United States Department of Agriculture

Animal and Plant Health Inspection Service

Plant Protection and Quarantine

New Pest Response Guidelines

Small Banded Pine Weevil
Pissodes castaneus

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When using pesticides, read and follow all label instructions.

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Small Banded Pine Weevil

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Cover Images

Image of *Pissodes castaneus* courtesy of Cecilia Gomez.

Chapter

1

Introduction

Contents

Introduction

Use *New Pest Response Guidelines: Small Banded Pine Weevil* when designing a program to detect, monitor, control, contain, or eradicate, an outbreak of small banded pine weevil 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 is meant to provide the necessary information to launch a response to a detection of small banded pine weevil.

If a species of small banded pine weevil 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 small banded pine weevil:

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

Contacts

When an emergency pest response program for small banded pine weevil 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 *Survey Procedures* on page 4-1 before entering and upon leaving each property to prevent contamination.

Scope

The guidelines is divided into the following chapters:

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 current 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–EDP-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: Small Banded Pine Weevil*. Washington, D.C. 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.

Chapter

2

Pest Information

Contents

Introduction

Use *Chapter 2 Pest Information* to learn more about the classification, history, host range, and biology of the small banded pine weevil, *Pissodes castaneus* (De Geer).

Classification

The small banded pine weevil belongs in the phylum Arthropoda, class Insecta, order Coleoptera, family Curculionidae, and species *Pissodes castaneus* (De Geer). Use *Table 2-1* as a guide to the classification of the small banded pine weevil and the names used to describe it in the guidelines.

Table 2-1 Classification of *Pissodes castaneus* (DeGeer)

Phylum	Arthropoda
Class	Insecta
Order	Coleoptera
Family	Curculionidae
Genus	Pissodes
Full Name	*Pissodes castaneus* (De Geer)
Preferred Common Name	Small Banded Pine Weevil

Other Common Names: banded pine weevil, lesser banded pine weevil, pine banded weevil, minor pine weevil, gorgojo de los pinos, gorgojo pequeño del pino, pissodes manchado, petit charançon du pin, pissode du pin, pissode note, pissodes ponctue, lille fyrresnudebille, taimipikikärsäkäs, Kiefernkulturrüssler, Rüsselkäfer, Kleiner Kiefern-, Rüssel, Kiefernjungholz-, Ruessler, Kiefernkultur-, Pissode notato, kleine Dennensnuittor, kleine Dennesnuitkever, mindre tallvivel (CABI, 2011; Pestana and Santolamazza-Carbone, 2010).

Synonyms

- *Curculio castaneus* De Geer 1775 (CABI, 2011)
- *Curculio notatus* Bonsdorff 1785 (Whitehead et al., 1985)
- *Curculio notatus* Fabricius 1787 (Whitehead et al., 1985)
- *Pissodes fabricii* Stephens, 1831 (CABI, 2011)
- *Pissodes notatus* Fabricius (CABI, 2011; Zaleski, 2009)

Pissodes castaneus has been confused for many years with other species of *Pissodes* in Europe, and *Pissodes notatus* (Fabricius) in France (Zaleski, 2009). While the valid name is *Pissodes castaneus*, *P. notatus* is considered a synonym (Zaleski, 2009).

Historical Information

Pissodes castaneus is one of the major causes of pine dieback (Alauzet, 1986b). It is considered a secondary pest, i.e., attacks weakened or recently cut plants, although it is responsible for the death of pine trees (Alauzet, 1986b; Gomez and Hartel, 2010). The weevil has a high degree of adaptive abilities and plasticity which allow it to distribute widely and in different ecological situations.

Ecological Range

Pissodes castaneus (De Geer) is of European origin (Gomez and Hartel, 2010 and is distributed throughout Europe, the Asian (Siberia) and European parts of Russia, Algeria, and Turkey (Panzavolta and Tiberi, 2010). It has also been introduced in South America: Argentina and Uruguay (Panzavolta and Tiberi, 2010).

Asia

Turkey (CABI, 2011); Russian Federation – Siberia (Kulinich and Orlinskii, 1998).

South America

Argentina (CABI, 2011; Gomez and Hartel, 2010; Zaleski, 2009); Brazil (Gomez and Hartel, 2010; Iede et al., 2007; Marques et al., 2011; Zaleski, 2009); Chile (CABI, 2011; Gomez and Hartel, 2010); Uruguay (Gomez and Hartel, 2010; Zaleski, 2009).

Europe

Austria (CABI, 2011; Gomez and Hartel, 2010; Zaleski, 2009); Belarus (CABI, 2011); Belgium (CABI, 2011; Gomez and Hartel, 2010; Zaleski, 2009); Bulgaria (CABI, 2011); Canary Islands (Spain) (Gomez and Hartel, 2010; Zaleski, 2009); Croatia (CABI, 2011); Czech Republic (CABI, 2011; Iede et al., 2007); Denmark (CABI, 2011; Gomez and Hartel, 2010; Zaleski, 2009); Finland (CABI, 2011; Gomez and Hartel, 2010; Zaleski, 2009); France (CABI, 2011; Gomez and Hartel, 2010; Zaleski, 2009); Germany (CABI, 2011; Gomez and Hartel, 2010; Zaleski, 2009); Greece (Avtzis, 2001; CABI, 2011; Gomez and Hartel, 2010; Zaleski, 2009); Hungary (CABI, 2011; Gomez and Hartel, 2010; Zaleski, 2009); Ireland (CABI, 2011); Italy (CABI, 2011; Gomez and Hartel, 2010; Zaleski, 2009); Sardinia (Italy) (CABI, 2011); Sicily (Italy) (CABI, 2011); Latvia (CABI, 2011); Lithuania (CABI, 2011); Moldova (CABI, 2011); Netherlands (CABI, 2011); Norway (CABI, 2011; Gomez and Hartel, 2010; Zaleski, 2009); Poland (CABI, 2011; Gomez and Hartel, 2010; Zaleski, 2009); Portugal (CABI, 2011; Gomez and Hartel, 2010; Zaleski, 2009); Azores (Portugal) (CABI, 2011); Romania (CABI, 2011; Gomez and Hartel, 2010; Zaleski, 2009); Russian Federation (CABI, 2011; Kulinich and Orlinskii, 1998); Serbia (CABI, 2011); Slovakia (CABI, 2011); Spain (CABI, 2011; Gomez and Hartel, 2010; Zaleski, 2009); Sweden (CABI, 2011); Switzerland (CABI, 2011; Gomez and Hartel, 2010; Zaleski, 2009); Ukraine (CABI, 2011); United Kingdom (CABI, 2011); Yugoslavia (CABI, 2011; Iede et al., 2007).

Africa

Algeria (CABI, 2011; Gomez and Hartel, 2010; Zaleski, 2009); Morocco (CABI, 2011); Madeira Islands (Portugal) (CABI, 2011); Canary Islands (Spain) (CABI, 2011; Iede et al., 2007).

Potential Distribution

In Italy, *Pissodes castaneus* is known to occur “from mountain pine forests to coastal pine forests of various regions” (Panzavolta and Tiberi, 2010). It is also reported to occupy “mixed forests” (Khrisanova and Egorov, 2006).

Hosts

Pissodes castaneus are xylophagous insects (Panzavolta, 2007). They prefer pine species between 4 and 15 years old (Gomez and Hartel, 2010). In Uruguay it is reported to attack some species of *Abies* and *Pseudotsuga* (Panzavolta and Tiberi, 2010), and there are also reports that it attacks *Taxus baccata*, *Larix decidua*, *Abies* sp., *A. alba*, *Picea* sp. and *P. abies* (CABI, 2011). In Europe, it is considered an aggressive pest of tree stands (Gomez and Hartel, 2010). Although it is known to attack trees of all ages, it prefers young trees (Panzavolta and Tiberi, 2010), especially young pine trees, and specifically if they are weakened by biotic or abiotic stresses (Alauzet, 1973; Panzavolta and Tiberi, 2010). In Italy, *P. castaneus* attacks both young and old trees (Panzavolta, 2007).

Hosts reported for *Pissodes castaneus* are listed in *Table 2-2*. The hosts were reported from their current distributions, and the host species may not be present in the United States. If pests are introduced into new areas, they may attack native species that have not previously been identified as host plants. Therefore, host species should be surveyed (where applicable) and surveys should be broadened to native species within the host genera.

Table 2-2 Hosts of *Pissodes castaneus*

Host Family	Scientific name	Common name	References
Pinaceae	*Abies* spp.		Iede et al., 2007; Zaleski, 2009
Pinaceae	*Abies* alba	silver fir	CABI, 2011
Pinaceae	*Abies nordmanniana*	Nordmann fir	CABI, 2011
Pinaceae	*Larix decidua*	common larch; European larch	CABI, 2011
Pinaceae	*Picea abies*	common spruce; Norway spruce	CABI, 2011
Pinaceae	*Pinus* spp.	pines	CABI, 2011; Kulinich and Orlinskii, 1998 Zaleski, 2009
Pinaceae	*Pinus banksiana*	jack pine	CABI, 2011
Pinaceae	*Pinus canariensis*		Zaleski, 2009
Pinaceae	*Pinus contorta*	lodgepole pine	CABI, 2011; Zaleski, 2009
Pinaceae	*Pinus elliottii*		Zaleski, 2009
Pinaceae	*Pinus halepensis*	Aleppo pine	CABI, 2011; Zaleski, 2009
Pinaceae	*Pinus halepensis* subsp. *halepensis*	Aleppo pine	Calamassi et al., 2008

Table 2-2 Hosts of *Pissodes castaneus*

Host Family	Scientific name	Common name	References
Pinaceae	*Pinus nigra*	black pine	CABI, 2011; Villemant et al., 2007; Zaleski, 2009
Pinaceae	*Pinus pinaster*	maritime pine	Alauzet, 1987; CABI, 2011; Zaleski, 2009
Pinaceae	*Pinus ponderosa*		Gomez and Hartel, 2010
Pinaceae	*Pinus pinea*	stone pine; Italian stone pine	CABI, 2011; Zaleski, 2009
Pinaceae	*Pinus radiata*	radiata pine	CABI, 2011 Zaleski, 2009
Pinaceae	*Pinus strobus*	eastern white pine	CABI, 2011
Pinaceae	*Pinus sylvestris*	Scots pine	CABI, 2011 Villemant et al., 2007; Zaleski, 2009
Pinaceae	*Pinus taeda*		Zaleski, 2009
Pinaceae	*Pinus wallichiana*	blue pine	CABI, 2011
Pinaceae	*Pseudotsuga menziesii*		Gomez and Hartel, 2010; Iede et al., 2007; Zaleski, 2009
Taxaceae	*Taxus baccata*	English yew	CABI, 2011

Life Cycle

Pissodes castaneus has high phenological variability, most likely due to its wide ecological and geographical distribution in Europe, its place of origin (Gomez and Hartel, 2010). In studies, from the south of France, the life cycle is shown to vary from place to place and from year to year (Alauzet, 1977, Gomez and Hartel, 2010).

Due to the variation in phenology, the number of generations per year of *Pissodes castaneus* is variable (CABI, 2011). One to two overlapping generations per year have been reported for *Pissodes castaneus* (Alauzet, 1986a; Institut Européen de la Forêt Cultivée, 2003), and Zaleski (2009) has stated up to three generations per year in warmer climates which can lead to overlapping generations (CABI, 2011). In the UK and colder climates, one generation every 2 years has been reported (Iede et al., 2007; Whitehead et al., 1985). Adults can live up to 20 months (Iede et al., 2007) and male longevity is similar to that of the female (Zaleski, 2009).

Pissodes castaneus has two types of development: (a) a long life cycle with development from egg to adult occurring over 11-12 months, and (b) a shorter life cycle with development from egg to adult completed in 2-3 months and with overwintering occurring in the adult stage (Alauzet, 1977; Gomez and Hartel, 2010). Both adults and mature larvae overwinter (CABI, 2011).

Oviposition of *Pissodes castaneus* females occurs during the entire adult flight season (CABI, 2011). In Europe it is reported that the two main egg-laying periods are between April and May, and July and September (Institut Européen de la Forêt Cultivée, 2003). The initial studies of *P. castaneus* were performed in the south of France by Alauzet (1986a) who reported two oviposition periods, one in the spring and one in the fall. However, for the most part, only one main period of adult emergence was observed and that occurred in the summer (July and August in southern France) when the temperatures were high. The majority of larvae from fall oviposition overwintered in the third larval instar . Even though there were two oviposition periods observed, and two types of development, emergence usually occurred during the summer so that emerging adults were either from eggs laid in the same year or those laid in the preceding fall which had overwintered as fourth instar larvae (Alauzet, 1986a).

In the Toulouse region of France, Alauzet (1972b) observed these two types of development for *Pissodes castaneus*. If the eggs were laid between March and July then the adults would emerge in the fall of the same year although duration of embryonic and post-embryonic development remaining relatively homogenous. However, if eggs were laid after mid-July then they overwinter as 4th instar larvae and emerge in the following year with no pupal stage observed (Alauzet, 1972b).

While temperature affects all stages of development of *Pissodes castaneus*, according to research by Alauzet (1986a) diapause is influenced by photoperiod in adults and temperature in larvae. By combining thermal and photoperiodic factors, the life cycle of *P. castaneus* has high plasticity and may account for the vast geographic and climatic distribution (from sub-polar northern Europe to the Mediterranean region) of this pest. During the cold period, the temperature thresholds explain the slowdown of the evolution of development of the first three larval instars and pupae as well as diapause in which the fourth instar larvae enters. However, low temperature may not be capable of inducing diapause alone (Alauzet, 1986a.)

The trees that *Pissodes castaneus* generally attacks are mainly already weakened, such as those affected by water stress and/or attacked by either bark beetles or the Pine processionary moth (*Thaumetopoea pytiocampa*) (Institut Européen de la Forêt Cultivée, 2003). Severe attacks can also occur after forest fires, as *P. castaneus* has been shown to be an abundant colonizer after a site

has burned (Hyvarinen et al., 2005; Institut Européen de la Forêt Cultivée, 2003; Santolamazza-Carbone et al., 2011).

Thermal Thresholds

In a trial by Alauzet (1986a) the thermal threshold for *Pissodes castaneus* eggs is around 8-9 ºC; 10 ºC for the first two instars, 11-12 ºC for the third instar and 14 ºC for the fourth and final instar. In addition, developmental rate did not increase significantly above 15 ºC in laboratory trials for the eggs and first and second larval instars, 20 ºC for the third larval instar, and 22 ºC for fourth larval instar.

Adults

Activity

Pissodes castaneus adults are long-lived and strong fliers (CABI, 2011). They are generally active from spring until autumn (Institut Européen de la Forêt Cultivée, 2003). Although they can be found in all warm months of the year (CABI, 2011), they are known to have a resting period in the summer (Institut Européen de la Forêt Cultivée, 2003). During mild winters, adults can remain active (Institut Européen de la Forêt Cultivée, 2003). Adults are strong fliers and so likely capable of long-range dispersal (CABI, 2011).

Emergence and Feeding

After pupation, young adults gnaw their way through the bark, making a round exit hole (Whitehead et al., 1985). In laboratory studies, adults have been observed to remain beneath the bark until pigmentation has completed (Whitehead et al., 1985).

In studies by Zaleski (2009) in Brazil, adults that overwintered required 5.05 – 5.3 weeks of feeding before sexual maturity.

Adults feed on the bark of trunks, branches and shoots (Institut Européen de la Forêt Cultivée, 2003). During the sap season the adults cut small, deep holes in the bark using their mandibles and also superficially damage the buds and young shoots.

Finding a suitable host in order to reproduce is the major limiting factor in survival of *Pissodes castaneus*, and makes the adult stage the most vulnerable since *P. castaneus* had a remarkable ability to survive adverse environmental situations (Alauzet, 1986b). See *Figure 2-1* for an image of a *Pissodes castaneus* adult on the bark of a host tree.

Figure 2-1 Adult *Pissodes castaneus* (Fabio Stergulc, Università di Udine, Bugwood.org)

Overwintering

In Europe larvae overwinter under the bark of the tree, while adults overwinter in the soil, under the bark, or in forest residues (Gomez and Hartel, 2010).

Oviposition

Females gnaw small holes, cavities, or slits, in the bark of *Pinus* species in order to lay their eggs (Gomez and Hartel, 2010; Institut Européen de la Forêt Cultivée, 2003; Zaleski, 2009). The eggs are laid between the bark and the wood either singly or in small batches at any point on the stem (Iede et al., 2007). The current year's leader or areas close to the whorls of branches are favored. The holes are 2.0 to 2.5 mm deep in the pine bark (Zaleski, 2009). The holes generally occur between the root collar and the first whorl of branches and in older trees on the trunk and branches (Alauzet, 1984) or just below the shoot apical terminal branch (current year's growth) (Iede et al., 2007). In young trees oviposition may occur anywhere on the tree (Whitehead et al., 1985).

Adult females initially lay their eggs singly but may eventually lay 2 to 3 in each hole (Zaleski, 2009). Eggs have been reported to be laid in batches of up

to five (Alauzet, 1986a) and CABI (2011) reports up to eight eggs per hole. The number of eggs depends on the diameter of the stem which was selected for oviposition by the female (CABI, 2011). In Italy, Panzavolta and Tiberi (2010) observed that holes with one egg were dominant (74%), followed by holes with two (22%), three (3%), and four (1%) eggs.

Zaleski (2009) observed that females laid an average of 32.2 and 35.8 eggs in *Pinus taeda* and *Pinus elliottii*, respectively, while one population on *Pinus taeda* averaged 48 eggs per female and another population on *P. elliottii* average 3.6 eggs per female. Alauzet (1986a) reported females to lay over 500 eggs during their lifetime. The latter study, however, was in the laboratory only and therefore may not be accurate in nature (Alauzet, 1986a).

Pattern of oviposition may be temperature-related as eggs have been more frequently recorded when the temperatures reached 13°C, but during the hottest months (when temperatures were between 23 and 32°C during the day), no eggs have been observed (Panzavolta and Tiberi, 2010).

The post-reproductive feeding period has been found to have wide variation, being observed to be as short as one week to as long as five weeks (Zaleski, 2009).

Fertility

If there is a large, dense population of suitable hosts, *Pissodes castaneus* reproduction can be great (Alauzet, 1986b). Egg production can exceed 500 eggs per female when the temperatures are between 12 ºC and 21 º C, and can reach more than 600 eggs per female when the temperatures are between 16 ºC and 17 º C. It has also been reported that a *P. castaneus* female will lay between 250 and 800 eggs in her lifetime (Iede et al., 2007). The temperature range favorable for reproduction is large, and reproduction is possible between 8 º C and 33 º C. Females will never stop laying eggs when weather conditions are favorable and hosts are available (Alauzet, 1986b). Fertility is strongly influenced by diet. Maritime pine, for example, has a nutritional value in favor of egg production. High enough temperatures such as those above 20 º C favor rapid succession of generations by reducing development time but cause a parallel decline in fertility (Alauzet, 1986b).

Eggs

According to CABI (2011), *Pissodes castaneus* egg “incubation requires 8-10 days at 22-23°C and the head and mandibles are usually visible on the ninth day after laying”, and eggs do not hatch below 9-10°C, (Zaleski, 2009). In a study in Italy, eggs were mainly present in the spring (March-June in the northern hemisphere) and at the end of summer/autumn (September-December in the northern hemisphere) (Panzavolta and Tiberi, 2010).

Larvae

Pissodes castaneus has four larval instars (Alauzet, 1977, Carle, 1967, Panzavolta, 2007, Zaleski, 2009). Bukzeyeva (1965) observed a fifth larval instar when *P. castaneus* was reared on pine logs and maintained in a natural environment in Russia.

After hatching, larvae bore galleries under the bark, gnaw into the inner bark, and feed on the phloem until they pupate (Gomez and Hartel, 2010; Institut Européen de la Forêt Cultivée, 2003). The larvae mine the leaders of one-, two-, and three- year old shoots, and this feeding will eventually kill the terminal of the shoot (Iede et al., 2007). The galleries are irregular passages and more or less radiate from the egg mass (CABI, 2011). The galleries have thermal and humidity stability and are therefore independent of environmental fluctuations because the openings to the galleries are obstructed by droppings (Plata-Negrache and Prendes-Ayayla, 1979). Galleries widen as the larvae develop and are clogged with compact sawdust excrement (Gomez and Hartel, 2010).

Pupae

Once larvae of *Pissodes castaneus* have completed their development, each larva will excavate a pupal cell in the surface of the wood and cover the cell with shredded wood fiber (Whitehead et al., 1985). “When eggs are laid in the bark of shoots of the current year, the young larva penetrates instead to the pith where it proceeds to feed and develop, finally excavating a cavity in the wood to form a pupal chamber, partly in the wood and partly in the pith. The chamber is usually at an angle of about 45 degrees to the main axis of the stem, but does not penetrate the bark, which is left intact to form an outer cover; in such cases no covering is formed of shredded wood fiber, although a thin layer of wood may be left intact” (Whitehead et al., 1985). Larvae transform into pupae in this very characteristic pupal chamber (*Figure 2-2*). The pupal chamber is a sort of oval cradle which is about 8 mm long and located at the end of the larval gallery. The pupa is protected by the wood fibers which accumulate as it constructs the pupal chamber. The pupa will then become an adult here (*Figure 2-3*).

In a field study in central Italy, pupae and adults (inside pupal cells) were observed outdoors on the same study site in spring and summer months in two different years from either March to June or April to July (northern hemisphere) (Panzavolta and Tiberi, 2010). This may indicate a role of climate, as temperatures in one year never reached 10°C, while in another year average mean monthly temperatures were over 10 °C (Panzavolta and Tiberi, 2010).

Figure 2-2 *Pissodes castaneus* larva in a pupal cell (Fabio Stergulc, Università di Udine, Bugwood.org)

Figure 2-3 Adult *Pissodes castaneus* emerging from a pupal chamber (Maja Jurc, University of Ljubljana, Bugwood.org)

Behavior

Pissodes castaneus preferentially attacks young pine trees which are stressed by biotic factors (diseases, insects, or other harmful agent), or abiotic factors (inadequate site selection or lack of management, low fertility, drought, waterlogged soil, pruning of trees, disturbances such as fire, non-removal of forest waste material, hailstorms) (Gomez and Hartel, 2010; Hyvarinen et al., 2005; Iede et al., 2007; Santolamazza-Carbone et al., 2011). For example, *P. castaneus* has been shown to effectively increase in numbers, and be one of the most abundant colonizers, after a site has been burned (Hyvarinen et al., 2005). In general, any factor that causes stress to a host tree encourages the spread of *P. castaneus* (Iede et al., 2007).

Branch Selection

Alauzet (1973) performed a study in the Toulouse region of France to determine if there was characteristic branches that were preferential to *Pissodes castaneus* attack (in the absence of other parasites) in pine trees. Height of the branch was not a significant characteristic, although branches that had a base diameter between 5 and 7 cm were preferentially selected by *Pissodes castaneus* for attack and oviposition. This branch size can hold approximately 3-4 larvae per cm^2. The cortical layer of these branches ranges from 0.45 – 0.9 cm, and may be a determining factor in the behavior of the weevil. However, larger and smaller cortical layers are also likely to harbor large populations.

Damage

Damage by *Pissodes castaneus* is due to both (1) adults feeding on the young buds and stems which leave holes in the resin, visible exudate, and abundant sawdust under the bark, and (2) larvae feeding and building galleries in the branches and trunks of young and adult trees (Zaleski, 2009). In younger trees, larval galleries girdle the plant resulting in death to the part immediately above the affected area (Gomez and Hartel, 2010). If reinfestation occurs in the same tier of the plant, it will die. The usual symptom of consistent defoliation is a chlorotic or brownish apex.

Pissodes castaneus bores into the phloem of pines, which results in girdling of the branches and/or trunk and causes the death of young plants in nurseries (Gomez and Hartel, 2010. Outbreaks of *P. castaneus* are generally associated with tree decline when in combination with other insects or pathogens (Gomez and Hartel, 2010). Damage to trees which is due to the feeding habits of *Pissodes castaneus* is a result of the attack on the living tissue of the host plant (Hanson, 1937). Larvae create subcortical larval galleries which impede sap flow (Alauzet, 1973), and are usually filled with excrement (Iede et al., 2007). The larvae also attack the terminal buds of trees, killing the shoot tips in the current year, which results in loss of growth the following year. If the terminal

completely dies, the lateral shoots' growth will not be inhibited by the terminal and give the distal part of the shoots a bushy appearance (Iede et al., 2007).

Visibly attacked trees have a red-orange or desiccated crown, and recently attacked trees have green crowns, with the first symptom of attack which is resin oozing from small oviposition and feeding holes (CABI, 2011, Panzavolta and Tiberi, 2010).

Association of *Pissodes castaneus* to Pathogens

There are indications that this weevil impacts diseases or vice versa. See the following for examples of this:

Oviposition of P. castaneus in Relation to Cronartium flaccidum—

According to Alauzet (1972) damaged areas along the branch or trunk caused by a rust, *Cronartium flaccidum*, are not attractive to *Pissodes castaneus*, and in fact, *P. castaneus* will not lay eggs in the area of the rust, but females will oviposit on each side of the damaged area. While *P. castaneus* exhibits this weak repulsion with respect to the fruiting bodies of the rust, trees that have been attacked by the rust, are favored as hosts by *P. castaneus* due most likely to their weakened state (Alauzet, 1972a). The tree on a whole has a greater intensity of the first attack by *P. castaneus* in the presence of the fungus, and those pines who are resistant to *Cronartium flaccidum* may not even be attacked by *P. castaneus* (Alauzet, 1972a).

Association to Aleppo Pine Knot Disease—When *Pissodes castaneus* is externally contaminated with the bacteria associated with Knot Disease of Aleppo pine and then feeds on the pine host, knot(s) form in the cortical parenchyma (Calamassi et al., 2008). Bacterial microcolonies can be found in these parenchyma cells. Interestingly, inoculation of the pine with the causal bacteria in the absence of *P. castaneus* did not produce knots. The bacteria associated with this Knot Disease of Aleppo pine is believed to be in the genus *Erwinia*.

Association to the blue-stain fungus Leptographium serpens—*Pissodes castaneus* has been observed to benefit from its interaction with *Leptographium serpens* on *Pinus pinaster* (Pestana and Santolamazza-Carbone, 2010). First, *P. castaneus* prefers to colonize stressed hosts over healthy hosts and *L. serpens* stresses *P. pinaster* enough to favor development of *P. castaneus* (Pestana and Santolamazza-Carbone, 2010). In the presence of the fungus, *P. castaneus* adults have been shown to emerge earlier and in greater numbers than if the fungus was not present. They also have a greater length when they emerge while in the presence of the fungus. Furthermore, in this study, *P. castaneus* was found to carry spores of *L. serpens* on its cuticle

and therefore could be a vector for this fungus. However, this was not conclusive as adult weevils in the field were not carrying spores.

Symptoms

Affected host plants become chlorotic from the apex of the tree to the base (Gomez and Hartel, 2010). Symptoms progressively move toward death of the tree (Gomez and Hartel, 2010). In addition, the upper portions of the canopy debark while the trunk and branches begin to dry out (Gomez and Hartel, 2010), and the canopy changes color.

See below for a list of symptoms:

Leaves and Canopy

- Abnormal colors; Discoloration of the canopy begins at the top and proceeds downward (CABI, 2011, Institut Européen de la Forêt Cultivée, 2003)
- Leaf yellowing (Institut Européen de la Forêt Cultivée, 2003)
- Needle death and decreased canopy coverage (Institut Européen de la Forêt Cultivée, 2003, Zaleski, 2009)
- Upper canopy is yellow or reddish (Zaleski, 2009), or reddish-brown (Iede et al., 2007) in color

Trunk and Branches

- "Small round exit holes in the bark (made by adults that emerged from the underlying pupal chambers)" (*Figure 2-4* and *Figure 2-5*) (Iede et al., 2007; Institut Européen de la Forêt Cultivée, 2003)
- Gummosis or resinosis
- Parts of the bark release due to trunk dryness
- Larval galleries between the bark and the wood (*Figure 2-6*) (Institut Européen de la Forêt Cultivée, 2003)
- Oval-shaped pupal chambers (about 1 cm long) filled with wood fibers (Institut Européen de la Forêt Cultivée, 2003)
- When the attack is great, larval galleries and pupal chambers are seen along the entire trunk, but to the tip of the tree (*Figure 2-6*) (Gomez and Hartel, 2010)

Whole Plant

- Plant death; dieback (Iede et al., 2007)

Figure 2-4 Round exit holes in the bark after *Pissodes castaneus* adults emerged from the pupal cells (Fabio Stergulc, Università di Udine, Bugwood.org)

Figure 2-5 Round exit holes from *Pissodes castaneus* pupal chambers between the bark and the wood (Milan Zubrik, Forest Research Institute – Slovakia, Bugwood.org)

Figure 2-6 *Pissodes castaneus* larval galleries along the length of the trunk between the bark and the wood (Fabio Stergulc, Università di Udine, Bugwood.org)

Economic Impact

An attack by *Pissodes castaneus* will cause economic losses to pine plantations, as they can kill the trees, specifically if they are on marginal or shallow soils, or have had periods of water stress or other abiotic or biotic stress (Gomez and Hartel, 2010). The large number of pines killed by *P. castaneus* also impacts regrowth of pine plantations (CABI, 2011).

Pissodes castaneus has a preference for stems rather than leaders of healthy pine hosts (Whitehead et al., 1985). This makes is a dangerous immigrant pest, and with a trait not shared with native American *Pissodes* species. *P. castaneus* could be a serious pest of reforestation and timber plantings in the U.S.

Environmental Impact

No specific environmental impact has been found in the literature except its impact on pine plantations. Only one *Abies*, *A. guatemalensis* Rehder, which is listed as Threatened sp., is listed on the List of Endangered and Threatened Plants (50 CFR 17.12) (USFWS 2011).

Chapter

3

Identification

Contents

Introduction

Use *Chapter 3 Identification* as a guide to recognizing the small banded pine weevil, *Pissodes castaneus* (DeGeer, 1775). Accurate identification of the pest is pivotal to assessing its potential risk, developing a survey strategy, and determining the level and manner of control.

Authorities

Qualified State, County, or cooperating University, personnel may perform preliminary identification and screening of suspect *Pissodes castaneus*. 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* and *Taxonomic Support for Surveys*.

Description

Use the morphological characteristics described in this section to identify *Pissodes castaneus*.

Adults

Lateral and dorsal images of adult *Pissodes castaneus* specimens can be found in *Figure 3-1*, *Figure 3-2*, *Figure 3-3*, and *Figure 3-4*.

Adults are 6-9 mm long and have an oblong-shaped body (Institut Européen de la Forêt Cultivée, 2003; Zaleski, 2009). They are usually colored brown/red (Gomez and Hartel, 2010). The head is reddish-brown, is prolonged into a rostrum and the antennae are geniculate (Zaleski, 2009) and implanted halfway on the snout (*Figure 3-5*; Institut Européen de la Forêt Cultivée, 2003). The elytra have four transverse yellow (Zaleski, 2009) or white-yellow (Institut Européen de la Forêt Cultivée, 2003) spots that are joined by a whitish longitudinal band (*Figure 3-6*; Zaleski, 2009). According to Iede et al (2007), *Pissodes castaneus* adults have a cylindrical brown body and range from 6 mm to 9 mm in length with a long curved rostrum and geniculate antennae.

Males and females are morphologically similar but can be distinguished by the structure of the abdomen and face. Seven abdominal segments can be viewed under the microscope in females while males can have eight (Gomez and Hartel, 2010; Zaleski, 2009).

A good description of the *Pissodes castaneus adult* (Whitehead et al., 1985). The following is a direct quote from the author:

> The principal problem in identification of *P. castaneus* is with the occasional specimen in which the pronotum is somewhat narrowed basally; such specimens closely resemble specimens of several American species, particularly those of the economically important *P. strobi-nemorensis* complex. If identification of a specimen is-still in question, the following annotated diagnosis should be used.
>
> Apex of elytral interval 5 (at tip of subapical callus or swelling) without evident, differentiated cluster of white or yellow scales (note: this pale patch is characteristic of *P. dubius* Randall and related taxa in North America, and of *P. harcyniae* Herbst and *P. piniphilus* Herbst in Europe); hind femur at subapical swelling (near apical 1/4) with clearly evident patch or ring of enlarged pale scales (note: this subapical annulus is not evident in the North American *P. fasciatus* LeConte nor in an unidentified Mexican species); sides of body (flanks of both pronotum and metasternum) with large, round or ovate, white or creamy scales densely and rather regularly distributed (note: in other Palearctic species and in some North American species these scales may be small, or dark,

> or lanceolate, or clustered into conspicuous patches); elytral striae, particularly striae 1-6, with punctures nearly uniform and of moderate size (note: in the European *P. piceae* (Illiger) and in some American species the striae have a mixture of small and grossly enlarged punctures; all such species also differ in one or more of the other characters given above); intervals 3 and 5 "costate," feebly but distinctly more elevated than interval 4 (note: the elytral costae are much more prominently elevated in the otherwise difficult to distinguish western American *P. radiatae* (Hopkins); hind tibia without a large ventral brush of long setae (note: this tibial brush is an extremely conspicuous character of males of the American *P. affinis* Randall); across intervals 4 and 6, posterior elytrai spot or band placed clearly behind middle (note: the posterior elytral spot is placed clearly over the middle in some American species), and in most but not all specimens this spot or band is distinctly bicolored (partly white, partly yellow to orange); pronotum not strongly rounded or narrowed at base, in most specimens widest at base or nearly so and with hind angles sharply or even acutely produced (note: this character distinguishes most specimens of *P. castaneus* from most specimens of North American species except *P . radiatae*, and from other European species except *P . piceae*); elytral humeri angulate to narrowly rounded (note : except for *P. radiatae* , most species in North America and Central America tend to have broadly rather than abruptly rounded humeri, but this character is too subtle and variable to be clearly diagnostic).

CABI (2011) also gives a description of the adult:

> Body length 5.0-11.0 mm, including rostrum; elbowed antennae inserted at about the middle of the curved rostrum; femora unarmed; large specimens resemble small individuals of *Hylobius abietis* but in these the antennae are inserted preapically on the rostrum and the femora are spurred ventrally; red-brown to darkbrown; elytra with two transverse squamose fasciae, the antemedian is yellowish, interrupted medially, the postmedian white or grey-white, yellow laterally, uninterrupted; scales on lateral region of prothorax between pronotum proper and coxa, white, large, round, never more than 1.5-2 times longer than broad. In the related *Pissodes validirostris* the majority of these scales are brown, smaller, elongate and more than 2 times longer than broad (Bevan, 1971). For further characters to separate these formerly confused species see Viedma (1972, 1973) and Roudier (1988) and for keys to the European species see Endrödi (1963) and Freude et al. (1983).

Figure 3-1 Dorsal/back view of a museum specimen of a *Pissodes castaneus* adult (Pest and Disease Image Library – Australia, Bugwood.org)

Figure 3-2 Dorsal view of *Pissodes castaneus* adult (James D. Young, USDA APHIS PPQ, Bugwood.org)

Figure 3-3 Lateral view of *Pissodes castaneus* adult (Pest and Disease Image Library, Australia, Bugwood.org)

Figure 3-4 Lateral view of *Pissodes castaneus* adult (James D. Young, USDA APHIS PPQ, Bugwood.org)

Figure 3-5 Anterior view of *Pissodes castaneus* head showing prolonged rostrum and genticulate antennae (Pest and Disease Image Library, Australia, Bugwood.org)

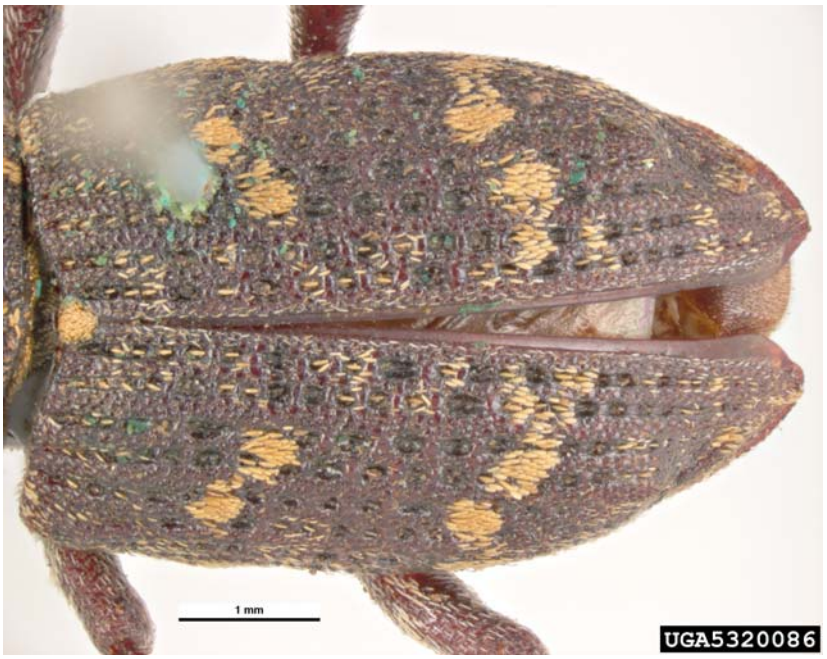

Figure 3-6 Dorsal view of *Pissodes castaneus* adult highlighting elytra with four transverse yellow spots formed by yellowish scales (Pest and Disease Image Library, Australia, Bugwood.org)

Eggs

The eggs are white when newly oviposited, but become yellow as they continue the process of maturation, and are ovoid with dimensions of 0.5 x 1.0 mm (Zaleski, 2009). CABI (2011) has reported the eggs as ivory-white, turgescent, and ellipsoidal; ranging from 0.70 to 0.75 mm in length and 0.45 to 0.48 mm in width with the posterior pole slightly more obtuse than the anterior pole. Iede et al (2007) report that the eggs are bright pearly-white in color, smooth, oblong, rounded at both ends and measuring between 0.5 mm and 1.0 mm in diameter; after incubation, the eggs become yellow.

Larvae

The larvae have the typical characteristics of Curculionidae larvae with no legs, white on the ventral side, with a brown head and grow to be 1 cm long (Gomez and Hartel, 2010).

The final instar is 8 – 10 mm in length with "head protracted, as broad as it is long, broadest in the middle, rounded posteriorly, dark orange-brown, paler in paired dorsal and lateral stripes, ocellus present on each side." (CABI, 2011) The body is white, curved, crescent-shaped and lacking thoracic legs. Slender pointed dense asperities cover the entire surface. Setae are strong and long, especially those at the abdominal apex. Abdominal segments are tripartite except the apically located segments (CABI, 2011).

The larvae have been reported as white and curved on the ventral side and have the typical "look" of weevil larvae, with a present head capsule, light brown color, and strong jaws (Zaleski, 2009). The final instar can reach 10 mm (Zaleski, 2009). Iede et al (2007) report the larvae as whitish-yellow, cylindrical, slightly curved into a "c"-shape, without feet, a light brown head, and about 10 mm when fully developed.

In a study in Italy of *P. castaneus* on *Pinus pinaster*, larval head capsule widths and lengths were used to determine the existence of four larval instars. Head capsule widths ranged from 240 to 1680 µm, and lengths ranged from 180 to 1580 µm (Panzavolta, 2007).

A description of *Pissodes castaneus* larvae is given by Whitehead et al. (1985) and is quoted verbatim as follows:

> Mature larvae of *P. castaneus* measure 8.0- 10.0 mm in length (Scherf 1964). The larva has been described, figured (as *notatus*), and distinguished in keys from those of other European species, but there is no information to separate it from larvae of North American species of *Pissodes*. Larvae of *Pissodes* differ from those of other genera of Curculionidae and Scolytidae found under bark of pine in the following features. As in other weevils and in the bark beetles, the larva is legless,

C-shaped, and white, except for the pigmentation of the head and pronotal sclerites; but unlike the other genera the terminal abdominal segment is subcylindrical without distinct lateral (pleural or epipleural) folds, giving it the appearance of a rounded cushion covered with fine dark asperities and a few setae. The labium and maxillae are similar to those of the other larvae mentioned, but the outer margin of the basal third of the maxilla bears a distinct toothlike lobe versus a simple, curved margin. The spiracles bear 2 annulated marginal air tubes and may be bordered dorsally by a dark crescent-shaped sclerite, but they are not surrounded by a dark ring as in *Hylobius* larvae. Further comparison of the figures of *P. castaneus* larvae and suspect *Pissodes* larvae, with careful regard to the number, arrangement, and relative length of setae on all parts figured, may be helpful. A detailed technical description of *Pissodes* larvae by Anderson (1947) is the best literature source for identifying larvae to genus, but dissection and slide-mounting of the specimens are required to see the necessary characters.

Pupae

According to Iede et al (2007), the pupa has a similar size to the adult, and is bright white in color at first but darkens as it matures. They also have well-developed legs and wings as well as a head with a prominent proboscis.

Whitehead et al., 1985 reports that "pupae of *P. castaneus* are described as white and 4.5- 7.0 mm long."

Similar Species

"Pissodes castaneus is morphologically very similar to *Pissodes validirostris* (Sahlberg) whose larvae feed in pine cones" (CABI, 2011).

"Large adult specimens resemble small individuals of *Hylobius abietis* but in these the antennae are inserted preapically on the rostrum and the femora are spurred ventrally." (CABI, 2011)

According to (Whitehead et al., 1985):

> *P. castaneus* is more easily distinguished from other Palearctic species than from some of the American species. A matured specimen of western Palearctic origin with the flanks of the pronotum largely concealed by large white scales is probably *P. castaneus*. If it also has the pronotum widest at the base and the strial punctures of the elytra nearly uniform in size, it is definitely this species.

If all three of the above characters are clearly developed, the only North American species with which *P. castaneus* might be confused would be *P. radiatae* Hopkins (Monterey pine weevil) from the far western United States; *P. radiatae* differs by having much more strongly elevated elytral costae.

Chapter

4

Survey Procedures

Contents

Introduction

Use *Chapter 4 Survey Procedures* as a guide when conducting a survey for the small banded pine weevil, *Pissodes castaneus* (DeGeer, 1775). The main way to survey for *P. castaneus* is through the use of trap logs (Institut Européen de la Forêt Cultivée, 2003). Special attention should be paid to any unusual *Pissodes* sp. infestations, particularly those in young pine plantations (Whitehead et al., 1985).

Preparation, Sanitization, and Clean-Up

Conduct the survey at the proper time. The schedule should be on a regular time interval that coincides with weather and temperature conditions most suitable for the *Pissodes castaneus*.

When visiting sites to conduct surveys or to take samples, everyone must take strict measures to prevent contamination between properties during inspections. Before entering a new property, make certain that clothing and

footwear are clean and free of pests and soil to avoid moving pests from one property to another. Wash hands with an approved antimicrobial soap.

Survey task forces should consist of an experienced survey specialist familiar with *Pissodes castaneus* and the symptoms of its damage.

Survey Types

Plant regulatory officials will conduct detection, delimiting, monitoring, targeted, traceback, trace-forward, and sentinel site surveys, for *Pissodes castaneus*. The survey types are described in detail in this chapter.

Detection Survey

Use a detection survey to determine whether a pest is present in a defined area where it is not known to occur. The detection survey 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 (a greenhouse).

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 the 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.

Procedure

Use the following tools singly or in any combination to detect the presence of *Pissodes castaneus*:

1. Check plants for the presence of the pest and its damage.
2. Focus the survey on high risk areas where *Pissodes castaneus* is more likely to be found.
3. Establish regular sites to inspect along your normal surveying route.

Delimiting Survey Following Initial U.S. Detection

Use a delimiting survey to determine the type and extent of control measures to apply. In large areas, locating the source of an infestation could be difficult.

Procedure

Use the procedure in *Detection Survey* on page 4-2 as a guide. Additional 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, if possible.

Traceback and Trace-Forward Surveys

Traceback and trace-forward investigations help surveyors to set priorities for delimiting survey activities after an initial detection. Use traceback investigations to determine the source of an infestation. Use trace-forward investigations to determine the potential dissemination of the pest, through means of natural and artificial spread (commercial or private distribution of infested plant material). Once a positive detection is confirmed, conduct investigations in order to determine the extent of the infestation or suspect areas in which to conduct further investigations.

Procedure

If this pest is found attacking nursery stock, surveyors should compile a list of facilities associated with nursery stock infested with *Pissodes castaneus*. The lists will be distributed by the State to the field offices, and are not to be shared with individuals outside USDA–APHIS–PPQ and State regulatory cooperators. Grower names and field locations on the lists are strictly confidential, and any distribution of lists beyond appropriate regulatory agency contacts is prohibited.

Each State is only authorized to see locations within their State and sharing of confidential business information may be restricted between State and Federal entities. Check the privacy laws with the State Plant Health Director for the State.

When notifying growers on the list, be sure to identify yourself as a USDA or State regulatory official conducting an investigation of facilities that may have received material infested with *Pissodes castaneus*. Speak to the growers or farm managers and obtain proper permission before entering private property. If any sales or distribution has occurred from an infested nursery during the previous six months, surveyors should check nursery records to obtain names and addresses for all sales or distribution sites.

Monitoring Survey

Perform a monitoring survey to determine the success of control or mitigation activities conducted against a pest.

Procedure

Trap logs can be used to monitor *Pissodes castaneus*.

In an Italian study, larvae of *Pissodes castaneus* were found in *Pinus pinaster* in the following manner: "The logs were debarked to expose and count eggs, larvae, pupae, and newly-formed adults of *P. castaneus*; eggs and first instar larvae were detected by means of a binocular microscope." (Panzavolta and Tiberi, 2010).

Targeted Survey

Conduct targeted surveys at facilities associated with high risk pathways.

Procedure

At the time of publication, a defined method was unavailable.

Visual Inspection of Plants

This section contains instructions for inspecting plants for infestations of *Pissodes castaneus* as well as the damage caused by this pest.

An initial attack of *Pissodes castaneus* may not be easy to identify as points of oviposition are short (approximately 1 cm long) and the galleries start small and may be inconspicuous in larger plants (Gomez and Hartel, 2010). *P. castaneus* can be in a forest for a number of years corresponding to an increase in the population prior to the primary outbreak (Alauzet, 1986b).

Procedure

1. Inspect potential host plants, and nearby resting places, for resting adults of *Pissodes castaneus*. See *Symptoms* on page 2-14. Symptoms include yellowing or browning of young pine needles. When this is observed, check under the bark for larval galleries and "cushion-like" pupal chambers (CABI, 2011).
2. Collect samples of *Pissodes castaneus* while inspecting potential host plants.

3. Follow the instructions described in ***Preparing Samples*** on page 4-5 when preparing specimens.
4. Submit specimens and plant material to the proper authority. Refer to *How to Submit Insect Specimens* on page C-1 for further information.

Similar Pest Species

According to CABI (2011):

> External damage on trees is easily confused with that of bark beetles. Larval galleries and pupal cells are typical for *Pissodes* spp. However, there are two other species living in pine trunks in Europe, *Pissodes pini* and *P. piniphilus*. Although these usually attack older trees, the three species can be found in trees of various ages. Larvae and pupae are difficult to separate (Sherf, 1964), but adults are easily distinguishable (Kudela 1974; Freude et al 1983).

Pheromone Lures

Pissodes castaneus males attract females (Gomez and Hartel, 2010). Zaleski (2009) identified two sex pheromones, (1R, 2S)-grandisal and (1R, 2S)-grandisol, released by *Pissodes castaneus* males from 21 days old until their death, and which are not produced by the females.

Marques et al., 2011 confirmed (1*R*-2*S*)-grandisal and (1*R*-2*S*)-grandisol as the male-produced volatile compounds as likely to act as sex pheromones. While plant odors are attractive to both males and females of *P. castaneus*, they did not increase the activity of these male-produced volatiles (Marques et al., 2011; Zaleski, 2009). Many weevils produce the same pheromones (grandisol and grandisal), but the relative amounts of both produced appear to be species specific (Marques et al., 2011).

Preparing Samples

Preserve *Pissodes castaneus* in 70 percent isopropyl alcohol and send for identification and preservation.

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 *Pissodes castaneus*.

Chapter

5

Regulatory Procedures

Contents

Introduction

Use *Chapter 5 Regulatory Procedures* as a guide to the procedures that must be followed by regulatory personnel when conducting pest control programs against the small banded pine weevil, *Pissodes castaneus* (DeGeer, 1775).

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 4-1.

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 *Resources* 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.

Chapter

6

Control Procedures

Contents

Introduction

Use *Chapter 6 Control Procedures* as a guide to controlling the small banded pine weevil, *Pissodes castaneus* (DeGeer). Consider the treatment options described within this chapter when taking action to eradicate, contain, or suppress the small banded pine weevil.

A successful Integrated Pest Management (IPM) program will consider chemical, biological and cultural techniques to reduce pest populations and maintain them at levels below those that cause economic damage.

Treatment Options

All treatments listed in the guidelines should only be used as a reference to assist in the regulatory decisionmaking 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.

Treatments can include any combination of the following options:

- Prevention
- Application of insecticides
- Biological control
- Phytosanitary measures

Eradication

Eradication is the first action to consider with the introduction of a new pest. Eradication may be feasible under some conditions, but if it fails then 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, or pest population density is low.

If an infestation of *Pissodes castaneus* is discovered that meets the above named conditions, eradication will be attempted. Measures will include but may not be limited to removal and destruction of all infested plant material, removal of host material within 2 miles (3.2 km) of the find, and treatment of the soil and surrounding vegetation with an approved pesticide after removal of the infested plants.

Prevention

The best way to control *Pissodes castaneus* is prevention (Alauzet, 1990; CABI, 2011. As death of the tree can occur from an attack by *P. castaneus* and *P. castaneus* preferably attacks weakened trees, preventative measures such as monitoring and proper management of the plantation should be employed (Zaleski, 2009). Removing dead wood which acts as a site for oviposition, as well as uprooting, removing and burning infected trees (rather than felling them since pupation occurs on young stems close to the ground), are good preventative measures (CABI, 2011; Institut Européen de la Forêt Cultivée, 2003). Removing attacked trees should occur as soon as they are found in the stand (Institut Européen de la Forêt Cultivée, 2003).

In addition, good sanitation should be employed in the tree stand (Institut Européen de la Forêt Cultivée, 2003). Site selection should consider reducing nutrient and water stress (Institut Européen de la Forêt Cultivée, 2003).

Early detection and monitoring of the pest should be used as a preventative measure. In addition, good site selection for plantations to prevent tree stress, and collection and subsequent burning of pruning and thinning debris prevent proliferation of the insect (Zaleski, 2009).

Phytosanitary Control

To prevent *Pissodes castaneus* from entering and establishing in a new area, plants which are brought into that area should be visually inspected for *P. castaneus* and/or galleries caused by *P. castaneus*. Wood should also be debarked before shipment (CABI, 2011).

Managing Insecticide Resistance

The non-judicious application of insecticides can lead to the development of resistance. Insecticides have been organized into mode of action (MOA) groups based on how they work to kill insects.

Procedure

One of the key steps in resistance management is to minimize the continuous use of pesticides with the same MOA classification. This classification system makes it easy for farmers and farm advisors to understand which pesticides share the same MOA without having to know the biochemical basis. The MOA classification thus provides growers, advisors, extension staff, consultants and crop protection professionals with a simple guide to the selection of insecticides for use in an effective and sustainable insecticide resistance management strategy.

Trap Logs

Trap logs can be used to monitor the fluctuation of pest population levels in the field, as well as to determine the peaks of adult emergence and female oviposition (Iede et al., 2007).

Trees that are artificially weakened can serve as trap trees and be placed within a stand of trees to attract oviposition by *Pissodes castaneus* (Institut Européen de la Forêt Cultivée, 2003). Once oviposition has occurred, these can be carefully removed and burnt (Institut Européen de la Forêt Cultivée, 2003). Other things that can serve as traps are piles of bark and/or twigs which can act as hibernation traps (CABI, 2011).

Trap logs can be used to monitor for *Pissodes castaneus* (Iede et al., 2007). Trap logs are freshly cut trees left in the plot to attract *Pissodes castaneus*. After the attack these logs should be removed from the planting and either burned or destroyed before the emergence of new adults.

Trap Log Procedure according to Yildiz et al., (2007):

> To determine the bark beetle species and population densities trap-log method was used… On each experimental plot, three healthy fir trees with 30–50 cm diameters and 200 m apart were cut down with a chainsaw. Each tree was delimbed and the log was separated into three sections as upper, middle and lower parts of the log. The trap logs were laid on the forest floor and covered with left over branches to avoid the moisture lost from the logs.

These trap logs should then examined for the presence of bark beetles. Adults should be taken for identification, and the bark peeled and placed in plastic bags to be taken back to a lab for further inspection.

Insecticides

According to CABI, 2011, chemical control is "rarely necessary, and is difficult." The flight period extends from May to September. Cobos and Robredo (1982) recommend 5% fenitrothion dust applied from aircraft when the attack intensity is high and the requirement for treatment is large.

Pyrethroid ester insectides have been used in Spain against adults and are allowed against adults from May to June, before oviposition. It is, however, only recommended in Spain in young pine stands where populations of *P. castaneus* are very high (Institut Européen de la Forêt Cultivée, 2003). Institut Européen de la Forêt Cultivée (2003) has reported that there are no pesticides registered against *Pissodes castaneus* in France or Portugal.

Natural Enemies

The natural enemies of *Pissodes castaneus* include parasitoids, entomopathogenic fungi, and epizootics (Gomez and Hartel, 2010. Biological control has good potential in forest plantations.

Several parasitoid species have been identified for *Pissodes castaneus* (Gomez and Hartel, 2010). These are both internal and external, egg and larval, and belong to three different families of Hymenoptera (Gomez and Hartel, 2010). Parasitism is dominated by the *Coeloides* and *Eubazus* [Hymenoptera:Braconidae]. *Rhopalicus* spp. were found by Hanson (1937) to be frequent parasites of species of pine beetles and more specifically of *Pissodes castaneus. Calyptus atricornis* Ratz. has also been observed to be a very efficient parasite of *Pissodes castaneus* (Hanson, 1937). Kenis and Mills

(1998) observed both *Eubazus semirugosus* (Nees) and *E. robustus* parasitize *P. castaneus.*

Parasitism rates are high and suggest that parasitoids can be used to increase the level of control (CABI, 2011), although Alauzet (1990) suggests that environmental conditions may play a larger role in control of *P. castaneus* than parasitoids. Parasitism is mainly dominated by *Eubazus* species and to a lesser extent *Coeloides* species (Kenis et al., 2004).

Alauzet (1987) identified 10 species able to grown on *Pissodes castaneus* in the south of France. The most frequent and abundant of these were *Coeloides abdominalis* Zetterstedt (Hymenoptera:Braconidae), *C. sordidator* Ratzeburg (Hymenoptera:Braconidae) and *Eubazus semirugosus* Nees (Hymenoptera:Braconidae). The geographic distribution of these species is large. However, the larval development of these parasitoids is very dependent on that of its host.

In France, life cycles of *Pissodes castaneus* did not always match with emergence *Eubazus semirugosus*. In a study in France by Alauzet (1987) using 25 females, *E. semirugosus* was observed to only parasitize *P. castaneus* at the egg stage.

The two *Coeloides* species lay eggs on the second or third instar larvae of *P. castaneus* (Alauzet, 1987). In the lab, *C. sordidator* prefers to lay on second, third and fourth instar larvae, and pupae were not accepted as hosts (Kenis, 1997). The weevil larvae then continue their development so that the hatching of the parasitoid generally occurs when the host *P. castaneus* has reached the third, or rarely fourth, larval instar (Alauzet, 1987; Kenis, 1997). At this point, the parasitoids behave as ectoparasites (Alauzet, 1987).

In 1966, small outbreaks of *Pissodes castaneus* were observed near Toulouse, France, in the Bouconne forest. The weevils were observed to be univoltine and emerge in the summer (Alauzet, 1990). The most abundant parasitoids were species of *Eubazus* and *Coeloides*, although other parasitoids of *P. castaneus* were also observed: *Habrobacon palpebrator* Ratzeburg (Hymenoptera:Braconidae), *Spathius rubidus* Nees (Hymenoptera:Braconidae), *Dendrosoter middendorffi* Ratz. (Hymenoptera:Braconidae), and *Rhopalicus tutela* Walk. (Hymenoptera: Pteromalidae). In all of these cases, no matter in what stage the weevil was parasitized, the death of the *P. castaneus* occurred in the fourth larval instar, and the adult parasitoids emerged between April and August (Alauzet, 1990). In his study, the rate of parasitism which occurred (based on the formula: [‘Number of parasitoids emerging’/(‘Number of parasitoids emerging’ + ‘Number of weevils emerging’)] was 16% parasitism. The major limiting factor in controlling *P. castaneus* was, in fact, found to be the environment.

In a study in Portugal, *Pissodes castaneus* was observed to carry nematodes belonging to different genera of the Aphelenchoididae, as well as other taxonomic groups (Sousa et al., 2002). *P. castaneus* is not, however, host to *Bursaphelenchus dauer* larvae (Sousa et al., 2002).

Predators

Table 6-1 Biological Control Agents of *Pissodes castaneus*[1]

Biology	Family	Species	Reference
L.ec. (h)	Hymenoptera: Eupelmidae	*Calosota aestivalis* Curtis	Kenis et al., 2004
Larval parasitoid	Hymenoptera: Braconidae	*Calyptus atricornis* Ratzeburg	Hanson, 1937
L.ec.	Hymenoptera: Braconidae	*Coeloides abdominalis* Zetterstedt	CABI, 2011; Kenis et al., 2004
L.ec.	Hymenoptera: Braconidae	*Coeloides sordidator* Ratzeburg	CABI, 2011; Kenis et al., 2004
L.ec.	Hymenoptera: Ichneumonidae	*Dolichomitus terebrans* Ratzeburg	CABI, 2011; Kenis et al., 2004
E.-L. en.	Hymenoptera: Braconidae	*Eubazus atricornis* Ratzeburg	CABI, 2011
E.-L. en.	Hymenoptera: Braconidae	*Eubazus robustus* Ratzeburg	CABI, 2011; Kenis et al., 2004; Villemant et al., 2007
E.-L. en.	Hymenoptera: Braconidae	*Eubazus semirugosus* Nees	CABI, 2011 Kenis and Mills, 1998; Kenis et al., 2004; Villemant et al., 2007
L.ec. (h)	Hymenoptera: Eupelmidae	*Eupelmus urozonus* Dalman	Kenis et al., 2004
L.ec.	Hymentoptera: Eurytomidae	*Eurytoma annilai* Hedgvist	CABI, 2011; Kenis et al., 2004
L.ec.	Hymenoptera: Eurytomidae	*Eurytoma wachtli* Mayr	CABI, 2011; Kenis et al., 2004
L.ec.	Hymenoptera: Pteromalidae	*Metacolus unifasciatus* Foerster	CABI, 2011; Kenis et al., 2004
P.ec.	Acari: Tarsonemidae	*Pediculoides ventricosus* Newport	Kenis et al., 2004

Table 6-1 Biological Control Agents of *Pissodes castaneus*[1]

Biology	Family	Species	Reference
L.ec.	Hymenoptera: Pteromalidae	*Rhopalicus guttatus* Ratzeburg	CABI, 2011; Kenis et al., 2004
L.ec.	Hymenoptera: Pteromalidae	*Rhopalicus tutela* Walker	Kenis et al., 2004 Hanson, 1937
L.ec.	Hymenoptera: Braconidae	*Spathius rubidus* Rossi	CABI, 2011; Kenis et al., 2004
Adult predator	Coleoptera: Cleridae	*Thanasimus formicarius* L.	CABI, 2011

1 Biology: L. ec. = Larval idiobiont ectoparasitoid; E.-L. en. = Egg-Larval koinobiont endoparasitoid; P. ec. Pupal ectoparasite; h = Facultative hyperparasitoid (Kenis et al., 2004)

Entomopathogenic Fungi

Beauveria bassiana has been reported as an entomopathogenic fungi of *Pissodes castaneus* in Spain (Gomez and Hartel, 2010). In addition, in Brazil epizootics on this weevil have been reported (Gomez and Hartel, 2010; Zaleski, 2009).

Chapter 7

Environmental Compliance

Contents

Introduction

Use *Chapter 7 Environmental Compliance* as a guide to environmental regulations pertinent to the small banded pine weevil, *Pissodes castaneus* (DeGeer, 1775).

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 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.

Chapter

8

Pathways

Contents

Introduction

Use *Chapter 8 Pathways* as a source of information on the pathways of introduction of the small banded pine weevil, *Pissodes castaneus* (DeGeer, 1775), in the United States.

Overview

The potential entry and establishment of *Pissodes castaneus* poses a serious threat to United States agriculture. Several fruits and vegetables as well as ornamental plants in the United States are at risk. This chapter discusses plausible pathways for entry of *P. castaneus* based on its current distribution and on import data for host commodities from infested countries.

Natural Movement

The known range for *Pissodes castaneus* is Europe, Africa, Asia, and South America. This means that the pest can not get to the United States on its own through migration or other natural means of spread.

Commodity Imports

The plant parts likely to carry *Pissodes castaneus* in transport are: stems, shoots, trunk, and branches (CABI, 2011). All stages can be found internally in galleries between the back and the wood itself, and should be visible to the naked eye. Solid pine packing material can carry the weevil and should be inspected in a port of entry.

The USDA lists *Pissodes castaneus* as a quarantined actionable pest. Officers with USDA-APHIS and the Department of Homeland Security reported 13 interceptions of PFM at U.S. ports of entry from 1984 to 2012 (USDA 2012). The interceptions of *P. castaneus* were all on pallets, crates or other products made from wood. 343 other *Pissodes* species were also intercepted during this period and only identified to genus. The majority of these were also found on wood products, pallets or crates.

Small Banded Pine Weevil

References

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

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Appendix

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 Small Banded Pine Weevil

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 *Manual for Agricultural Clearance*	http://www.aphis.usda.gov/import_export/plants/manuals/online_manuals.shtml
PPQ *Treatment Manual*	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	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
National Climatic Center, Data Base Administration, Box 34, Federal Building, Asheville, North Carolina 28801	http://www.ncdc.noaa.gov/oa/ncdc.html
CAPS Survey Manuals	http://caps.ceris.purdue.edu/
Leafhopper and treehopper genera in New Zealand	http://www1.dpi.nsw.gov.au/keys/leafhop/deltocephalinae/opsiini.htm
GenBank®	http://www.ncbi.nlm.nih.gov/
iPhyClassifier	http://plantpathology.ba.ars.usda.gov/cgi-bin/resource/iphyclassifier.cgi

Appendix

B

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

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 IIBIII USE
LOT NO.
PRIORITY

1. COLLECTION NUMBER
2. DATE — MO | DA | YR
3. SUBMITTING AGENCY — ☐ State Cooperator ☐ PPQ ☐ Other _____

SENDER AND ORIGIN

4. NAME OF SENDER
6. ADDRESS OF SENDER
ZIP

INTERCEPTION SITE

5. TYPE OF PROPERTY *(Farm, Feedmill, Nursery, etc.)*
7. NAME AND ADDRESS OF PROPERTY OR OWNER
COUNTRY/ COUNTY

PURPOSE

8. REASON FOR IDENTIFICATION *("x" ALL Applicable Items)*

A. ☐ Biological Control (Target Pest Name)
B. ☐ Damaging Crops/Plants
C. ☐ Suspected Pest of Regulatory Concern *(Explain in* REMARKS*)*
D. ☐ Stored Product Pest
E. ☐ Livestock, Domestic Animal Pest
F. ☐ Possible Immigrant *(Explain in* REMARKS*)*
G. ☐ Survey *(Explain in* REMARKS*)*
H. ☐ Other *(Explain in* REMARKS*)*

9. IF PROMPT OR URGENT IDENTIFICATION IS REQUESTED, PLEASE PROVIDE A BRIEF EXPLANATION UNDER "REMARKS".

HOST DATA

10. HOST INFORMATION
NAME OF HOST *(Scientific name when possible)*

11. QUANTITY OF HOST
NUMBER OF ACRES/PLANTS
PLANTS AFFECTED *(Insert figure and indicate* ☐ Number ☐ Percent*):*

12. PLANT DISTRIBUTION
☐ LIMITED
☐ SCATTERED
☐ WIDESPREAD

13. PLANT PARTS AFFECTED
☐ Leaves, Upper Surface ☐ Leaves, Lower Surface ☐ Petiole ☐ Stem
☐ Trunk/Bark ☐ Branches ☐ Growing Tips ☐ Roots
☐ Bulbs, Tubers, Corms ☐ Buds ☐ Flowers ☐ Fruits or Nuts
☐ Seeds

PEST DATA

14. PEST DISTRIBUTION
☐ FEW
☐ COMMON
☐ ABUNDANT
☐ EXTREME

15. ☐ INSECTS ☐ NEMATODES ☐ MOLLUSKS

NUMBER SUBMITTED	LARVAE	PUPAE	ADULTS	CAST SKINS	EGGS	NYMPHS	JUVS.	CYSTS
ALIVE								
DEAD								

16. SAMPLING METHOD
17. TYPE OF TRAP AND LURE
18. TRAP NUMBER

19. PLANT PATHOLOGY – PLANT SYMPTOMS *("X" one and describe symptoms)*
☐ ISOLATED ☐ GENERAL

20. WEED DENSITY
☐ FEW ☐ SPOTTY ☐ GENERAL

21. WEED GROWTH STAGE
☐ SEEDLING ☐ VEGETATIVE ☐ FLOWERING/FRUITING ☐ MATURE

22. REMARKS

23. TENTATIVE DETERMINATION

24. DETERMINATION AND NOTES *(Not for Field Use)*

SIGNATURE
DATE

FOR IIBIII USE
DATE RECEIVED
NO.
LABEL
SORTED
PREPARED
DATE ACCEPTED
RR

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

This is a 6-Part form. Copies must be disseminated as follows:
☐ PART 1 – PPQ ☐ PART 2 – RETURN TO SUBMITTER AFTER IDENTIFICATION ☐ PART 3 – IIBIII OR FINAL IDENTIFIER
☐ PART 4 – INTERMEDIATE IDENTIFIER ☐ PART 5 – INTERMEDIATE IDENTIFIER ☐ 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	1. Assign a number for each collection beginning the year, followed by the collector's initials and collector's number **EXAMPLE** In 2001, Brian K. Long collected his first specimen for determination of the year. His first collection number is 01-BLK-001 2. Enter the collection number
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	• 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	Description	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 *Block 22*
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	Description	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.

1. PPQ LOCATION | 2. DATE ISSUED

3. NAME AND QUANTITY OF ARTICLE(S)

4. LOCATION OF ARTICLES

5. DESTINATION OF ARTICLES

6. SHIPPER

7. NAME OF CARRIER

8. SHIPMENT ID NO.(S)

9. OWNER/CONSIGNEE OF ARTICLES

Name:

Address:

PHONE NO. | FAX NO.

SS NO. | TAX ID NO.

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*.

Appendix

C

How to Submit Insect Specimens

Contents

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 1day. 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, most of the 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.

Appendix

D

Taxonomic Support for Surveys

Contents

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.govwith 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.