycangia. specialized abdominal glands of adult siricids, capable of housing symbiotic wood-decaying fungi

mycetophagous. organism that feeds on fungus

NEPA. National Environmental Policy Act
NIS. PPQ-National Identification Service
NPAG. PPQ New Pest Advisory Group
NPRG. New Pest Response Guidelines
non-native. immigrant
ocellus. simple eye of an insect, compare with a compound eye of many eye units or ommatidia
oidia. asexually produced fungal spores that are not part of the reproductive process of the fungi
ovipositing. process of laying or inserting eggs
parasite. animal living within or upon the body of another living animal (its host) for part of its life cycle, consuming some of its host's tissues
parasitoid. an animal that feeds within or upon the body of another animal, generally for a much longer portion of its life cycle and finally consuming enough of the host to be fatal
pathogen. microorganism that causes disease
PERAL. Plant Epidemiology and Risk Analysis Laboratory
pest. includes insects, weeds, plant disease agents, and microorganisms
pheromone. chemical released from one individual that causes a response in other individuals, can be for mating or alarm
phytotoxic. capable of causing damage to plant tissues
PIB. polyisobutylene
plant hardiness zones. geographic areas in which plants are able to grow, as defined by common climatic conditions
polyphagous. feeding on a wide range of hosts
PPQ. APHIS-Plant Protection and Quarantine
posterior. hind or rear
predator. animal that attacks and feeds on another animal (its prey), consuming most or all of the prey and usually eating many prey over the lifetime of the predator
SEL. USDA-ARS-Systematic Entomology Laboratory
semiochemical. chemical message from one organism that affects other individuals
SPHD. State Plant Health Director
SPRO. State Plant Regulatory Official
suppression. measures taken to reduce pest populations in an infected area
symbiotic. two species living together and benefitting both
swarming. aggregated flight behavior of numerous insects, usually for purposes of mating
tibia. fourth leg segment, between the femur and the tarsus
traceback. to investigate the origin of infested plants through intermediate steps in commercial distribution channels to the origin
trace-forward. to investigate where infected plants may have been distributed from a source through steps in commercial distribution channels
TWG. Technical Working Group

tyloses. outcome of protective responses by a plant to internal damage or decay in the woody (xylem) tissue

umbriate. shingle-like; having regularly arranged, overlapping edges such as in roof tiles

univoltine. one generation per year

USDA. United States Department of Agriculture

volatile components. chemical compounds with a high vapor pressure or low boiling point to allow portions to evaporate into a gas and enter the surrounding air

windbreaks. trees or shrubs planted in a row to provide shelter from the wind or protect soil from erosion

A

Resources

Use *Appendix A Resources* to find the Web site addresses, street addresses, and telephone numbers of resources mentioned in the guidelines. To locate where in the guidelines a topic is mentioned, refer to the index.

Table A-1 Resources for *Tremex fuscicornis*

Resource	Contact Information
Center for Plant Health, Science, and Technology (USDA–APHIS–PPQ–CPHST)	http://www.aphis.usda.gov/plant_health/cphst/index.shtml
Emergency and Domestic Programs, Emergency Management (USDA–APHIS–PPQ–EDP–EM)	http://www.aphis.usda.gov/plant_health/plant_pest_info/index.shtml
PPQ <i>Manual for Agricultural Clearance</i>	http://www.aphis.usda.gov/import_export/plants/manuals/online_manuals.shtml
PPQ <i>Treatment Manual</i>	http://www.aphis.usda.gov/import_export/plants/manuals/online_manuals.shtml
Host or Risk Maps	http://www.nappfast.org/caps_pests/CAPs_Top_50.htm
Plant, Organism, and Soil Permits (APHIS–PPQ)	http://www.aphis.usda.gov/plant_health/permits/index.shtml
National Program Manager for Native American Program Delivery and Tribal Liaison (USDA–APHIS–PPQ)	14082 S. Poston Place Tucson, AZ 85736 Telephone: (520) 822-544
Biological Control Coordinator (USDA–APHIS–CPHST)	http://www.aphis.usda.gov/plant_health/cphst/projects/arthropod-pests.shtml
FIFRA Coordinator (USDA–APHIS–PPQ–EDP)	4700 River Road Riverdale, MD 20737 Telephone: (301) 734-5861
Environmental Compliance Coordinator (USDA–APHIS–PPQ–EDP)	4700 River Road Riverdale, MD 20737 Telephone: (301) 734-7175
PPQ Form 391(fillable)	http://www.aphis.usda.gov/library/forms/
List of State Plant Health Directors (SPHD)	http://www.aphis.usda.gov/services/report_pest_disease/report_pest_disease.shtml
List of State Plant Regulatory Officials (SPRO)	http://nationalplantboard.org/member/index.html

Forms

Use *Appendix B Forms* to learn how to complete the forms mentioned in the guidelines. To locate where in the guidelines a form is mentioned, refer to the index.

Contents

PPQ Form 391 Specimens For Determination **B-2**

PPQ 523 Emergency Action Notification **B-7**

PPQ Form 391 Specimens For Determination

This report is authorized by law (7 U.S.C. 147a). While you are not required to respond your cooperation is needed to make an accurate record of plant pest conditions.

See reverse for additional OMB information. **FORM APPROVED**
OMB NO. 0579-0010

U.S. DEPARTMENT OF AGRICULTURE ANIMAL AND PLANT HEALTH INSPECTION SERVICE SPECIMENS FOR DETERMINATION		Instructions: Type or print information requested. Press hard and print legibly when handwritten. Item 1 - assign number for each collection beginning with year, followed by collector's initials and collector's number. Example (collector, John J. Dingle): 83-JJD-001. Pest Data Section - Complete Items 14, 15 and 16 or 19 or 20 and 21 as applicable. Complete Items 17 and 18 if a trap was used.		FOR IIB/III USE LOT NO.							
1. COLLECTION NUMBER		2. DATE MO DA YR		3. SUBMITTING AGENCY <input type="checkbox"/> State <input type="checkbox"/> PPQ <input type="checkbox"/> Other _____ Cooperator							
SENDER AND ORIGIN	4. NAME OF SENDER		INTERCEPTION SITE	5. TYPE OF PROPERTY (<i>Farm, Feedmill, Nursery, etc.</i>)							
	6. ADDRESS OF SENDER			7. NAME AND ADDRESS OF PROPERTY OR OWNER							
	ZIP			COUNTRY/ COUNTY							
8. REASON FOR IDENTIFICATION ("x" ALL Applicable Items)											
PURPOSE	A. <input type="checkbox"/> Biological Control (Target Pest Name _____)			E. <input type="checkbox"/> Livestock, Domestic Animal Pest							
	B. <input type="checkbox"/> Damaging Crops/Plants			F. <input type="checkbox"/> Possible Immigrant (<i>Explain in REMARKS</i>)							
	C. <input type="checkbox"/> Suspected Pest of Regulatory Concern (<i>Explain in REMARKS</i>)			G. <input type="checkbox"/> Survey (<i>Explain in REMARKS</i>)							
	D. <input type="checkbox"/> Stored Product Pest			H. <input type="checkbox"/> Other (<i>Explain in REMARKS</i>)							
9. IF PROMPT OR URGENT IDENTIFICATION IS REQUESTED, PLEASE PROVIDE A BRIEF EXPLANATION UNDER "REMARKS".											
HOST DATA	10. HOST INFORMATION NAME OF HOST (<i>Scientific name when possible</i>)			11. QUANTITY OF HOST NUMBER OF ACRES/PLANTS PLANTS AFFECTED (<i>Insert figure and indicate</i>) <input type="checkbox"/> Number <input type="checkbox"/> Percent):							
	12. PLANT DISTRIBUTION		13. PLANT PARTS AFFECTED								
	<input type="checkbox"/> LIMITED <input type="checkbox"/> SCATTERED <input type="checkbox"/> WIDESPREAD		<input type="checkbox"/> Leaves, Upper Surface <input type="checkbox"/> Trunk/Bark <input type="checkbox"/> Bulbs, Tubers, Corms <input type="checkbox"/> Seeds <input type="checkbox"/> Leaves, Lower Surface <input type="checkbox"/> Branches <input type="checkbox"/> Buds <input type="checkbox"/> Petiole <input type="checkbox"/> Growing Tips <input type="checkbox"/> Flowers <input type="checkbox"/> Stem <input type="checkbox"/> Roots <input type="checkbox"/> Fruits or Nuts								
PEST DATA	14. PEST DISTRIBUTION		15. <input type="checkbox"/> INSECTS <input type="checkbox"/> NEMATODES <input type="checkbox"/> MOLLUSKS								
	<input type="checkbox"/> FEW <input type="checkbox"/> COMMON <input type="checkbox"/> ABUNDANT <input type="checkbox"/> EXTREME		NUMBER SUBMITTED	LARVAE	PUPAE	ADULTS	CAST SKINS	EGGS	NYMPHS	JUVS.	CYSTS
	16. SAMPLING METHOD		17. TYPE OF TRAP AND LURE				18. TRAP NUMBER				
	19. PLANT PATHOLOGY - PLANT SYMPTOMS ("X" one and describe symptoms) <input type="checkbox"/> ISOLATED <input type="checkbox"/> GENERAL										
20. WEED DENSITY <input type="checkbox"/> FEW <input type="checkbox"/> SPOTTY <input type="checkbox"/> GENERAL						21. WEED GROWTH STAGE <input type="checkbox"/> SEEDLING <input type="checkbox"/> VEGETATIVE <input type="checkbox"/> FLOWERING/FRUITING <input type="checkbox"/> MATURE					
22. REMARKS											
23. TENTATIVE DETERMINATION											
24. DETERMINATION AND NOTES (<i>Not for Field Use</i>)									FOR IIB/III USE		
									DATE RECEIVED		
									NO. LABEL SORTED PREPARED		
									DATE ACCEPTED		
SIGNATURE _____									RR _____		
									DATE _____		

PPQ FORM 391 *Previous editions are obsolete.*
(AUG 02)

This is a 6-Part form. Copies must be disseminated as follows:

- | | | |
|---|--|---|
| <input type="checkbox"/> PART 1 - PPQ | <input type="checkbox"/> PART 2 - RETURN TO SUBMITTER AFTER IDENTIFICATION | <input type="checkbox"/> PART 3 - IIB/III OR FINAL IDENTIFIER |
| <input type="checkbox"/> PART 4 - INTERMEDIATE IDENTIFIER | <input type="checkbox"/> PART 5 - INTERMEDIATE IDENTIFIER | <input type="checkbox"/> PART 6 - RETAINED BY SUBMITTER |

Figure B-1 Example of PPQ Form 391 Specimens For Determination, side 1

OMB Information

According to the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0579-0010. The time required to complete this information collection is estimated to average .25 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

Instructions

Use PPQ Form 391, Specimens for Determination, for domestic collections (warehouse inspections, local and individual collecting, special survey programs, export certification).

BLOCK	INSTRUCTIONS
1	<p>1. Assign a number for each collection beginning the year, followed by the collector's initials and collector's number</p> <p>EXAMPLE In 2001, Brian K. Long collected his first specimen for determination of the year. His first collection number is 01-BLK-001</p> <p>2. Enter the collection number</p>
2	Enter date
3	Check block to indicate Agency submitting specimens for identification
4	Enter name of sender
5	Enter type of property specimen obtained from (farm, nursery, feedmill, etc.)
6	Enter address
7	Enter name and address of property owner
8A-8L	Check all appropriate blocks
9	Leave Blank
10	Enter scientific name of host, if possible
11	Enter quantity of host and plants affected
12	Check block to indicate distribution of plant
13	Check appropriate blocks to indicate plant parts affected
14	Check block to indicate pest distribution
15	<ul style="list-style-type: none"> • Check appropriate block to indicate type of specimen • Enter number specimens submitted under appropriate column
16	Enter sampling method
17	Enter type of trap and lure
18	Enter trap number
19	Enter X in block to indicate isolated or general plant symptoms
20	Enter X in appropriate block for weed density
21	Enter X in appropriate block for weed growth stage
22	Provide a brief explanation if Prompt or URGENT identification is requested
23	Enter a tentative determination if you made one
24	Leave blank

Distribution of PPQ Form 391

Distribute PPQ Form 391 as follows:

1. Send Original along with the sample to your Area Identifier.
2. Retain and file a copy for your records.

Figure B-2 Example of PPQ Form 391 Specimens For Determination, side 2

Purpose

Submit PPQ Form 391, Specimens for Determination, along with specimens sent for positive or negative identification.

Instructions

Follow the instructions in *Table B-1* on page **B-5**. Inspectors must provide all relevant collection information with samples. This information should be shared within a State and with the regional office program contact. If a sample tracking database is available at the time of the detection, please enter collection information in the system as soon as possible.

Distribution

Distribute PPQ Form 391 as follows:

- 1.** Send the original along with the sample to your area identifier
- 2.** Keep and file a copy for your records

Table B-1 Instructions for Completing PPQ Form 391, Specimens for Determination

Block		Instructions
1	COLLECTION NUMBER	1. ASSIGN a collection number for each collection as follows: 2-letter State code–5-digit sample number (Survey Identification Number in Parentheses) Example: PA-1234 (04202010001) 2. CONTINUE consecutive numbering for each subsequent collection 3. ENTER the collection number
2	DATE	ENTER the date of the collection
3	SUBMITTING AGENCY	PLACE an X in the PPQ block
4	NAME OF SENDER	ENTER the sender's or collector's name
5	TYPE OF PROPERTY	ENTER the type of property where the specimen was collected (farm, feed mill, nursery, etc.)
6	ADDRESS OF SENDER	ENTER the sender's or collector's address
7	NAME AND ADDRESS OF PROPERTY OR OWNER	ENTER the name and address of the property where the specimen was collected
8A-8H	REASONS FOR IDENTIFICATION	PLACE an X in the correct block
9	IF PROMPT OR URGENT IDENTIFICATION IS REQUESTED, PLEASE GIVE A BRIEF EXPLANATION UNDER "REMARKS"	LEAVE blank; ENTER remarks in <i>Block 22</i>
10	HOST INFORMATION NAME OF HOST	If known, ENTER the scientific name of the host
11	QUANTITY OF HOST	If applicable, ENTER the number of acres planted with the host
12	PLANT DISTRIBUTION	PLACE an X in the applicable box
13	PLANT PARTS AFFECTED	PLACE an X in the applicable box
14	PEST DISTRIBUTION FEW/COMMON/ ABUNDANT/EXTREME	PLACE an X in the appropriate block
15	INSECTS/NEMATODES/ MOLLUSKS	PLACE an X in the applicable box to indicate type of specimen
	NUMBER SUBMITTED	ENTER the number of specimens submitted as ALIVE or DEAD under the appropriate stage
16	SAMPLING METHOD	ENTER the type of sample
17	TYPE OF TRAP AND LURE	ENTER the type of sample
18	TRAP NUMBER	ENTER the sample numbers
19	PLANT PATHOLOGY- PLANT SYMPTOMS	If applicable, check the appropriate box; otherwise LEAVE blank
20	WEED DENSITY	If applicable, check the appropriate box; otherwise LEAVE blank

Table B-1 Instructions for Completing PPQ Form 391, Specimens for Determination (continued)

Block		Instructions
21	WEED GROWTH STAGE	If applicable, check the appropriate box; otherwise LEAVE blank
22	REMARKS	ENTER the name of the office or diagnostic laboratory forwarding the sample; include a contact name, email address, phone number of the contact; also include the date forwarded to the State diagnostic laboratory or USDA-APHIS-NIS
23	TENTATIVE DETERMINATION	ENTER the preliminary diagnosis
24	DETERMINATION AND NOTES (Not for Field Use)	LEAVE blank; will be completed by the official identifier

PPQ 523 Emergency Action Notification

According to the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information is 0579-0102. The time required to complete this information collection is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

FORM APPROVED - OMB NO. 0579-0102

U.S. DEPARTMENT OF AGRICULTURE ANIMAL AND PLANT HEALTH INSPECTION SERVICE PLANT PROTECTION AND QUARANTINE EMERGENCY ACTION NOTIFICATION	SERIAL NO. <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">1. PPQ LOCATION</td> <td style="width: 50%;">2. DATE ISSUED</td> </tr> </table>	1. PPQ LOCATION	2. DATE ISSUED
1. PPQ LOCATION	2. DATE ISSUED		
3. NAME AND QUANTITY OF ARTICLE(S)	4. LOCATION OF ARTICLES		
6. SHIPPER	5. DESTINATION OF ARTICLES		
9. OWNER/CONSIGNEE OF ARTICLES	7. NAME OF CARRIER		
Name: _____ Address: _____ _____ _____ PHONE NO. _____ FAX NO. _____ SS NO. _____ TAX ID NO. _____	8. SHIPMENT ID NO.(S)		
	10. PORT OF LADING		
	11. DATE OF ARRIVAL		
	12. ID OF PEST(S), NOXIOUS WEEDS, OR ARTICLE(S)		
	12a. PEST ID NO.		
	12b. DATE INTERCEPTED		
	13. COUNTRY OF ORIGIN		
	14. GROWER NO.		
	15. FOREIGN CERTIFICATE NO.		
	15a. PLACE ISSUED		
	15b. DATE		

Under Sections 411, 412, and 414 of the Plant Protection Act (7 USC 7711, 7712, and 7714) and Sections 10404 through 10407 of the Animal Health Protection Act (7 USC 8303 through 8306), you are hereby notified, as owner or agent of the owner of said carrier, premises, and/or articles, to apply remedial measures for the pest(s), noxious weeds, and/or article(s) specified in Item 12, in a manner satisfactory to and under the supervision of an Agriculture Officer. Remedial measures shall be in accordance with the action specified in Item 16 and shall be completed within the time specified in Item 17.

AFTER RECEIPT OF THIS NOTIFICATION, ARTICLES AND/OR CARRIERS HEREIN DESIGNATED MUST NOT BE MOVED EXCEPT AS DIRECTED BY AN AGRICULTURE OFFICER. THE LOCAL OFFICER MAY BE CONTACTED AT:

16. ACTION REQUIRED

- TREATMENT: _____
- RE-EXPORTATION: _____
- DESTRUCTION: _____
- OTHER: _____

Should the owner or owner's agent fail to comply with this order within the time specified below, USDA is authorized to recover from the owner or agent cost of any care, handling, application of remedial measures, disposal, or other action incurred in connection with the remedial action, destruction, or removal.

17. AFTER RECEIPT OF THIS NOTIFICATION COMPLETE SPECIFIED ACTION WITHIN (Specify No. Hours or No. Days):	18. SIGNATURE OF OFFICER:
--	---------------------------

ACKNOWLEDGMENT OF RECEIPT OF EMERGENCY ACTION NOTIFICATION

I hereby acknowledge receipt of the foregoing notification.

SIGNATURE AND TITLE:	DATE AND TIME:
----------------------	----------------

19. REVOCATION OF NOTIFICATION

ACTION TAKEN: _____

SIGNATURE OF OFFICER:	DATE:
-----------------------	-------

PPQ FORM 523 (JULY 2002)

Previous editions are obsolete.

Figure B-3 Example of PPQ 523 Emergency Action Notification

Purpose

Issue a PPQ 523, Emergency Action Notification (EAN), to hold all host plant material at facilities that have the suspected plant material directly or indirectly connected to positive confirmations. Once an investigation determines the plant material is not infested, or testing determines there is no risk, the material may be released and the release documented on the EAN.

The EAN may also be issued to hold plant material in fields pending positive identification of suspect samples. When a decision to destroy plants is made, or in the case of submitted samples, once positive confirmation is received, the same EAN which placed plants on hold also is used to document any actions taken, such as destruction and disinfection. More action may be warranted in the case of other fields testing positive for this pest.

Instructions

If plant lots or shipments are held as separate units, issue separate EAN's for each unit of suspected plant material and associated material held. EAN's are issued under the authority of the Plant Protection Act of 2000 (statute 7 USC 7701-7758). States are advised to issue their own hold orders parallel to the EAN to ensure that plant material cannot move intrastate.

When using EAN's to hold articles, it is most important that the EAN language clearly specify actions to be taken. An EAN issued for positive testing and positive-associated plant material must clearly state that the material must be disposed of, or destroyed, and areas disinfected. Include language that these actions will take place at the owner's expense and will be supervised by a regulatory official. If the EAN is used to issue a hold order for further investigations and testing of potentially infested material, then document on the same EAN, any disposal, destruction, and disinfection orders resulting from investigations or testing.

Find more instructions for completing, using, and distributing this form in the *PPQ Manual for Agricultural Clearance*.

How to Submit Insect Specimens

Contents

Insects and Mites	C-1
Liquids	C-2
Sticky Trap Samples	C-2
Dry Specimens	C-3
Documentation	C-3

Insects and Mites

Taxonomic support for insect surveys requires that samples be competently and consistently sorted, stored, screened in most cases, and submitted to the identifier. The following are submission requirements for insects.

1. Sorting Trap Samples

Trapping initiative is most commonly associated with a pest survey program, such as Wood Boring and Bark Beetles (WBBB), see Bark Beetle Submission Protocol from the PPQ Eastern Region CAPS program for detailed procedures. As such, it is important to sort out the debris and non-target insect orders from the trap material. The taxonomic level of sorting will depend on the expertise available on hand and can be confirmed with the identifier.

2. Screening Trap Samples

Consult the screening aids on the CAPS website for screening aids for particular groups. The use of these aids should be coupled with training from identifiers and/or experienced screeners before their use. These can be found at: <http://pest.ceris.purdue.edu/caps/screening.php>

3. Storing Samples

Where appropriate, samples can be stored indefinitely in alcohol, however samples of dried insects such as those in sticky traps may decompose over time if not kept in a cool location such as a refrigerator or freezer. If insect samples have decomposed, do not submit them for identification.

4. Packaging and Shipping

Ensure specimens are dead before shipping. This can be accomplished by placing them in a vial of alcohol or putting the dry specimens in the freezer for at least 1 day. The following are a few tips on sorting, packaging and shipping liquids, sticky traps and dry samples.

Liquids

Factors such as arthropod group, their life-stage and the means they were collected determine the way the specimens are handled, preserved and shipped to the identifier. In general mites, insect larvae, soft-bodied and hard-bodied adult insects can be transferred to vials of 75-90 percent Ethanol (ETOH), or an equivalent such as isopropyl alcohol. At times, Lingren funnel trap samples may have rainwater in them. To prevent later decay, drain off all the liquid and replace with alcohol. Vials used to ship samples should contain samples from a single trap and a printed or hand-written label with the associated collection number that is also found in the top right corner of form 391. Please make sure to use a writing utensil that isn't alcohol soluble, such as a micron pen or a pencil. It is important not to mix samples from multiple traps in a single vial so as to preserve the locality association data. Vials can be returned to field personnel upon request.

If sending specimens in alcohol is an issue with the mail or freight forwarder, the majority of liquid can be decanted off from the vial and then sealed tightly in the container just before shipping. Tell the identifier that the vials will need to have alcohol added back to them as soon as they are received. During the brief time of shipping, the specimens should not dry out if the vial is properly sealed.

Sticky Trap Samples

Adult Lepidoptera, because of their fragile appendages, scales on wings, etc. require special handling and shipping techniques. Lepidoptera specimens in traps should not be manipulated or removed for preliminary screening unless expertise is available. Traps can be folded, with stickum-glue on the inside, but only without the sticky surfaces touching, and secured loosely with a rubber band for shipping. Inserting a few styrofoam peanuts on trap surfaces without insects will cushion and prevent the two sticky surfaces from sticking during shipment to taxonomists. Also DO NOT simply fold traps flat or cover traps with transparent wrap (or other material), as this will guarantee specimens will be seriously damaged or pulled apart – making identification difficult or impossible.

An alternative to this method is to cut out the area of the trap with the suspect pest and pin it securely to the foam bottom of a tray with a lid. Make sure there is some room around the specimen for pinning and future manipulation. For larger numbers of traps, placing several foam peanuts between sticky surfaces (arranged around suspect specimens) can prevent sticky surfaces from making contact when packing multiple folded-traps for shipment. **DO NOT** simply fold traps flat or cover traps with transparent wrap (or other material), as this will guarantee specimens will be seriously damaged or pulled apart – making identification difficult or impossible.

Dry Specimens

Some collecting methods produce dry material that is fragile. Dry samples can be shipped in vials or glassine envelopes, such as the ones that can be purchased here: <http://www.bioquip.com/Search/default.asp>. As with the alcohol samples, make sure the collection label is associated with the sample at all times. This method is usually used for larger insects and its downside is the higher chance of breakage during shipping. Additionally, dry samples are often covered in debris and sometimes difficult to identify.

Be sure that the samples are adequately packed for shipment to ensure safe transit to the identifier. If a soft envelope is used, wrap it in shipping bubble sheets; if a rigid cardboard box is used, pack it in such a way that the samples are restricted from moving in the container. Please include the accompanying documentation and tell the identifier before shipping. Remember to tell the identifier that samples are on the way, giving the approximate number and to include your contact information.

Documentation

Each trap sample/vial should have accompanying documentation along with it in the form of a completed PPQ form 391, Specimens for Determination. The form is fillable electronically and can be found here:

http://cals-cf.calsnet.arizona.edu/azpdn/labs/submission/PPQ_Form_391.pdf

It is good practice to keep a partially filled electronic copy of this form on your computer with your address and other information filled out in the interest of saving time. Indicate the name of the person making any tentative identification before sending to an identifier. Please make sure all fields that apply are filled out and the bottom field (block 24: Determination and Notes) is left blank to be completed by the identifier. Include the trap type, lure used, and trap number on the form. Also, include the phone number and/or e-mail

address of the submitter. Other documentation in the form of notes, images, etc. can be sent along with this if it useful to the determination. It is important that there be a way to cross-reference the sample/vial with the accompanying form. This can be done with a label with the “Collection Number” in the vial or written on the envelope, etc.

Taxonomic Support for Surveys

Contents

[Background](#) **D-1**

Background

The National Identification Services (NIS) coordinates the identification of plant pests in support of USDA's regulatory programs. Accurate and timely identifications are the foundation of quarantine action decisions and are essential in the effort to safeguard the nation's agricultural and natural resources.

NIS employs and collaborates with scientists who specialize in various plant pest groups, including weeds, insects, mites, mollusks and plant diseases. These scientists are stationed at a variety of institutions around the country, including federal research laboratories, plant inspection stations, land-grant universities, and natural history museums. Additionally, the NIS Molecular Diagnostics Laboratory is responsible for providing biochemical testing services in support of the agency's pest monitoring programs.

On June 13, 2007, the PPQ Deputy Administrator issued PPQ Policy No. PPQ-DA-2007-02 which established the role of PPQ NIS as the point of contact for all domestically- detected, introduced plant pest confirmations and communications. A Domestic Diagnostics Coordinator (DDS) position was established to administer the policy and coordinate domestic diagnostic needs for NIS. This position was filled in October of 2007 by Joel Floyd (USDA, APHIS, PPQ-PSPI, NIS 4700 River Rd., Unit 52, Riverdale, MD 20737, phone (301) 734-4396, fax (301) 734-5276, e-mail: joel.p.floyd@aphis.usda.gov).

Taxonomic Support and Survey Activity

Taxonomic support for pest surveillance is basic to conducting quality surveys. A misidentification or incorrectly screened target pest can mean a missed opportunity for early detection when control strategies would be more viable and cost effective. The importance of good sorting, screening, and identifications in our domestic survey activity cannot be overemphasized.

Fortunately most states have, or have access to, good taxonomic support within their states. Taxonomic support should be accounted for in cooperative agreements as another cost of conducting surveys. Taxonomists and laboratories within the State often may require supplies, develop training materials, or need to hire technicians to meet the needs of screening and identification. As well, when considering whether to survey for a particular pest a given year, consider the challenges of taxonomic support.

Sorting and Screening

For survey activity, samples that are properly sorted and screened before being examined by an identifier will result in quicker turn around times for identification.

Sorting

Sorting is the first level of activity that assures samples submitted are of the correct target group of pests being surveyed, that is, after removal of debris, ensure that the correct order, or in some cases family, of insects is submitted; or for plant disease survey samples, select those that are symptomatic if appropriate. There should be a minimum level of sorting expected of surveyors depending on the target group, training, experience, or demonstrated ability.

Screening

Screening is a higher level of discrimination of samples such that the suspect target pests are separated from the known non-target, or native species of similar taxa. For example, only the suspect target species or those that appear similar to the target species are forwarded to an identifier for confirmation. There can be first level screening and second level depending on the difficulty and complexity of the group. Again, the degree of screening appropriate is dependent on the target group, training, experience, and demonstrated ability of the screener.

Check individual survey protocols to determine if samples should be sorted, screened or sent entire (raw) before submitting for identification. If not specified in the protocol, assume that samples should be sorted at some level.

Resources for Sorting, Screening, and Identification

Sorting, screening, and identification resources and aids useful to CAPS and PPQ surveys are best developed by taxonomists who are knowledgeable of the taxa that includes the target pests and the established or native organisms in the same group that are likely to be in samples and can be confused with the target. Many times these aids can be regionally based. They can be in the form of dichotomous keys, picture guides, or reference collections. NIS encourages the development of these resources, and when aids are complete, post them in the CAPS Web site so others can benefit. If local screening aids are developed,

please notify Joel Floyd, the Domestic Diagnostics Coordinator, as to their availability. Please see the following for some screening aids available: <http://pest.ceris.purdue.edu/caps/screening.php>

Other Entities for Taxonomic Assistance in Surveys

When taxonomic support within a state is not adequate for a particular survey, in some cases other entities may assist including PPQ identifiers, universities and state departments of agriculture in other states, and independent institutions. Check with the PPQ regional CAPS coordinators about the availability of taxonomic assistance.

Universities and State Departments of Agriculture

Depending on the taxonomic group, there are a few cases where these two entities are interested in receiving samples from other states. Arrangements for payment, if required for these taxonomic services, can be made through cooperative agreements. The National Plant Diagnostic Network (NPDN) also has five hubs that can provide service identifications of plant diseases in their respective regions.

Independent Institutions

The Eastern Region PPQ office has set up multi-state arrangements for Carnegie Museum of Natural History to identify insects from trap samples. They prefer to receive unscreened material and work on a fee basis per sample.

PPQ Port Identifiers

There are over 70 identifiers in PPQ that are stationed at ports of entry who primarily identify pests encountered in international commerce including conveyances, imported cargo, passenger baggage, and propagative material. In some cases, these identifiers process survey samples generated in PPQ conducted surveys, and occasionally from CAPS surveys. They can also enter into our Pest ID database the PPQ form 391 for suspect CAPS target or other suspect new pests, prior to being forwarded for confirmation by an NIS recognized authority.

PPQ Domestic Identifiers

PPQ also has a limited number of domestic identifiers (three entomologists and two plant pathologists) normally stationed at universities who are primarily responsible for survey samples. Domestic identifiers can be used to handle unscreened, or partially screened samples, with prior arrangement through the PPQ regional survey coordinator. They can also as an intermediary alternative to sending an unknown suspect to, for example, the ARS Systematic Entomology Lab (SEL), depending on their specialty and area of coverage.

They can also enter into our Pest ID database the PPQ form 391 for suspect CAPS target or other suspect new pests, prior to being forwarded for confirmation by an NIS recognized authority.

PPQ Domestic Identifiers
Bobby Brown
Domestic Entomology Identifier
Specialty: forest pests (coleopteran, hymenoptera)
Area of coverage: primarily Eastern Region

USDA, APHIS, PPQ
901 W. State Street
Smith Hall, Purdue University
Lafayette, IN 47907-2089
Phone: 765-496-9673
Fax: 765-494-0420
e-mail: robert.c.brown@aphis.usda.gov

Julieta Brambila
Domestic Entomology Identifier
Specialty: adult Lepidoptera, Hemiptera
Area of Coverage: primarily Eastern Region
USDA APHIS PPQ
P.O. Box 147100
Gainesville, FL 32614-7100
Office phone: 352- 372-3505 ext. 438, 182
Fax: 352-334-1729
e-mail: julieta.bramila@aphis.usda.gov

Kira Zhaurova
Domestic Entomology Identifier
Specialty: to be determine
Area of Coverage: primarily Western Region
USDA, APHIS, PPQ
Minnie Belle Heep 216D
2475 TAMU
College Station, TX 77843
Phone: 979-450-5492
e-mail: kira.zhaurova@aphis.usda.gov

Grace O'Keefe
Domestic Plant Pathology Identifier
Specialty: Molecular diagnostics (citrus greening, P. ramorum, bacteriology, cyst nematode screening)
Area of Coverage: primarily Eastern Region

USDA, APHIS, PPQ
105 Buckhout Lab
Penn State University
University Park, PA 16802
Lab: 814 - 865 - 9896
Cell: 814 - 450- 7186
Fax: 814 - 863 - 8265
e-mail: grace.okeefe@aphis.usda.gov

Craig A. Webb, Ph.D.
Domestic Plant Pathology Identifier
Specialty: Molecular diagnostics (citrus greening, *P. ramorum*, cyst nematode screening)
Area of Coverage: primarily Western Region
USDA, APHIS, PPQ
Department of Plant Pathology
Kansas State University
4024 Throckmorton Plant Sciences
Manhattan, KS 66506-5502
Cell (785) 633-9117
Office (785) 532-1349
Fax: 785-532-5692
e-mail: craig.a.webb@aphis.usda.gov

Final Confirmations

If identifiers or laboratories at the state, university, or institution level suspect they have detected a CAPS target, a plant pest new to the United States, or a quarantine pest of limited distribution in a new state, the specimens should be forwarded to an NIS recognized taxonomic authority for final confirmation. State cooperator and university taxonomists can go through a PPQ area identifier or the appropriate domestic identifier that covers their area to get the specimen in the PPQ system (for those identifiers, see table G-1-1 in the Agriculture Clearance Manual, Appendix G link below). They will then send it to the NIS recognized authority for that taxonomic group.

State level taxonomists, who are reasonably sure they have a new United States record, CAPS target, or new federal quarantine pest, can send the specimen directly to the NIS recognized authority, but must notify their State Survey Coordinator (SSC), PPQ Pest Survey Specialist (PSS), State Plant Health Director (SPHD), and State Plant Regulatory Official (SPRO).

Before forwarding these suspect specimens to identifiers or for confirmation by the NIS recognized authority, please complete a PPQ form 391 with the tentative determination. Also fax a copy of the completed PPQ Form 391 to

“Attention: Domestic Diagnostics Coordinator” at 301-734-5276, or send a PDF file in an e-mail to <mailto:nis.urgents@aphis.usda.gov> with the overnight carrier tracking number.

The addresses of NIS recognized authorities of where suspect specimens are to be sent can be found in The Agriculture Clearance Manual, Appendix G, tables G-1-4 and G-1-5: http://www.aphis.usda.gov/import_export/plants/manuals/ports/downloads/mac_pdf/g_app_identifiers.pdf

Only use Table G-1-4, the “Urgent” listings, for suspected new United States records, or state record of a significant pest, and Table G-1-5, the “Prompt” listings, for all others.

When the specimen is being forwarded to a specialist for NIS confirmation, use an overnight carrier, insure it is properly and securely packaged, and include the hard copy of the PPQ form 391 marked “Urgent” if it is a suspect new pest, or “Prompt” as above.

Please contact Joel Floyd, the Domestic Diagnostics Coordinator if you have questions about a particular sample routing, at phone number: 301-734-5276, or e-mail: joel.p.floyd@aphis.usda.gov

Digital Images for Confirmation of Domestic Detections

For the above confirmations, do not send digital images for confirmation. Send specimens in these instances. For entry into NAPIS, digital imaging confirmations can be used for new county records for widespread pests by state taxonomists or identifiers if they approve it first. They always have the prerogative to request the specimens be sent.

Communications of Results

If no suspect CAPS target, program pests, or new detections are found, communication of these identification results can be made by domestic identifiers or taxonomists at other institutions directly back to the submitter. They can be in spread sheet form, on hard copy PPQ form 391’s, or other informal means with the species found, or “no CAPS target or new suspect pest species found”. Good record keeping by the intermediate taxonomists performing these identifications is essential.

All confirmations received from NIS recognized authorities, positive or negative, are communicated by NIS to the PPQ Emergency and Domestic Programs (EDP) staff in PPQ headquarters. EDP then notifies the appropriate PPQ program managers and the SPHD and SPRO simultaneously. One of these contacts should forward the results to the originating laboratory, diagnostician, or identifier.

Data Entry

Cooperative Agricultural Pest Survey (CAPS)

For survey data entered into NAPIS, new country and state records should be confirmed by an NIS recognized authority, while for others that are more widespread, use the identifications from PPQ identifiers or state taxonomists.

Distribution of Hosts

Purpose

Maps indicating distributions of known specific hosts were generated in ArcView 9.3, using data sources including PLANTS Database (USDA, 2011), EDDMapS (EDDMS, 2011), GBIF (GBIF, 2011) and similar resources on plant distribution data. The list of plants does not include all known hosts, but provides examples to indicate the ranges of known host species for which county level distribution data could be determined.

Access other host maps based on National Agricultural Statistics Service (NASS) and Forest Inventory and Analysis (FIA) data at the NAPPFAST (North Carolina State University APHIS Plant Pest Forecasting System) Web site.

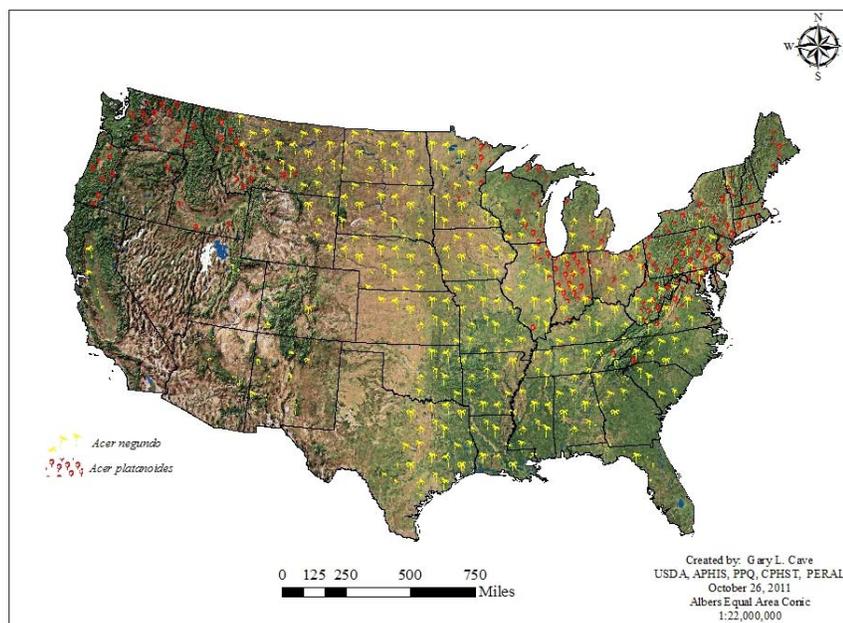


Figure E-1 Counties in the United States Containing *Acer negundo* L. and *A. platanoides* L.

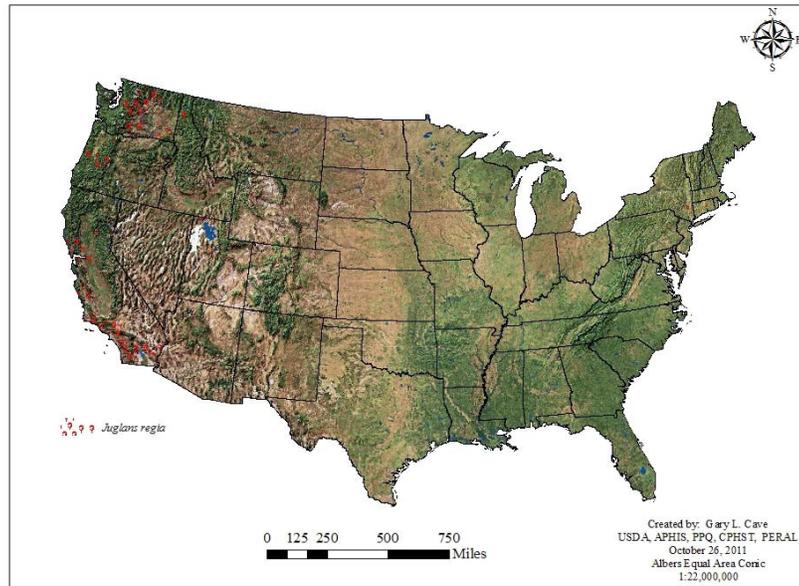


Figure E-2 Counties in the United States Containing *Juglans regia* L.

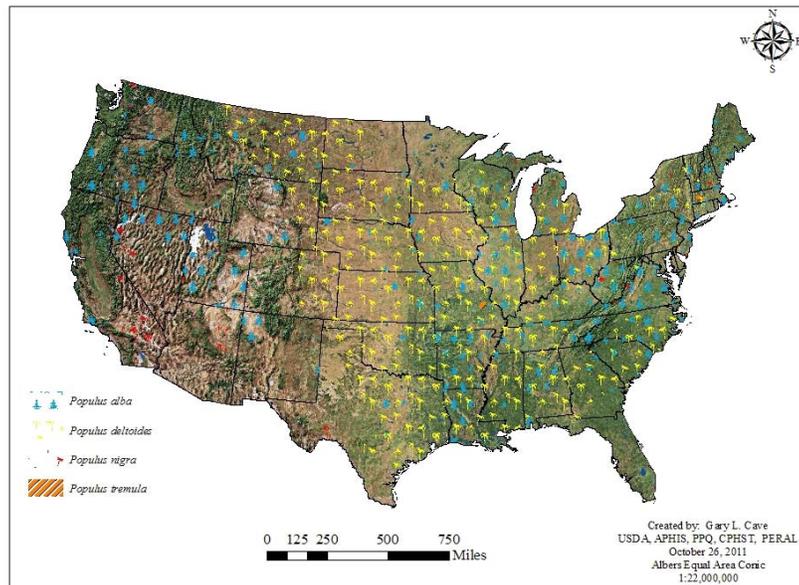


Figure E-3 Counties in the United States Containing *Populus alba* L., *P. deltoides* Bartram ex Marsh, *P. nigra* L., *P. tremula* L.

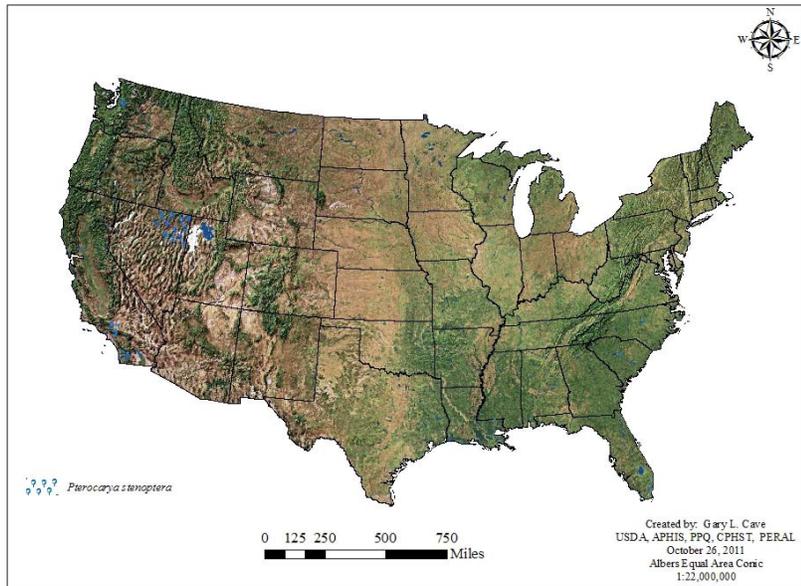


Figure E-4 Counties in the United States Containing *Pterocarya stenoptera* C.

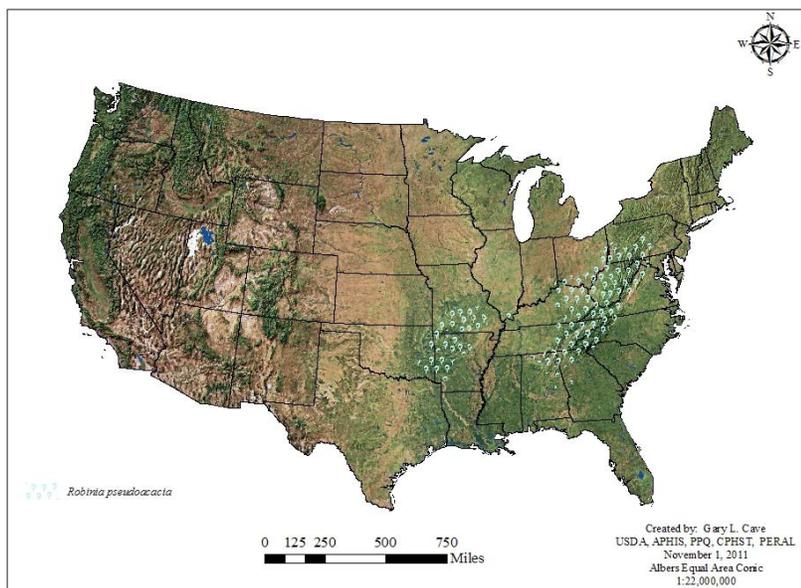


Figure E-5 Counties in the United States Containing *Robinia pseudoacacia* L.

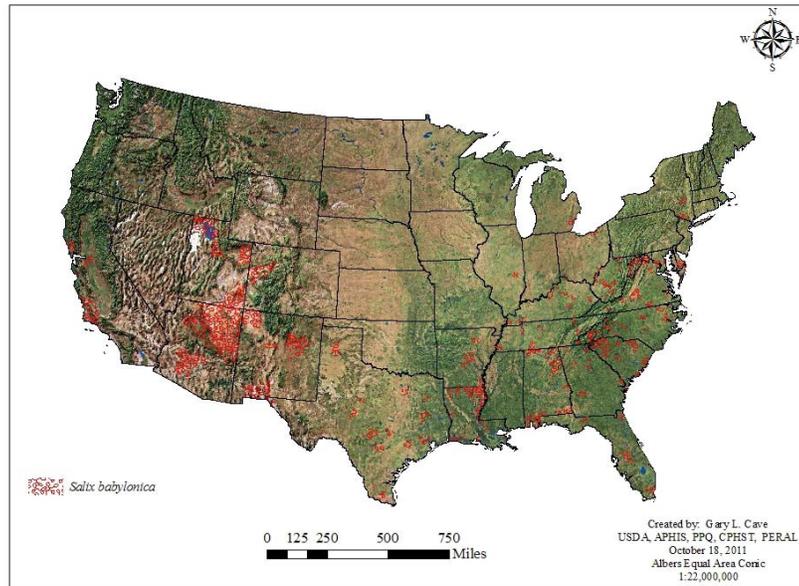


Figure E-6 Counties in the United States Containing *Salix babylonica* L.

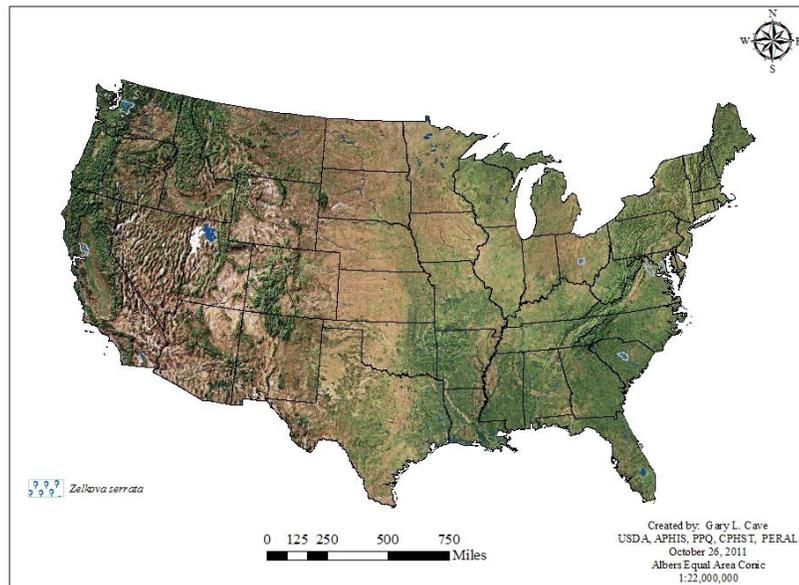


Figure E-7 Counties in the United States Containing *Zelkova serrata* (Thunb.) Makino

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