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When using pesticides, read and follow all label instructions.

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Cover page Japanese beetle photograph is courtesy of Gerald Holmes, Strawberry Center, Cal Poly San Luis Obispo, Bugwood.org.

Cover page exclusion device photograph is courtesy of Phillip Lewis, APHIS–PPQ–Science and Technology, Forest Pest Methods Laboratory.
Chapter 1

Introduction

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APHIS Mission

The Animal and Plant Health Inspection Service (APHIS) is an Agency within the United States Department of Agriculture (USDA). Our mission is to protect the health and value of America’s agriculture and natural resources.

PPQ Mission

APHIS Plant Protection and Quarantine (PPQ) safeguards agriculture and natural resources from the risks associated with the entry, establishment, or spread of animal and plant pests and noxious weeds. Japanese beetle (JB) (*Popillia japonica*) is one such pest capable, if not controlled, of causing economic damage to U.S. agriculture and natural resources.

Japanese Beetle Policy

The primary objective of the JB Program is to protect the agriculture and natural resources of the Western United States by preventing the human-assisted spread of the JB from the Eastern United States on aircraft. This manual will help APHIS–PPQ personnel, State and county cooperators by outlining the policies and procedures necessary to protect the Western States from the accidental transportation of JB on aircraft.
Protected States

Nine Western States requested protection from JB infestation. These States are known as the “protected States.” They are:

- Arizona
- California
- Colorado
- Idaho
- Montana
- Nevada
- Oregon
- Utah
- Washington

Japanese Beetle Program Manual Tasks

Specifically, this manual will address the following tasks:

- Determining the risk at JB-infested airports
- Issuing and canceling Emergency Action Notifications (EANs)
- Monitoring airports in JB-free areas
- Monitoring airports in protected States
- Treating aircraft and cargo
- Treating grounds
- Using compliance agreements (CAs)


U.S. Domestic Japanese Beetle Harmonization Plan

The National Plant Board adopted the U.S. Domestic Japanese Beetle Harmonization Plan on August 19, 1998 (most recent revision June 20, 2016). This plan establishes procedures for the free movement of JB host commodities, such as nursery stock. The plan is periodically revised in order to incorporate new technologies and new procedures.
For more information on the plan, visit the U.S. Domestic Japanese Beetle Harmonization Plan website at http://nationalplantboard.org/japanese-beetle-harmonization-plan/.

Scope

The manual is organized into the following chapters:

- Chapter 1—Introduction on page 1-1
- Chapter 2—General Information on page 2-1
- Chapter 3—Airport Monitoring and Classification on page 3-1
- Chapter 4—Control Measures on page 4-1
- Chapter 5—Compliance Agreements and Management on page 5-1
- Appendix A—Forms on page A-1
- Glossary—Glossary on page Glossary-1
- Index—Index on page Index-1

Users

The primary users of this manual may include the following:

- APHIS–PPQ field personnel who are:
  - Cooperating under Compliance Agreements (CAs)
  - Monitoring airports
  - Supervising PPQ officers
- State and county personnel who are:
  - Cooperating under CAs
  - Monitoring airports
- Airport personnel who are:
  - Applying pesticides
  - Cooperating under CAs
  - Monitoring airports
The following documents may supplement this manual:


- Plant Protection Act (PPA)—the Plant Protection Act of June 20, 2000, which modernized and streamlined the plant quarantine laws and replaced the previous legislation. Information is in 7 USC 7701-36, with sections 14, 15, 23, 24, and 31 addressing specific issues

- U. S. Domestic Japanese Beetle Harmonization Plan—the National Plant Board working with USDA–APHIS–PPQ and the American Nursery and Landscape Association developed the U. S. Domestic Japanese Beetle Harmonization Plan. This plan establishes procedures for the free movement of JB host commodities. This plan is available at the National Plant Board website located at the following address: http://nationalplantboard.org/japanese-beetle-harmonization-plan/

- Treatment Manual located at the following address: https://www.aphis.usda.gov/import_export/plants/manuals/ports/downloads/treatment.pdf and published by USDA–APHIS–PPQ, contains accepted treatments for various commodities including aircraft (T409)


The conventions used in this manual are as follows.

**Advisories**

Advisories are used throughout this manual to bring important information to your attention. Carefully review each advisory. The definitions coincide with the American National Standards Institute (ANSI), with the goal of making the warnings easy to recognize and understand and are in the format shown below.

**DANGER**

Danger Table message is used in the event of imminent risk of death or serious injury
**WARNING**

Warning Table message is used in the event of possible risk of serious injury.

**CAUTION**

Caution Table message is used for tasks involving minor to moderate risk of injury.

**NOTICE**

Notice Table message is used to alert a reader of important information or Agency policy.

**SAFETY**

Safety Table message is used for general instructions or reminders related to safety.

**Boldface**

Boldface type is used to emphasize important words throughout this manual. These words include, but are not limited to: cannot, do not, does not, except, lacks, must, neither, never, nor, not, only, other than.

**Bullets**

Bulleted lists indicate that there is no order of priority to the information being listed.

**Change Bar**

A black change bar in the left margin is used to indicate a change appearing on a revised page.

**Contents**

Every chapter has a table of contents listing only the first- and second-level headings within the chapter.

**Control Data**

Control data is located at the top and bottom of each page to help users keep track of where they are in the manual and be aware of updates to specific chapters, sections, appendixes, etc., in the manual. At the top of the page is the chapter title and first-level heading for that page. At the bottom of the page is the transmittal number (month/year-number), manual title, and page number. To track revisions, use the control data.

---

Decision Tables
Decision tables are used throughout the manual. The first and middle columns in each table represent conditions, and the last column represents the action to be taken 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. Refer to Table 1-1 for guidance on using decision tables.

Table 1-1 How to Use Decision Tables

<table>
<thead>
<tr>
<th>If you:</th>
<th>And if the condition applies:</th>
<th>Then:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read this column cell and row first</td>
<td>Continue in this cell</td>
<td>TAKE the action listed in this cell</td>
</tr>
<tr>
<td>Find the previous condition did not apply, then read this column cell</td>
<td>Continue in this cell</td>
<td>TAKE the action listed in this cell</td>
</tr>
</tbody>
</table>

Examples
Examples are used to clarify a point by applying it to a real-world situation. Examples always appear in boxes as a means of visually separating them from the other information contained on a page.

EXAMPLE
Examples are graphically placed boxes within the text as a means of visually separating information from other information contained on the page. Examples will always appear in a box.

Footnotes
Footnotes comment on or cite a reference to text and are referenced by number. The footnotes used in this manual 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 multipage tables or tables that cover the length of a page, footnote numbers and 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 table or figure.
Heading Levels
Within each chapter and section there may be up to four heading levels. The first-level heading is indicated by a horizontal line across both left and right columns with the heading language across the left and right columns directly underneath. The body text after a first-level heading is located inside the margined text area, one line after the heading language. The second- and third-level headings are inside the margined text area with the body text following underneath. The fourth-level heading is inside the margined text area followed by a period and leading into the text.

Hypertext Links (Highlighting) to Tables, Figures, and Headings
Tables, figures, and headings are cross-referenced in the body of the manual. These appear in blue hypertext in the online manual.

EXAMPLE
See Reporting Issues With or Suggestions for the Japanese Beetle Manual on page 1-8 to determine where to report problems with this manual.

Indentions
Entry requirements which are summarized from CFRs, import permits, or policies are indented on the page.

Italics
The following items are italicized throughout this manual.

◆ Cross-references to headings
◆ Publication names
◆ Scientific names of commodities

Numbering Scheme
A two-level numbering scheme is used in this manual for pages, tables, and figures. The first number represents the chapter. The second number represents the page, table, or figure. This numbering scheme allows for easier updating and adding pages without having to reprint an entire chapter. Dashes are used in page numbering to differentiate page numbers from decimal points.
Transmittal Number
The transmittal number contains the month, year, and 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, section, appendix, glossary, table, or index is updated. If no changes are made, then the transmittal number remains unchanged. The transmittal number only changes for the entire manual when a new edition is issued or changes are made to the entire manual.

EXAMPLE 05/2022-05 is the transmittal number for this update and is located in the control data on the pages in this chapter.
05 is the month the update was issued
2022 is the year the update was issued
05 is the edition number (the new edition was 01, and there have been 4 updates)

Using the Manual
Review the Table of Contents (TOC) of this manual to get a feel for the scope of covered material. Use the TOC in each chapter (miniTOC) to find the needed information. If the TOC or miniTOC are not specific enough, turn to the Index on page Index-1 to find the topic and corresponding number.

Table 1-2 Reporting Issues With or Suggestions for the Japanese Beetle Manual

<table>
<thead>
<tr>
<th>If you:</th>
<th>Then:</th>
</tr>
</thead>
<tbody>
<tr>
<td>◆ Are unable to access the online manual</td>
<td>CONTACT PPQ Manuals Unit at 240-529-0350 or email <a href="mailto:josie.cooley@usda.gov">josie.cooley@usda.gov</a>.</td>
</tr>
<tr>
<td>◆ Have a suggestion for improving the format (layout, spelling, etc.)</td>
<td>CONTACT PPQ Manuals Unit at 240-529-0350 or email <a href="mailto:josie.cooley@usda.gov">josie.cooley@usda.gov</a>.</td>
</tr>
<tr>
<td>◆ Disagree with a policy, procedure</td>
<td>CONTACT the PPQ National Policy Manager at <a href="mailto:foday.conteh@usda.gov">foday.conteh@usda.gov</a>.</td>
</tr>
<tr>
<td>◆ Have an urgent situation requiring an immediate response</td>
<td>CONTACT the PPQ National Policy Manager at <a href="mailto:foday.conteh@usda.gov">foday.conteh@usda.gov</a>.</td>
</tr>
</tbody>
</table>

Manual Updates
The PPQ Manuals Unit issues and maintains the manuals electronically on the Manuals Unit website. The online manuals located at the following address: https://www.aphis.usda.gov/aphis/ourfocus/planthealth/complete-list-of-electronic-manuals contain the most up-to-date information. Revisions to the manual are distributed via the APHIS Stakeholder Registry to anyone, government employees and external stakeholders, who have subscribed to receive Japanese Beetle Manual updates. To subscribe, register at this APHIS Stakeholder Registry website located at the following address: https://public.govdelivery.com/accounts/USDAAPHIS/subscriber/new.
Ordering Additional Manuals and Revisions
Although using the online manuals is the preferred method, APHIS employees may order hard copies of manuals from the APHIS–MRP–Business Services, Acquisition & Asset Management, Printing, Distribution, Mail, Copier Solutions (PDMCS). Visit the PDMCS website at the following address: https://my.aphis.usda.gov/myportal/myaphis/employeeresources/administrativeservices/Printing_Distribution_Mail_Copier_Solutions for detailed information and printing costs. The Manuals Unit is not responsible for printing costs.
Chapter 2

General Information

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Economic Importance

The Japanese beetle (JB) is a highly destructive plant pest that causes extensive damage to more than 300 different agricultural and ornamental plants. The larvae (grubs) feed on grass roots and damage lawns, golf courses, and pastures. Adult JB prefer foliage, flowers, and fruits. Population size varies considerably and may be sporadic from year to year due to weather conditions and other factors. Once established, JB infestations can be costly to control with insecticides or biological methods.

APHIS cooperated with State and county officials to develop regulations and guidelines to control the artificial spread of JB from infested Eastern States to the protected Western States. The cooperative Federal and State regulatory programs have been operating for many years.

First Detection

The JB was first found in the United States in 1916 near Riverton, New Jersey. In 1918, the USDA and New Jersey authorities attempted to exterminate the pest. However, they were not able to eradicate the pest because the infestation was well established, their control measures were marginally effective, and only limited funding was available.
Since then, JB has spread throughout most of the States east of the Mississippi River. Because of the possibility of artificial spread by aircraft, it is a major threat to the agriculture and flora of the Western United States.

**Distribution**

**East of the Mississippi River**
At present, JB occurs throughout most of the United States east of the Mississippi River. For the current distribution, refer to the National Agricultural Pest Information System (NAPIS) at the following website: http://pest.ceris.purdue.edu/pest.php?code=INBPZA.

**West of the Mississippi River**
Many States west of the Mississippi River do **not** have JB populations. Several States immediately west of the Mississippi River are generally infested (Arkansas, Iowa, and Missouri) and some are only partially infested (Kansas, Minnesota, Nebraska, Oklahoma, South Dakota, and Texas).

The Program’s goal is to eradicate JB infestations in protected and uninfested States. Those States that are **unable** to eradicate JB, typically use integrated pest management (IPM) techniques to keep populations below economically damaging levels.

**Distribution in Canada**
Areas regulated for JB in Canada include:

1. Southwestern portion of Quebec Province south of Montreal
2. Southeastern Ontario Province along the shores of the St. Lawrence River
3. Southwestern Ontario Province in the area bounded by Lake Huron, Lake St. Clair, and Lake Erie. This area includes the western shore of Lake Ontario.

A complete listing of infested regional municipalities and a map are located at the Canadian Food Inspection Agency (CFIA) website located the following address: http://www.inspection.gc.ca/plants/plant-pests-invasive-species/insects/japanese-beetle/eng/1328048149161/1328048244390.

**Distribution in Asia**
Although native to Japan, JB is found in the Republic of Korea (South Korea) as well as most of Southeast Asia and parts of Russia.
Hosts and Nonhosts

Larvae feed on the roots and underground stems of plants, particularly grasses.

Adult Japanese beetles (JBs) are gregarious general feeders on leaves, flowers, and fruits. Preferred hosts include small fruits, tree fruits, garden crops, ornamental shrubs, vines, and trees. Studies indicate adult JB feed on over 300 species of plants representing 79 families.

Preferred Hosts

Refer to Table 2-1 for a list of preferred hosts.

Table 2-1  Preferred Japanese Beetle Hosts (page 1 of 2)

<table>
<thead>
<tr>
<th>Scientific name</th>
<th>Common name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abutilon hybridum</td>
<td>Chinese-lantern</td>
</tr>
<tr>
<td>Acacia baileyana</td>
<td>Cootamundra wattle</td>
</tr>
<tr>
<td>Acer palmatum</td>
<td>Japanese maple</td>
</tr>
<tr>
<td>Acer plantoides</td>
<td>Norway maple</td>
</tr>
<tr>
<td>Aesculus hippocastanum</td>
<td>Horse chestnut</td>
</tr>
<tr>
<td>Alcea rosea</td>
<td>Hollyhock</td>
</tr>
<tr>
<td>Althaea spp.</td>
<td>Althaea</td>
</tr>
<tr>
<td>Arbutus unedo</td>
<td>Strawberry tree</td>
</tr>
<tr>
<td>Bauhinia variegata</td>
<td>Orchid tree</td>
</tr>
<tr>
<td>Betula populifolia</td>
<td>Gray birch</td>
</tr>
<tr>
<td>Castanea dentata</td>
<td>American chestnut</td>
</tr>
<tr>
<td>Ceanothus griseus</td>
<td>Carmel ceanothus</td>
</tr>
<tr>
<td>Citrus sinensis</td>
<td>Orange</td>
</tr>
<tr>
<td>Cydonia oblongas</td>
<td>Common quince</td>
</tr>
<tr>
<td>Eucalyptus sideroxylon</td>
<td>Red ironbark</td>
</tr>
<tr>
<td>Fremontodendron californicum</td>
<td>Common flannel bush</td>
</tr>
<tr>
<td>Glycine max</td>
<td>Soybean</td>
</tr>
<tr>
<td>Grewia caffra</td>
<td>Lavender starflower</td>
</tr>
<tr>
<td>Hibiscus syriacus</td>
<td>Rose-of-sharon</td>
</tr>
<tr>
<td>Juglans nigra</td>
<td>Black walnut</td>
</tr>
<tr>
<td>Lagerstroemia indica</td>
<td>Common crape myrtle</td>
</tr>
<tr>
<td>Larix occidentalis</td>
<td>Western larch</td>
</tr>
<tr>
<td>Malus domestica</td>
<td>Apple</td>
</tr>
<tr>
<td>Nandina domestica</td>
<td>Heavenly bamboo</td>
</tr>
<tr>
<td>Parthenocissus quinquefolia</td>
<td>Virginia creeper</td>
</tr>
<tr>
<td>Platanus acerifolia</td>
<td>London plane tree</td>
</tr>
<tr>
<td>Podocarpus macrophyllus</td>
<td>Yew pine</td>
</tr>
<tr>
<td>Polygonum spp.</td>
<td>Smartweed</td>
</tr>
</tbody>
</table>
Nonpreferred Hosts and Nonhosts

Although adult beetles feed on over 300 species of plants, they feed sparingly or not at all on many cultivated plants. Some plants are rarely or never fed on such as evergreens, common grains, most truck and field crops, and many of the common ornamental flowers.

When beetles are abundant, plant damage may be avoided by using species that are immune or seldom attacked by the insect.\(^1\)

Refer to Table 2-2 for a list of nonpreferred hosts and nonhosts.

### Table 2-2  Nonpreferred Hosts and Nonhosts for Japanese Beetle (page 1 of 2)

<table>
<thead>
<tr>
<th>Plant group:</th>
<th>Specific plants:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small fruits</td>
<td>American cranberry, black huckleberry, European gooseberry, northern dewberry, northern gooseberry</td>
</tr>
<tr>
<td>Orchard fruits</td>
<td>Pear, persimmon</td>
</tr>
<tr>
<td>Truck and garden crops</td>
<td>Artichoke, brussels sprouts, cabbage, cantaloupe, cauliflower, celery, onion, cucumber, eggplant, endive, carrot, pea, radish, kale, leek, lettuce, muskmelon, parsley, parsnip, peanut, potato, pumpkin, red pepper, rutabaga, salsify, spinach, summer squash, sweet potato, tomato, turnip, watermelon</td>
</tr>
<tr>
<td>Field crops</td>
<td>Barley, buckwheat, hops, millet, oats, rye, timothy, tobacco, vetch, wheat</td>
</tr>
</tbody>
</table>

There is usually 1 generation of JB each year, but a percentage of the grubs may take 2 years to mature, especially in wet, cold soils. A diagram of a typical life cycle is shown in Figure 2-3 on page 2-8. However, temperature and moisture influence the development of life stages. As a result, life stage development will vary from year to year at a given locality. Additionally, geography and latitude within a particular State can significantly impact the beetle’s life cycle.

### Egg Stage

Female JB burrows into the soil to a depth of about 3 inches to lay eggs. The eggs are deposited singly and only a few are laid at a time. Egg laying is intermittent and a female usually deposits 40 to 60 eggs during its lifetime.
**Larval Stage**

The eggs hatch in approximately 2 weeks and the larvae (grubs) begin feeding on the roots of grass and other plants. During the summer, the grubs feed within the upper 4 inches of soil. However, during late fall, they work downward in the soil to a depth of 8 to 10 inches to overwinter. In the spring, the grubs move upward and resume feeding on grass roots.

The full-grown larvae are about 1 inch long and usually lie in the soil in a curled position. Refer to Figure 2-1 to view an example of a larva.

![Figure 2-1 Japanese Beetle Larva](UCA0660086)

1. Photo courtesy of the USDA–Agricultural Research Service, Bugwood.org.

**Description of First, Second, and Third Instar Larvae**

A micrometer eyepiece can be used to measure the length of the instar and the width of the head capsule; the measurements in Table 2-3 serve as a guide for identifying the different larval stages.

<table>
<thead>
<tr>
<th></th>
<th>First instar:</th>
<th>Second instar:</th>
<th>Third instar:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of instar</td>
<td>10.5 mm</td>
<td>18.5 mm</td>
<td>32 mm</td>
</tr>
<tr>
<td>Width of head</td>
<td>1.2 mm</td>
<td>1.9 mm</td>
<td>3.1 mm</td>
</tr>
</tbody>
</table>
Refer to Table 2-4 for detailed characteristics of the third larval instar.

**Table 2-4 Description of Third Instar Larvae**

<table>
<thead>
<tr>
<th>Description:</th>
<th>Characteristics:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form</td>
<td>C-shaped</td>
</tr>
<tr>
<td>Surface of head</td>
<td></td>
</tr>
<tr>
<td>Epicranial arm is not conspicuous</td>
<td></td>
</tr>
<tr>
<td>Epicranial stem is a fine, dark, impressed line</td>
<td></td>
</tr>
<tr>
<td>Front with a short, vague, longitudinal, median impression in apical third; at each side of this is a row of five punctures diverging toward the middle bend of the epicranial arm</td>
<td></td>
</tr>
<tr>
<td>Smooth, shining</td>
<td></td>
</tr>
<tr>
<td>Color of head</td>
<td>Pale, dull yellow</td>
</tr>
<tr>
<td>Raster</td>
<td>Medially, two conspicuous, divergent rows of shorter, straight spines in V-form</td>
</tr>
<tr>
<td>Numerous coarse, rather long, scattered, brown, hooked spines</td>
<td></td>
</tr>
<tr>
<td>Numerous rather long, yellowish hairs located at the sides and end of the tenth segment</td>
<td></td>
</tr>
<tr>
<td>Six or seven spines in each row</td>
<td></td>
</tr>
<tr>
<td>Anal slit</td>
<td>Transverse, arcuate</td>
</tr>
<tr>
<td>Vestiture</td>
<td>Entire grub with rather long, scattered brown hairs</td>
</tr>
<tr>
<td>Dorsal convexities of first six abdominal segments clothed with fine, short, brown spines</td>
<td></td>
</tr>
<tr>
<td>Habitat</td>
<td>In soil, primarily under turf</td>
</tr>
</tbody>
</table>

The distinct V-like arrangement in two rows of short dark spines of the underside of the raster is sufficient to distinguish the JB from other soil-dwelling scarab beetles.

![V-Like Arrangement of Spines on the Raster](image)

*Figure 2-2 V-Like Arrangement of Spines on the Raster*

1 Illustration courtesy of University of Massachusetts Amherst, Center for Agriculture, Food, and the Environment.
**Pupal Stage**

When full grown, the grubs move slightly deeper in the soil and form an earthen cell to pupate. A prepupal stage is followed by a pupal stage that lasts 7 to 17 days. The grubs enter the pupal stage about 2 weeks before adult emergence.

**Adult Stage**

Newly emerged adults may remain in the pupal cell for 2 to 14 days before emerging from the soil. During the warm summer months, adult JB live above the ground.

The onset of adult emergence is primarily influenced by soil temperature. In the Southern United States, adult JB can emerge in May and in New England, emergence can begin in July. In Eastern North Carolina, JB begin to emerge from the soil in mid-May, while further north in Philadelphia, Pennsylvania, adult JB emerge during June. Typically, peak adult JB activity occurs 4 to 6 weeks after the first adult beetles emerge. **Accurate and real-time phenology degree-day maps of adult JB emergence** can be found at the following website: https://safaris.cipm.info/safaristmodel/StartuServlet?fieldops.

Beetles fly only during the day and are especially active on warm, sunny, calm days. Often gregarious, they feed mostly on the upper surfaces of leaves exposed to the sun. When feeding on the leaves, the beetles chew out the parts between the veins giving the leaves a “lace like” or “skeletonized” appearance.

Refer to **Figure 2-3** for a diagram of the life cycle.

---

**Figure 2-3  Diagram of the Japanese Beetle Life Cycle**

1 Illustration courtesy of the USDA–Animal and Plant Health Inspection Service (APHIS); illustrated by APHIS employee Joel Floyd.
Description of Adults
Adult JB are 10 to 12 millimeters (mm) long; their color is shiny metallic green with coppery-brown elytra (wings). The beetles can readily be recognized by the presence of 6 small patches of white along each side and the back of the abdomen just under the edges of the elytra. Refer to Figure 2-4 for a picture of an adult JB.

Figure 2-4  Single Adult Japanese Beetle¹


Characteristics of Male and Female Adults
A hand lens is helpful when determining the gender of beetles in the field; with practice, this can be done with the unaided eye.

The gender of adults can easily be determined by the shape of the foretibia and tarsi. For males, the apical tibial spur terminates in a sharp point; for females, the apical tibial spur is elongated and more rounded. In males, it is shorter and stouter, with the first segment about as long as wide; for females, the tarsi are somewhat longer and slenderer, with the first segment elongated and about equal in length to the next two or three segments combined. For males, the tarsus inserts near the apex of the tibia, while insertion of the tarsus is closer to the midpoint of the tibia in females.
Refer to Table 2-5 for a summary of these characteristics.

Table 2-5  Characteristics of Male and Female Adult Japanese Beetles

<table>
<thead>
<tr>
<th>Males:</th>
<th>Females:</th>
</tr>
</thead>
<tbody>
<tr>
<td>◆ Foretarsus</td>
<td>◆ Foretarsus</td>
</tr>
<tr>
<td>Shorter and stouter</td>
<td>Longer and more slender</td>
</tr>
<tr>
<td>◆ Insertion of foretarsus</td>
<td>◆ Insertion of foretarsus</td>
</tr>
<tr>
<td>Close to apex of tibia</td>
<td>Closer to midpoint of tibia</td>
</tr>
<tr>
<td>◆ First tarsal segment</td>
<td>◆ First tarsal segment</td>
</tr>
<tr>
<td>About as long as wide</td>
<td>Two to three times as long as wide</td>
</tr>
<tr>
<td>◆ Apical spur of foretibia</td>
<td>◆ Apical spur of foretibia</td>
</tr>
<tr>
<td>Short and pointed</td>
<td>Elongated and rounded</td>
</tr>
</tbody>
</table>

The photograph in Figure 2-5 illustrates the differences between male and female adults.

Figure 2-5  Photograph Showing the Foretibia of Males and Females with Distinctive Differences

1 Photo courtesy of Bruce Gill, Centre for Plant Quarantine Pests, Canadian Food Inspection Agency (CFIA), Ottawa, Canada.
Chapter 3

Airport Monitoring and Classification

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Goal of Airport Monitoring

The goal of airport monitoring is to estimate the level of risk and likelihood that Japanese beetle (JB) will enter aircraft by evaluating three factors:

1. The extent of JB activity (i.e., flying adults) near aircraft operating areas
2. The size of the JB population at the airport
3. The risk of JB entry into aircraft and transport to JB-free areas

Remember that aircraft operating areas include passenger boarding, luggage handling, and cargo loading areas.

These factors assessed together by agriculture officials represent the probable risk of JB transportation on aircraft to the protected States from the airport. The officials use the factors to determine the classification of the entire or a section of the airport as regulated or unregulated. The classification then dictates the type of safeguards and treatments required for airport operations.

Helpful Tools

The JB website can serve as a helpful tool for personnel involved in monitoring JB populations at infested airports in the East and noninfested airports in the “protected States.” The JB website can be located at the following address: https://www.aphis.usda.gov/aphis/ourfocus/planthealth/plant-pest-and-disease-programs/pests-and-diseases/japanese-beetle/japanese-beetle.

Goal of Airport Classification

The goal of airport classification is to classify airports in the JB-infested area into either a regulated or nonregulated status. This classification into regulated and nonregulated airports is based on the threat the individual airports pose to the JB-free areas. In the JB-free area, nine Western States have protected status, they are Arizona, California, Colorado, Idaho, Montana, Nevada, Oregon, Utah, and Washington.

Regulated airports in the JB-infested areas under quarantine should be those airports where the beetle is likely to enter aircraft and be transported to JB-free areas. APHIS will issue an Emergency Action Notification (EAN) to inform airport personnel when the airport is to be regulated. APHIS inspectors can cancel an EAN to return a regulated airport to nonregulated status.
Nonregulated airports in the JB-infested areas under quarantine should be those airports where the beetle is not likely to enter aircraft and be transported to JB-free areas.

**Airport Monitoring in Infested Areas**

In JB-infested areas, under the direction of the State Plant Health Director (SPHD), authorized inspectors (either PPQ officers or designees) will survey JB populations to determine the potential risk at each airport using one or more of the following methods:

1. **Trapping Adult Beetles** on page 3-3
2. **Larval Surveys** on page 3-5
3. **Adult Visual Surveys** on page 3-6

**Trapping Adult Beetles**

Trapping adults is a valuable monitoring method that provides a population estimate at the time when the risk of live adult transport on aircraft is most likely. Within a single season, these captures can determine when adult emergence begins, peaks, and ends; and if performed over several seasons, trapping may indicate population trends within the airport.

**Number of Traps**

To monitor adult JB emergence at infested airports with flights to JB-free areas, place 4 to 8 traps per airport. Upon first JB capture, remove all traps and place at least 1 mile from the airport environs so as not to attract beetles to the airport operating area.

**Trap Types**

Dual-lure traps, containing both food and pheromone lures, are most effective in attracting adults. The trap and lure procurement database can be used to request traps and lures. Contact your regional trap and lure program manager for details.

If only a food-type lure is used, it should be “PEG,” which is a combination of phenyl ethyl propionate, eugenol, and geraniol in a ratio of 3:7:3. Using the food-type lure alone is not recommended.

Commercially prepared, sustained-release dispensers are available to disperse the pheromone lure for 75 to 100 days. Neither trap color nor size is a factor in trapping adults. Traps are usually yellow; however, white and green traps are equally effective.

**Trap Placement**

Trap placement is critical. Place traps to meet the following criteria:
◆ All-day sun (or at least midday sun)—traps placed in direct sunlight are twice as effective as those placed in the shade.

◆ Near, but not adjacent to, host plants. Trap placement should be 3 to 7 yards from favored trees, shrubs, and vines. Do not place traps immediately adjacent to tall, bushy plants or other objects that could interfere with dissemination of the lure. See Preferred Japanese Beetle Hosts on page 2-3 for a list of common names of host plants.

◆ Place traps so the bottom is approximately 22 inches above ground level. Traps baited with a pheromone attractant and PEG were most effective when placed at this height.

**NOTICE**

When placing traps, **never** put traps closer than 1 mile to aircraft-operating areas. Above all, **never** put traps only near aircraft-operating areas. Traps near aircraft-operating areas will only attract beetles into the aircraft-operating areas, creating entry problems where none existed.

**Trap Examination**

At a minimum, examine traps three times per week during JB flight period to ensure they are operative, as well as to remove all contents and clean the trap. Save suspected JB for identification and discard all other insects. Never reuse traps without inspecting for the presence of dead or live beetles. In areas of high JB populations, traps may need to be inspected more often, daily if necessary.

**NOTICE**

If the airport is in a State involved in invasive species surveys, consider examining the traps for nontarget exotic species. If an airport receives flights from around the world, an additional examination for exotic species may be a valuable part of an exotic species detection program.

At the end of the monitoring (or control) season, store traps in a dry location. They may be stored either assembled or disassembled. Thoroughly clean traps before storage.

**Trap Removal**

When a high-risk situation exists according to the three risk criteria (1) JB adults observed flying near aircraft-operating area; 2) high JB population; 3) and the potential for transport to JB-free area in the west), remove traps following the first detection.

When a low-risk situation exists at an airport (beetles are not likely to enter aircraft in an aircraft-operating area), traps can remain in place throughout the monitoring period. In this situation, traps can be checked less frequently depending on the weather.
Larval Surveys
Larval surveys are most often conducted to determine the most common life stage and the population level. They may be used alone or in combination with traps. As such, they are an invaluable tool used to determine whether pesticide applications or biological controls are necessary.

When to Conduct Larval Surveys
Surveys should be conducted in the spring before adult emergence and in the fall following the JB flight season. Furthermore, if turf damage indicates many larvae in the soil, conduct a survey.

During the spring and fall, larvae consume the fibrous roots of the turf. This gives it a soft, spongy surface that can be readily observed by a trained inspector. Severely damaged turf caused by the damage from larvae, as well as bird and animal feeding, can usually be rolled back like a rug. Because other scarab larvae produce similar damage as JB, identification of the responsible larvae is crucial.

Sampling Protocol
To estimate JB population density and determine potential treatment methods, identification must be swift and accurate. Refer to Table 3-1 on page 3-6 for a sequential sampling plan. The required number of samples is determined by the cumulative total from the initial samples.

The sequential sampling plan in Table 3-1 on page 3-6 is for second instar populations only. In New England, researchers determined that JB populations will be almost completely second instar by the end of August (about 1 month after the midpoint of the adult flight period; adjust timing for your location as necessary).

Each sample consists of 1 square foot of turf collected and examined for larvae to a depth of 4 to 5 inches. The time required to examine 1 sample is brief, around 15 minutes.

Control of the second instars is recommended when the average larval count is greater than 3 per square foot. When the count is less than 1 per square foot, control is not required. If only 1 larva is observed, additional sampling should be conducted.
Using **Table 3-1**, discontinue sampling when the cumulative number of larvae falls within the category of “Treatment NOT required” using the 5% error rate column, if possible.

**Table 3-1 Sequential Sampling Table for Treatment Decisions on Second Instars in Turfgrass**

<table>
<thead>
<tr>
<th>No. of samples</th>
<th>10% error rate</th>
<th>5% error rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Treatment NOT required</td>
<td>Treatment required</td>
</tr>
<tr>
<td>1</td>
<td>*</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>*</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>8</td>
<td>10</td>
<td>18</td>
</tr>
<tr>
<td>9</td>
<td>11</td>
<td>20</td>
</tr>
<tr>
<td>10</td>
<td>13</td>
<td>22</td>
</tr>
<tr>
<td>11</td>
<td>15</td>
<td>23</td>
</tr>
<tr>
<td>12</td>
<td>16</td>
<td>25</td>
</tr>
<tr>
<td>13</td>
<td>18</td>
<td>27</td>
</tr>
<tr>
<td>14</td>
<td>20</td>
<td>28</td>
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<tr>
<td>15</td>
<td>22</td>
<td>30</td>
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<tr>
<td>16</td>
<td>23</td>
<td>32</td>
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<tr>
<td>17</td>
<td>25</td>
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<tr>
<td>18</td>
<td>27</td>
<td>35</td>
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<tr>
<td>19</td>
<td>29</td>
<td>37</td>
</tr>
<tr>
<td>20</td>
<td>30</td>
<td>39</td>
</tr>
</tbody>
</table>

* Decision cannot be reached.

**Adult Visual Surveys**

Adult visual surveys are commonly used to determine the level of the beetle population in aircraft-operating areas. A minimal level of monitoring requires visual surveys of aircraft-operating areas in airports that were **regulated in any of the last 3 years**.

To coordinate visual surveys with the most optimum periods, use traps to detect the onset and peak of emergence. As an alternative, use surveys of various preferred hosts.
Peak Emergence Period
Adult beetles begin to emerge in May in southern localities, later in northern localities. Peak adult activity occurs 4 to 6 weeks after emergence starts. For an accurate near real-time prediction of adult emergence, visit the Spatial Analytic Framework for Advanced Risk Information Systems (SAFARIS) website where you can view and print phenology maps for your State; the website address is https://safaris.cipm.info/safarispestmodel/StartupServlet?pestcast&pid=JB.

Frequency of Visual Surveys
During the peak emergence period, perform visual surveys three to five times weekly, depending on the weather.

Duration of the Survey
Each visual survey at an aircraft-operating area should last at least 15 minutes and be conducted under conditions favorable for beetle activity. If high numbers of adults are flying near aircraft, longer and more frequent surveys may be necessary.

Time, Humidity, and Temperature
Adults fly only in the daytime. Critical times to observe beetles associated with aircraft are daylight hours on warm, sunny, and calm days. Typically, peak beetle activity and captures occur between 1:00 p.m. and 2:00 p.m., when air temperatures are at their highest. Trapping has shown that 45% of beetle activity occurs between 10:00 a.m. and 1:00 p.m. Although captures were spread out over most of the afternoon, the greatest number of captures occurred between 1:00 p.m. and 2:00 p.m. Fewer than 5% of the beetles were captured after 5:00 p.m. or before 9:00 a.m.

Beetles typically fly on clear days when the temperature reaches about 70 °F and relative humidity is below 60%. Often, but not always, temperatures above 95 °F or relative humidity above 60% stop or reduce flights of the adults. In Louisville, KY, flights did occur when the temperature was near 100 °F and the relative humidity was 70%. When Japonilure (an attractant placed in traps) was used alone, about 70% of the captures occurred between 10:00 a.m. and 1:00 p.m. and peak capture was at noon.

Rain and the Visual Survey
If possible, conduct visual surveys the day after a rainstorm, because adult emergence typically increases following a rain event.

Detections on Aircraft
Airport monitoring using traps, larval surveys, and/or visual surveys may not detect a high-risk situation. A single interception at an airport in a JB-free area may potentially indicate a high-risk situation at the originating airport.
Therefore, when beetles are found on aircraft in the **JB-infested area** and those aircraft are scheduled to go to **JB-free areas**, a high-risk situation likely exists. That is why it is essential that the State Plant Regulatory Official (SPRO) complete a Japanese Beetle Aircraft Inspection Record (JBAIR) (see Figure A-5 on page A-7) and inform the National Operations Manager (NOM). Next, the NOM will immediately inform the SPHD of the originating State and possibly airport personnel.

**Reports from Infested and Partially Infested Areas**

Enter information from JB partially infested States into the **National Agricultural Pest Information System (NAPIS)** found at the following website: http://pest.ceris.purdue.edu/.

When monitoring information indicates a threatening condition, weekly reports are necessary. Even if a threatening condition is **not** present, bimonthly reports of emergence and population levels at infested airports are essential to aid protected States in developing more stringent inspection and mitigation measures.

**Reporting Monitoring Information**

In addition to weekly reports during the JB flight period (June–September), enter monitoring information using NAPIS.

**Reports at the End of the Season**

After traps are removed for the season, information on New State Records (NSR) and New County Records (NCR) will be entered into NAPIS.

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**NOTICE**

At the first find of a beetle infestation in a county or State, enter a NCR or a NSR into NAPIS.

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**Determining Risk at Infested Airports**

**Determine the Risk at a JB-Infested Airport Using Three Criteria**

1. Population size
2. Proximity to aircraft operating areas
3. Aircraft-associated detections in protected States

**JB population size**

Evaluate if the beetle population is at a high-risk level. Is the population high enough to place aircraft or cargo at risk at the airport being evaluated? High-risk aircraft are those scheduled to fly to a protected State and may have been exposed or had cargo exposed to a JB infestation.
To ascertain the previously mentioned risk criteria at your airport, you will collect specific information related to each one of these risk factors, which will be discussed in more detail in the next section.

**Operating areas**
Consider the second criterion: are aircraft in aircraft-operating areas or cargo likely to become infested? Generally, JB population numbers alone are not sufficient to cause an airport (or portion of an airport) to be regulated. A JB population may be isolated from the aircraft-operating area. However, JB host plants and grassy areas growing close to either the airport, terminal, or hangers can increase risk.

Survey data should influence the decision-making process at each airport. If records indicate increasing JB population and the other risk criteria are met, a high-risk situation usually exists. However, each airport possesses unique factors and agriculture officials may have to make a judgment call. Light populations typically represent a lower risk. Regardless of beetle numbers, entry into an aircraft is likely if adult JB fly near or rest on the aircraft’s exterior surfaces, boarding ladders, or similar items. This situation should be considered **high risk**. If a 15-minute visual survey, conducted under optimal conditions around an aircraft-operating area finds two or more live adults, aircraft infestation is highly likely.
**Detects in Protected States**
Consider the third criterion: are infested aircraft arriving in protected States? A single beetle interception in any protected State (or in any JB-free area) indicates a potential high-risk situation at the originating airport or at a previous stopover airport(s); therefore, regulation at a high-risk infested airport should be considered. See Monitoring and Managing Airports in Protected States on page 3-14 for information on responding to a detection in protected States.

**Determine Which Specific Areas, Carriers, Aircraft and Containers Are at Risk**
Use the risk criteria in Determine the Risk at a JB-Infested Airport Using Three Criteria on page 3-8 to determine the risk from various factors.

- Aircraft at high-risk times versus aircraft at low-risk times
- Carriers
- Containers stored outdoors
- Containers stored indoors
- Individual aircraft operating areas
- Other factors

**Evaluate Mitigating Measures**
If one or more high-risk factors have been identified, evaluate all mitigating measures that, either alone or in combination, would reduce each factor and the overall risk. Examples of mitigating measures include:

- Keeping all at-risk aircraft closed whenever possible
- Moving at-risk aircraft and cargo operations to a low-risk section of the airport
- Reducing JB populations in the airport and in surrounding areas
- Rescheduling aircraft loading and flight times to low-risk times
- Using excluders whenever an at-risk aircraft is opened

These examples and other mitigating measures are discussed in detail in Control Measures on page 4-1.

Prompt application of one or more mitigating measures may allow an airport to remain unregulated.
Complete an Emergency Action Notification (EAN), If Necessary
If an airport or a carrier needs to be regulated to prevent the beetles being transported to protected States, complete an EAN. See Using the Emergency Action Notification (EAN) and Other Activities on page 3-11 for more information on the EAN and other required activities.

- Aircraft scheduled to fly to a protected State; and
- Aircraft is either exposed to infestation by JB or is carrying cargo exposed to infestation

The detection of beetles at an origin airport or in the immediate vicinity is not in itself sufficient reason to declare the airport under quarantine, nor is treated as a high-risk regulated airport.

Using the Risk Criteria for Decision Making
The State Plant Health Director (SPHD) of the regulated State will review the situation at the airport using an evaluation based on the three criteria. Based on this review the SPHD can decide to regulate all or part of the airport.

Potential High-Risk Airports
High-risk aircraft departing during the peak JB daily flight period (June – September) and between 7:00 a.m. and 8:00 p.m. may require safeguarding and treatment. PPQ officers should collect the flight numbers and airlines of these aircraft for monitoring purposes.

NOTICE
High-risk aircraft include any aircraft with a destination anywhere in the protected States; even if the aircraft has intermediate stops in other airports along the way to the destination, it is still considered high risk. Obtain flight information from these aircraft during beetle emergence.

Using the Emergency Action Notification (EAN) and Other Activities
If aircraft going to protected States are likely to be infested, the JB National Operations Manager (NOM), the SPHD or a designee, may designate any airport within a quarantined State as a regulated airport. The high probability of JB-infested aircraft spreading the beetle to protected States justifies this regulation.

Issuing the EAN
After determining an airport is high risk and must be regulated, the SPHD (or a designee) will immediately complete and issue an EAN (PPQ Form 523) to the following individuals:
◆ Official in charge of the airport
◆ Officials in charge of the airlines sending aircraft during daylight hours to the protected States

The SPHD will provide a copy of the EAN to the JB Program NOM.

**Regulated Airport Report**

When an airport is regulated, the Program NOM will inform all interested parties by circulating a report like the one in Table 3-2 by email.

**Table 3-2 Regulated Airport Report**

<table>
<thead>
<tr>
<th>Name of Airport:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Date regulated/time:</td>
<td>Date—00:00 hours</td>
<td></td>
</tr>
<tr>
<td>Date deregulated/time:</td>
<td>Date—00:00 hours</td>
<td></td>
</tr>
</tbody>
</table>

SPHDs responsible for regulated airports will inform their Associate Executive Director through the NOM of all actions taken. If additional actions are necessary, the SPHDs will notify the NOM.

**High-Risk Flights**

When an airport is regulated, the SPHD (or a designee) must obtain schedules listing all high-risk flights. The high-risk flights are usually those departing during daylight hours (between 7:00 a.m. and 8:00 p.m.) for protected States; however, high-risk flights may depart at other times. The SPHD (or a designee) will then provide these schedules to the JB Program NOM for distribution to APHIS personnel and State Plant Regulatory Officials (SPROs) in the protected States.

This feedback system of communication between the “protected States” and the “infested States” is necessary to coordinate safeguarding and treatment options as well as to track where flights originated.

**Unscheduled Flights**

For all unscheduled commercial and military flights, the SPHD of the originating airport will notify the personnel or SPRO at the destination airport at least 1 hour before departure. The SPHD at the originating airport may omit the 1-hour notification requirement on a case-by-case basis per 7 CFR 301.48-4(d).

**Arranging Control Measures at Regulated Airports**

To protect JB-free areas, the SPHD of the regulated airport must implement control measures such as:

◆ Electing to treat aircraft with an approved insecticide if unable to modify loading times and areas (this option is for large carriers)
Airport Monitoring and Classification
Using the Emergency Action Notification (EAN) and Other Activities

- Loading aircraft in an area with less exposure to adult JB
- Removing or treating JB host plants
- Replacing landscaping with nonhost plants
- Rescheduling aircraft loading and departure times to the evening or night when JB activity is low
- Treating JB larvae with insecticides or using a biological control agent

**Failure to Comply With an EAN**
An airport or airline that does **not** comply with the requirements of an EAN may be issued a violation notice (PPQ Form 518) by a PPQ officer.

**Military Cooperation**
Authorization for military cooperation is contained in the Defense Transportation Regulations (DTRs):

- **DTR 4500.9-R, Part II, Chapter 208 (Packaging and Handling)** see the document at the following website: https://www.ustranscom.mil/dtr/part-ii/dtr_part_ii_208.pdf; and
- **DTR Part V, Chapter 505 (Agricultural Cleaning and Inspection Requirements)** see the document at the following website: https://www.ustranscom.mil/dtr/part-v/dtr_part_v_505.pdf

If a SPHD has any difficulty in obtaining cooperation, they will contact the Commanding Officer and reference the above provisions.

**Revoking the EAN**
When successful safeguards have been enacted that reduce the JB risk to aircraft, PPQ officers (or their designees) will inform the SPHD, who may then cancel the EAN and return the airport to nonregulated status. The SPHD will then complete Block 16 of the EAN, Action Taken. Copies of the updated EAN will be supplied to all affected airline and airport officials.

The SPHD responsible for the recently deregulated airport will inform the NOM of the EAN revocation. The NOM will notify the JB Program National Policy Manager (NPM) via email of the status change.
Reporting the Deregulation of an Airport

It is the NPM’s responsibility to inform all program staff, as well as update and distribute the list of regulated and nonregulated airports via the Deregulation of an Airport Report (see Table 3-3 below). This report is published on the JB Program website and available to all affected stakeholders.

<table>
<thead>
<tr>
<th>Table 3-3 Deregulation of an Airport Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of Airport:</td>
</tr>
<tr>
<td>Date regulated/time:</td>
</tr>
<tr>
<td>Date deregulated/time:</td>
</tr>
</tbody>
</table>

Monitoring and Managing Airports in Protected States

To maintain a JB-free status, flights arriving in protected States, particularly those originating from regulated airports, are monitored through careful inspection of all interior parts of the aircraft and its cargo. All JB that are found, whether live or dead, must be recorded on the Japanese Beetle Aircraft Inspection Record (JBAIR) and communicated to the SPHD of both the receiving and originating airports.

Using the JBAIR

When inspecting flights from infested airports, the JBAIR is used to record data. The complete JBAIR will specify the total number, condition, and specific locations of beetles found on the infested aircraft. See Japanese Beetle Aircraft Inspection Record (JBAIR) on page A-7 for an example of a JBAIR.

The online version of the JBAIR can be accessed at the PPQ Field Operations, Domestic Program Data website at the following address: https://maps.mrp.usda.gov/arcgis/apps/sites/#/ppq-field-ops&data.

Reports will be available for PPQ, State, and industry personnel. The reports will enable PPQ, State, and industry personnel to evaluate:

- How effective exclusion procedures are
- How effective pesticide treatments are

Communicating with Infested States with the JBAIR

These JBAIRs, available to PPQ, State, and industry personnel, are an essential recordkeeping tool that evaluates the potential effectiveness of safeguarding and exclusion procedures, including treatments in the infested States. Therefore, it is essential when live JBs are found that all protected States not only complete the form, but also immediately contact the NOM and SPHD of the originating airport. Additionally, the JBAIR should be entered into the Integrated plant Health Information System (IPHIS) database so all impacted parties can access the information.
The Role of the SPRO of Protected States
When beetles are intercepted at an airport in protected States, and the origin of the aircraft is from an infested airport, the SPRO of the protected State is responsible for sending the JBAIR and immediately notifying the following individuals:

◆ NOM
◆ SPHD of the originating airport

The Role of the SPHD of the Originating Airport
Within 24 hours, the SPHD at the originating airport will determine if a high-risk situation exists by following the steps in the section Determining Risk at Infested Airports on page 3-8.

The SPHD responsible for the originating airport will immediately inform the NOM. The NOM will inform the SPRO responsible for the receiving airport of actions taken (monitoring results and/or mitigating measures implemented).

If the aircraft upon which the interception was made transited two or more airports within the JB-infested States and the origin of the beetle cannot be verified, the SPRO at the receiving airport must notify the SPHDs responsible for all the transited airports. The SPHDs responsible for the transited airports will follow the previously mentioned steps to determine which of the transited airports are high risk.

Response of Protected States to Live JB Finds
When live beetles are found in protected States, the SPRO (or a designee) responsible for the receiving airport may take one or more of the following safeguarding actions:

◆ Closing the infested aircraft and treating it or its cargo at a later destination
◆ Issuing an State equivalent of an EAN
◆ Monitoring unloading activities
◆ Terminating all unloading activities
◆ Treating the infested aircraft and/or cargo immediately

Generally, the SPRO responsible for the receiving airport (or a designee) will issue an EAN or Hold Notice and the aircraft will be treated.
Responding to Interceptions from Regulated Airports

Interceptions of dead or moribund beetles on aircraft from regulated airports are to be expected because of the pesticide treatments. Finding live beetles in aircraft from regulated airports and carriers is an indication that safeguarding procedures were not correctly followed or were not completely effective. If such is the case, within 24 hours, the SPHD at the originating airport will determine the effectiveness of the safeguarding procedures by considering the following and similar questions:

- Are all mitigating procedures being used correctly?
- Are treatments being applied correctly?
- Are treatments effective when used correctly?
- How effective are the mitigating procedures being used?

After completing the determination, the SPHD responsible for the originating airport under quarantine or the regulated carrier will immediately inform the SPHD responsible for the receiving airport of the actions taken (determination results and mitigating measures implemented).

When live beetles are found, the SPRO responsible for the receiving airport (or a designee) may take all appropriate action to safeguard the receiving airport. For example, the SPRO may issue an EAN to treat or re-treat an aircraft or any of the actions described above.

Responsibilities of Protected States

Clear communication between infested States and protected States, along with regulatory controls and sharing data, is the key to preventing JB from spreading.

More specifically, to foster cooperation within the JB Program, a protected State is encouraged to:

- Maintain a parallel intrastate quarantine for the beetle, if applicable
- Participate in bimonthly conference calls during the JB season to receive and provide updates on Program activities
- Share their State’s data on JB distribution based on current surveys

Responding to Interceptions from Unregulated Airports or Carriers

Interceptions of beetles on aircraft from unregulated airports or carriers is an indication that a high-risk situation probably exists and that regulation in the JB-infested area is necessary. If so, the SPRO of the receiving airport will issue an EAN or Hold Notice outlining the specific safeguarding or treatment actions required in accordance with 7 CFR 301.48.
Monitoring and Managing Airports in JB-FREE Areas Outside of Protected States

This section addresses monitoring protocols at airports outside of protected States. Trapping at these airports is optional and the methods used are based on the availability of resources. When a beetle is intercepted, the SPHD (or designee) or the SPRO (or by a cooperative decision) determines how they should be monitored.

Available Methods
The following methods, alone or in combination, can be used for monitoring:

- Conduct random inspections of high-risk (cargo) flights from regulated airports
- Conduct random inspections of high-risk flights from unregulated airports within the quarantine area
- Conduct a visual survey of the area where the beetle was initially trapped
- Increase the number of traps in areas where JB were previously captured
Control Measures

The goal of airport control measures is to prevent the Japanese beetle (JB) from entering aircraft destined to protected Western States.

Use the following methods, alone or in combination, to control beetles at infested airports:

1. **Exclude Beetles from High-Risk Aircraft** on page 4-1
2. **Reduce the Beetle Population Using Short- and Long-Term Controls** on page 4-4
3. **Treating Infested Aircraft and Cargo** on page 4-7
4. **Safety Procedures for Chemical Treatments** on page 4-7
5. **Safety Precautions for Aircraft** on page 4-9

**Exclude Beetles from High-Risk Aircraft**

Beetles can be excluded using the following techniques:

- Change aircraft-operating areas to areas less attractive to the beetle
- Position aircraft with cargo doors in the shade rather than in the sun, which is less attractive to the beetle
- Safeguard cargo and baggage (e.g., keep containers closed, store containers in enclosed areas, cover cargo containers with plastic wrap)
- Schedule flights when the beetles are **not** flying (or fewer are flying)
- Use exclusion devices to prevent beetles from entering the aircraft
- Use physical barriers, such as enclosed walkways

Beetles often rest overnight on cargo pallets, cans (enclosed containers), and other devices for cargo handling; as a result, cargo stored outside for lengthy periods can become high risk. This is why it is essential to inspect **all** cargo prior to loading and practice safeguarding methods as outlined above.
Exclusion Devices
In certain situations, exclusion devices, called “excluders,” will prevent the entry of beetles into aircraft. Excluders are enclosed compartments with an open side end designed to fit snugly against the surface of open aircraft hatches and doors to permit loading and unloading. Use exclusion devices whenever possible.

Because beetles tend to fly along the sunny side of a fuselage, they can often be excluded by the excluders. When the beetles encounter the excluders, they tend to drop below the open doors. Even if beetles enter the aircraft, the numbers entering will be greatly reduced.

Aircraft at regulated airports must be treated with an insecticide before exclusion devices can be used on open hatches and doors.

When exclusion devices are used, protect all openings in the aircraft from 7:00 a.m. to 8:00 p.m.

Passenger Compartments
Examples of exclusion devices used for passenger compartments are enclosed walkways and bus-type vehicles for passenger loading and unloading. The portholes of exclusion devices fit tightly against the aircraft.

When using exclusion devices for passenger boarding, thoroughly inspect all areas within 10 feet of the doors on the aircraft. Pay special attention to the floor and windowsills, and remove any beetles found.

Cargo Areas
Effective exclusion devices have been developed for cargo aircraft by carriers faced with a beetle entry problem. These excluders are now the standard for handling these aircraft at high-risk airports. Refer to Figure 4-1 on page 4-3 for an example of a cargo exclusion device.
Figure 4-1  Example of a Cargo Exclusion Device

1 Photograph courtesy of Phillip Lewis, APHIS–PPQ–Science and Technology, Forest Pest Methods Laboratory.
Selecting Aircraft-Operating Areas
Certain aircraft-operating areas are much more likely to attract beetles than other locations. Therefore, whenever possible, avoid the following areas:

◆ Close to feeding hosts for the adult beetles
◆ Close to moist, grassy areas on light-textured soil favorable for egg laying and larval development
◆ With a favored sunny exposure

If areas attractive to beetles are used for aircraft operations, especially during the hours of greatest activity (7:00 a.m. to 8:00 p.m.), aircraft entries are likely.

Positioning Aircraft
If possible, position aircraft so at least its doors are in the shade. Beetles prefer sunny locations and are more likely to enter if doors and hatches are exposed to the sun.

Standby Aircraft
The standby aircraft that replace aircraft on scheduled flights must be JB free. “Tail-swapping” is the term for the replacement of one aircraft by another. When “tail-swapping” occurs, the standby aircraft may require treatment and safeguarding to prevent beetle movement on aircraft.

Reduce the Beetle Population Using Short- and Long-Term Controls
The following methods will lower the beetle population:

◆ Apply fast-acting insecticides to host plants to control adults
◆ Apply insecticides to the soil for larval control
◆ Destroy host plants and plant fewer desirable species as outlined in Table 2-1 on page 2-3 and Table 2-2 on page 2-4
◆ Use biocontrol agents such as those in Table 4-1 on page 4-6
◆ If the airport is in an agricultural area, request that farmers treat host plants during the beetle season

Initiating Control
Ideally, control will begin before a beetle population reaches a high-risk level requiring regulation; therefore, both short- and long-term solutions should be sought.

Long-term control solutions emphasize integrated pest management (IPM) practices that will keep the beetle population below the high-risk level. Examples include:
Control Measures

Control Measures

◆ Biocontrol agents, such as the fungal pathogen *Ovavesicula*, have proven very effective in reducing JB populations. For more information about biocontrol agents, visit USDA–APHIS–PPQ Forest Pest Methods (Otis) Laboratory at https://www.aphis.usda.gov/aphis/ourfocus/planthealth/ppq-program-overview/science-technology/forest-pest-methods-laboratory. Or you can contact the Lab at 508-563-0900

◆ Landscape planning at the airport prevents planting host plants near aircraft-operating areas (see Table 2-1 on page 2-3 and Table 2-2 on page 2-4)

Short-term control solutions emphasize the quick reduction of a population at the high-risk level. Examples include:

◆ Foliar treatment of hosts
◆ Quick-acting soil insecticide
◆ Replace host plants with nonhost plants

When designing a control program for JB, it is wise to seek advice from IPM consultants, entomologists, cooperative extension personnel, and other professionals. Carriers have hired consultants who develop IPM programs that emphasize exclusion and are suitable for specific airports.

**Removal and Reduction of Host Plants**
Removing host plants can rapidly reduce a JB population in the long term and minimize the beetle transportation risk of aircraft; however, this can result in aesthetic loss and impact the environment. Careful planning and planting nonpreferred hosts can offset the damage caused by removal, and quickly restore an area. Competition for sunlight and other resources by nonhost plants can prevent resprouting and reestablishing removed host plants.

**Treatments for Airport Grounds**
Airport grounds are treated for either larvae (grubs) or adults. Approved treatments include chemical and biological control in addition to removing or reducing host plants.

**Treatment for Larvae**
*Chemical Control.* The major advantage of treating larvae (grubs) in the soil by fast-acting chemicals is the destruction of the grubs before they become adults; however the practice is labor intensive and costly. Contact your local agricultural extension service for recommended chemicals.

*Biological Control.* The major advantage of biological control is the possibility of long-term reduction of the population to a nonthreatening level. However, significant long-term control may develop slowly or not at all.
Refer to Table 4-1 for a list of organisms used for biocontrol of the larvae. The control success rate varies.

**Table 4-1 Organisms Used for Biocontrol of Japanese Beetle**

<table>
<thead>
<tr>
<th>Scientific name:</th>
<th>Description:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ovavesicula papillae</td>
<td>Microsporidian, a fungal-like organism against grubs</td>
</tr>
<tr>
<td>B. thuringiensis tenebrionis (btt)</td>
<td>Bt strain for the JB grub</td>
</tr>
<tr>
<td>Heterorhabditis bacteriophora</td>
<td>Nematode effective against JB grubs</td>
</tr>
<tr>
<td>Steinemema glaseri</td>
<td>Nematode effective against JB grubs</td>
</tr>
<tr>
<td>Tipia vernalis</td>
<td>Small wasp parasitic on the JB grub</td>
</tr>
<tr>
<td>Isocheta aldrichi</td>
<td>Tachinid fly, an internal parasitoid of the adult JB</td>
</tr>
</tbody>
</table>

**NOTICE**

Biocontrol agents against the larvae can be used in conjunction with those used to control adults.

**Treatment for Adults**

*Chemical Control.* A major advantage to treating adults by fast-acting chemicals is a quick reduction in the population. Often, however, those destroyed are quickly replaced by newly immigrating or newly emerged adults following a treatment. For a list of recommended chemicals, contact your local cooperative extension office.

*Biological Control.* The Tachinid fly, *Istocheta aldrichi*, is a solitary internal parasitoid of the adult beetle. The female flies deposit up to 100 eggs during a 2-week period. Usually laid upon the thorax of the female beetles, the eggs hatch into maggots that bore into and kill their hosts. In ideal situations, this fly can suppress adults before they can reproduce.

*Ovavesicula papillae*, a microsporidian (fungal pathogen), that targets the larval stage, has shown to be very effective in reducing adult JB populations in the long term.

**Monitoring Results of Control Methods**

To monitor the effectiveness of short- and long-term control methods, use one or more of the following:

- Adult visual surveys
- Detections on aircraft arriving in the JB-free area
- Detections on aircraft at the infested airport
- Larval surveys
- Trapping
See *Airport Monitoring and Classification* on page 3-1 for details on each of these monitoring results.

**NOTICE**

The application of the methods to control JB populations are unique to each airport. Those airports that are currently regulated, or were regulated in the past 3 years, are required under 7 CFR 301.48 to develop both short- and long-term strategies for managing JB populations. Moreover, it is prudent for all airports within JB-infested States to take a proactive approach to manage JB populations so that more stringent measures and regulations can be averted.

**Treating Infested Aircraft and Cargo**

Currently, the following insecticides are approved for use on infested aircraft:

- 10% d-phenothrin
- 2% d-phenothrin + 2% permethrin (1-Shot™)

**NOTICE**

Before using any insecticide, read the instructions on the label.

Authorized by the *Treatment Manual* (T409-b-1) at https://www.aphis.usda.gov/import_export/plants/manuals/ports/downloads/treatment.pdf, d-phenothrin is registered for use as an aerosol on aircraft in the 10% formulation (EPA registration number 10308-21.) Callington 1-Shot™, 2% d-phenothrin + 2% permethrin (EPA number 83795-1) is authorized as T409-b-3. Usually, application of these insecticides is either to passenger-carrying aircraft (when unoccupied) or loaded cargo aircraft (when unoccupied).

**WARNING**

d-phenothrin is for use by or under the direction of Federal/State personnel. Only personnel trained by the USDA can apply this insecticide. If trained by the USDA, airline personnel can apply this insecticide.

**NOTICE**

These insecticides are also used if, upon inspection of arriving aircraft, two or more live JB are found in a protected State. For further information regarding applications, visit the *Treatment Manual* Chapter 2-12 Aerosols and Micronized Dusts, and T409-b-1 and T409-b-3 at https://www.aphis.usda.gov/import_export/plants/manuals/ports/downloads/treatment.pdf.
Timing an Insecticide Application
Under the following conditions, adult beetles usually do not fly; therefore, treating aircraft may not be necessary:

- Cool days below 73 °F (23 °C)
- Hot days above 104 °F (40 °C)
- Rainy days
- When arriving and leaving during the same night
- Windy days

NOTICE
Although these represent conditions for not treating aircraft and cargo that is potentially infested, sometimes beetles deviate from established patterns and may fly on windy, hot, cold, or rainy days. Therefore, the State Plant Health Director's (SPHD) (or a designee) decision of whether to treat at-risk aircraft or cargo should be based on sound data and each State's unique needs. Moreover, protected States have the option of whether to treat an aircraft.

PPQ Form 250 Aircraft Clearance or Safeguard Order
After treating an aircraft, if the pilot at the destination airport requests a PPQ Form 250 Aircraft Clearance or Safeguard Order, issue it. If not requested, do not issue it.

Safety Procedures for Chemical Treatments
Ideally, training potential applicators should start before hazardous conditions exist. To protect the health of applicators’ and anyone who could be exposed, all pesticide applications must follow the recommended Federal and State labels and procedures.

For additional information and advice on safety procedures, visit USDA–APHIS–PPQ Forest Pest Methods (Otis) Laboratory at https://www.aphis.usda.gov/aphis/ourfocus/planthealth/ppq-program-overview/science-technology/forest-pest-methods-laboratory or contact the Lab via telephone, FAX, or U.S. mail or commercial carrier at:

USDA–APHIS–PPQ
Forest Pest Methods (Otis) Laboratory
1398 West Truck Road
Buzzards Bay, MA 02542-1329
Tel: 508-563-0900
FAX: 508-563-0903
Safety Precautions for Aircraft

- Read the insecticide label **before** applying; deviation from these instructions can endanger your health and the health of others
- **Never** eat or smoke while applying insecticides
- Thoroughly wash your hands and face after applying insecticides, especially **before** eating, drinking, or smoking
- **Always** wear long sleeves and pants
- Collect empty containers and follow label regarding disposal
- **Never** treat galleys or kitchen areas
- If treating the passenger compartment, **always** delay serving food or beverages until after the treatment
- **Never** apply any chemical treatment when passengers, crew, or animals are present
- Take precautions when applying d-phenothrin aerosols; instruct applicators to seek fresh air **immediately** if they feel light-headed or dizzy when applying the aerosol

⚠️ **DANGER**

Seek fresh air **immediately** if you feel light headed or dizzy.
Chapter 5

Compliance Agreements and Management

Contents

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Using the Compliance Agreement for Monitoring Regulated Airports in JB-Infested States 5-1
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Definition of a Compliance Agreement

A Compliance Agreement (CA) is a written agreement between APHIS and an individual in a business engaged in growing, handling, or moving regulated articles. In a CA for the Japanese Beetle (JB), an individual agrees to comply with the Federal JB regulations (7 CFR 301.48). Adherence to these provisions will reduce the risk of JB introduction into protected States.

In addition to governing the procedures for moving regulated articles from JB-infested States, CAs can also be used to monitor the JB status of airports in protected States receiving infested flights from regulated airports. These and other examples are discussed on the following pages.

Using the Compliance Agreement for Monitoring Regulated Airports in JB-Infested States

Controlling and monitoring JB populations at regulated, high-risk airports in aircraft departing from infested States and destined to protected States is the chief purpose of the provisions outlined in 7 CFR 301.48. Remember, airports receive a regulated status only when the following risk criteria are met: JB adults observed flying near an aircraft-operating area; high JB populations; and the potential for transport to a JB-free area in the west.
Those airports listed as unregulated in infested States should monitor and control JB risk to aircraft to avoid further regulation. For example, by applying integrated pest management (IPM) practices, airports in infested States can maintain JB population at manageable levels, thereby reducing the threat to aircraft and avoid a regulated status. These flights, too, should be inspected according to each State’s unique needs.

For a fillable copy of the Compliance Agreement PPQ Form 519, visit the USDA–APHIS forms library at https://www.aphis.usda.gov/library/forms/pdf/ppq519.pdf. Refer to Figure A-1 on page A-2 for an example of a completed form. The Compliance Agreement specifies the conditions under which monitoring will be conducted by asking the following questions:

◆ Are infested flights leaving the airport? If so, are they destined to protected States?
◆ If aircraft/cargo require treatment, what are the specific procedures?
◆ How will monitoring be conducted to safeguard aircraft from JB intrusion?
◆ When will the monitoring start and stop?
◆ Who will do the work?
◆ How will this information be recorded?
◆ How will the data be communicated and to whom?
◆ How will the JB populations be controlled (chemical/biological) to minimize risk?

The following statements are examples of stipulations that may be included on page two of the CA to minimize the risk of artificial/accidental JB spread.

◆ Aircraft may be re-treated in the protected State if two or more live beetles are discovered
◆ All aircraft must be treated no more than 1 hour prior to loading
◆ All areas around doors, hatches, and other openings must be inspected prior to removing exclusion devices—all doors and hatches must be closed immediately after the exclusion devices are removed
◆ All cargo containers that have not been safeguarded in a protected area must be covered with plastic wrap
◆ All openings of the aircraft must be safeguarded using exclusion devices, or similar devices, during the daylight hours of 7:00 a.m. to 8:00 p.m.
All personnel must inspect their clothing for JB prior to entering the aircraft

All containers must be inspected for JB prior to and during the loading process

Compliance Agreement for Monitoring Receiving Airports in Protected States

Airports in protected States that receive flights from infested States, particularly those classified as regulated, must be carefully monitored for the presence of JB. The following questions will help to design a monitoring program.

- How will monitoring be conducted?
- When will the monitoring start?
- Who will do the work?
- What is the procedure if JB are found?
- Who is contacted if JB are found?

Operating Under a Compliance Agreement

Authorized Inspectors

Authorized inspectors can be any APHIS employee or an individual authorized by APHIS to enforce the JB quarantine.

Access for Authorized Inspectors

An individual who enters into a CA (and employees or agents of that person) are required by 7 CFR 301.48 to provide authorized inspectors access to all areas where regulated materials are handled. Examples include:

- Aircraft-operating areas in protected States where unloading and servicing (and possibly treatment) occur
- Aircraft-operating areas at regulated airports where loading, unloading, servicing, and/or treatment of aircraft occur
- Secured areas of airports

To allow authorized inspectors access to secured areas, procedures should be in place as soon as possible.
Recordkeeping and the Compliance Agreement

Any individual who enters into a CA (and employees or agents of that person) must maintain records of all treatment and mitigation measures for 2 years and present these to authorized inspectors upon request.

Legal Recourse for Noncompliance

Title IV of the Agriculture Risk Protection Act of 2000, known as the Plant Protection Act (PPA) and available for reference at https://www.aphis.usda.gov/plant_health/plant_pest_info/weeds/downloads/PPAText.pdf, provides the authority to prohibit the interstate movement of plant pests (Section 411, Section 412). In addition, the PPA provides the authority to apply civil penalties for noncompliance. Refer to Section 424 for details.

Canceling a Compliance Agreement

If authorized inspectors determine that compliance was not satisfactory, they may cancel the CA using either oral or written communication. If the CA is canceled during a spoken discussion, within 20 days of cancellation the Authorized Inspector must write a letter confirming the oral cancellation and stating the reasons for the cancellation.

Appealing a Compliance Agreement

Within 10 days after receiving written notification of a cancellation, any person whose CA has been canceled may appeal the decision by writing to the APHIS Administrator. The appeal must provide evidence as to why they think the CA was wrongfully canceled. A hearing will be arranged by the APHIS Administrator to resolve the conflict.

As promptly as circumstances allow, a written appeal will be granted or denied specifying the reason for the decision. If it is canceled, it will remain so pending the next appeal.
Appendix A

Forms

Contents

PPQ Form 519, Compliance Agreement  A-1
PPQ Form 523, Emergency Action Notification  A-4
PPQ Form 250, Aircraft Clearance or Safeguard Order  A-6
Japanese Beetle Aircraft Inspection Record (JBAIR)  A-7

PPQ Form 519, Compliance Agreement

For a fillable copy of the Compliance Agreement PPQ Form 519, visit the USDA–APHIS forms library at https://www.aphis.usda.gov/library/forms/pdf/ppq519.pdf. Refer to Figure A-1 on page A-2 for an example of a completed form. An example of stipulations is located in Figure A-2 on page A-3.
## PPQ Form 519, Compliance Agreement

**Figure A-1 Example of Completed PPQ Form 519, Compliance Agreement**
9. After the on-load is complete, close the door to the point of about 12 inches. During this closing process, monitor the bottom door seal for any beetles that may have fallen into this area. Then spray the entire area around the door with the insecticide d-phenothrin, for added protection. After this, completely close the door while monitoring the door for bugs.

10. As the main cargo door is being closed, two eschuser team members must be as close as possible to the door to prevent beetles from entering—this is the highest risk time frame of the entire process. It is imperative the cargo doors be closed AS QUICKLY AS POSSIBLE once on load is complete.

11. Excursion team personnel must monitor all nonprotected cargo holds and door openings AT ALL TIMES while they are opened, from block time to take off.

12. All cans and pallets must be covered with plastic as directed by USDA-APHIS-PPQ.

13. All cans must be inspected immediately BEFORE and AFTER entering the eschuser.

14. All personnel boarding the aircraft must be inspected for beetles attached to clothing PRIOR to entering the aircraft. Remove and destroy all beetles.

15. Immediately before aircraft departure, thoroughly inspect cockpit and galley area. Remove and destroy all Japanese beetles.


17. If regularly scheduled aircraft are replaced with an alternate aircraft, it must be inspected and all Japanese beetles must be removed. Also, all treatment and safeguard requirements applicable to the regularly scheduled aircraft must be implemented.

18. Aircraft treatment records must be maintained for 2 years.

19. Failure to comply with the Japanese beetle regulations and/or provisions of this Compliance Agreement may result in cancellation of this Compliance Agreement and/or assessment of civil penalties.

PPQ Form 523, Emergency Action Notification

Use PPQ Form 523 (EAN) when either of the following conditions occur:

- Condition 1: when a Japanese beetle (JB)-infested aircraft is intercepted at an airport in a JB-free State; or
- Condition 2: when aircraft leaving an airport in a JB-infested area are likely to be JB infested

When the first condition occurs, use the EAN to obtain treatment of the infested aircraft. When the second condition occurs, use the EAN to regulate the airport. See Figure A-3 on page A-5 for an example EAN.
Figure A-3  Example of PPQ Form 523, Emergency Action Notification
PPQ Form 250, Aircraft Clearance or Safeguard Order

If requested by personnel at a destination airport, issue PPQ Form 250 to the pilot after treating an aircraft. However, if personnel do not request PPQ Form 250, do not issue the document.

For a fillable copy of the Aircraft Clearance or Safeguard Order PPQ Form 250, visit the USDA–APHIS forms library located at https://my.aphis.usda.gov/wcm/myconnect/393fb579-2586-4783-bea8-26c4a17307cb/ppq250.pdf?

NOTICE
This document is not accessible to non-APHIS employees.
Japanese Beetle Aircraft Inspection Record (JBAIR)

The JBAIR is a record used at receiving airports in protected States to document the interception of JBs on arriving flights.

Figure A-5  Example Japanese Beetle Aircraft Inspection Record (JBAIR)
Use this Glossary to find the meaning of specialized words, abbreviations, acronyms, and terms used in the Japanese Beetle Program. To locate where in the manual a given definition, term, or abbreviated is mentioned, refer to the Index on page Index-1. Abbreviation for Japanese beetle is “JB.”

Definitions, Terms, and Abbreviations

**adult stage.** fourth and final life stage of the JB

**adult visual surveys.** used to determine the level of the beetle population in aircraft-operating areas. A minimal level of monitoring requires visual surveys of aircraft-operating areas in airports that were regulated in any of the last 3 years.

**Aircraft Clearance or Safeguard Order (PPQ Form 250).** the document issued to the pilot after inspection and, possibly, treatment of an aircraft. Usually, this document is issued when requested by a destination airport in the JB-free area. If personnel at the destination airport do not request a PPQ Form 250, the document is not issued. For an example of PPQ Form 250, Aircraft Clearance or Safeguard Order, visit page A-6.

**aircraft-operating areas.** areas of an airport in which one or more of the following activities occur:

- Aircraft maintenance
- Cargo handling
- Luggage handling
- Passenger boarding

**APHIS.** Animal Plant Health Inspection Service. An agency within the United States Department of Agriculture (USDA). The APHIS mission is to protect U.S. animal and plant resources

**APHIS–PPQ Treatment Manual.** contains accepted treatments for various commodities including aircraft (T409)
Armed Forces Pest Management Board Technical Guide 31, Operation Washdown and Agricultural Inspection Preparation for Military Conveyances and Equipment. technical guide (TG) that describes procedures, outlines responsibilities, and defines requirements for preparing military conveyances (vehicles, vessels, aircraft), rolling stock, equipment, cargo, and unit and personal gear to comply with agricultural and public health pest exclusion requirements for movement of ships, aircraft, equipment, and personnel, particularly from locations outside the United States. Note that TGs are not policy documents; they provide best management practices and technical guidance for the U.S. Department of Defense (DoD) operations, pest management, natural resources, and other DoD communities. Accordingly, TGs should not be construed or referenced as policy.¹

authorized inspector. any employee of APHIS (or any individual authorized by the APHIS Administrator) to enforce the JB quarantine

biocontrol agents. as the use of natural efficient strains of any microorganisms or modified organisms that reduce the incidence or severity of diseases caused by plant pathogens.²

biological control. the use of living organisms to control pests. A natural enemy such as a parasite, predator, or disease organism is introduced into the environment of a pest or, if already present, is encouraged to multiply and become more effective in reducing the number of pest organisms.³

Canadian Food Inspection Agency (CFIA). Canadian government agency dedicated to safeguarding food, animals and plants, which enhances the health and well-being of Canada's people, environment and economy.

chemical control. a variety of chemicals are available that have been designed to control plant diseases by inhibiting the growth of or by killing the disease-causing pathogens. Chemicals used to control bacteria (bactericides), fungi (fungicides), and nematodes (nematicides) may be applied to seeds, foliage, flowers, fruit, or soil.⁴

**Code of Federal Regulation (CFR).** Parts 300 to 309—published by the Office of the Federal Register (National Archives and Records Administration (NARA)) at the United States Government Printing Office (GPO). This CFR guide contains information on the JB in Subpart 301.48

**Compliance Agreement (CA) (PPQ Form 519).** a written agreement between APHIS and an individual in a business engaged in growing, handling, or moving regulated articles. In addition to governing the procedures for moving regulated articles from JB-infested States, CAs can also be used to monitor the JB status of airports in protected States receiving infested flights from regulated airports.

**Defense Transportation Regulations (DTR).** DTR 4500.9-R, Part II, Chapter 208 (Packaging and Handling); document providing DoD general guidance on the handling of packaged material.5

**Egg stage.** first life stage of the JB

**Elytra.** hardened forewings of beetles that provide protection

**Emergency Action Notification (EAN) (PPQ Form 523).** a document that may be issued to hold articles or facilities, pending positive identification and/or further instruction from the USDA–APHIS–PPQ Deputy Administrator. This document is issued by a PPQ inspector to notify an owner or agent of carrier, premises, and/or articles, to apply specific remedial measures to prevent the potential spread of a plant pest or disease. the official Federal authorization of hold6

**EPA.** See United States Environmental Protection Agency (EPA) on page Glossary-8

**Exclusion devices (excluders).** designed to prevent or reduce the entry of JBs into aircraft during loading, unloading, and maintenance, excluders are a critical component of any JB management program. They will vary in size based on local environmental factors and facilities and they may be simple, such as netting (cloth or screen) covering the opening of an aircraft, or complex, such as a framed or covered structure.

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first instar larvae. newly-hatched JB larvae; length of instar is 10.5 mm, width of head is 1.2 mm

generally JB-infested States. Arkansas, Iowa, and Missouri

grubs. young form of an insect

high-risk aircraft. those aircraft scheduled to fly to protected States after probable exposure to infestation by the JB or carrying cargo probably exposed to infestation. Because high-risk aircraft may be infested, they are regarded as regulated articles.

infested State. those States in which surveys have found JB is established throughout the State or in a portion of the State.

instar. stage in the life of an arthropod (such as an insect) between two successive molts7

Integrated Plant Health Information System (IPHIS) Database. web-based application providing a single, standardized, and comprehensive data management system capable of supporting activities associated with domestic or emergency pest programs.8

Japanese beetle policy. to protect the agriculture and natural resources of the Western United States by preventing the human-assisted spread of the JB from the Eastern United States on aircraft.

Japanese Beetle Aircraft Inspection Record (JBAIR). the form used by receiving airports to document the interception of JB on arriving flights.

Japanese beetle-FREE area. an area in which JB is not established. All protected States are JB free (Note: there are JB-free areas not located in protected States).

Japanese beetle flight period. June through September

Japonilure. an attractant placed in JB traps

larvae. stage in the development of many animals, occurring after birth or hatching and before the adult form is reached9

**JBAIR.** see Japanese Beetle Aircraft Inspection Record (JBAIR) on page Glossary-4

**larval stage.** second life stage of the JB

**larval surveys.** surveys most often conducted to determine the most common life stage and the population level; they may be used alone or in combination with traps

**low-risk situation.** beetles are not likely to enter aircraft in an aircraft-operating area

**Managing the Japanese Beetle: A Homeowner’s Handbook.** a program aid designed and published by USDA–APHIS for use by homeowners in the infested Eastern United States10

**National Agricultural Pest Information System (NAPIS).** the information-management system developed to handle data on endemic and exotic pests from regulatory officials and scientists in the State departments of agriculture, scientists from land-grant universities, and regulatory officials within APHIS. Located at Purdue University (West Lafayette, IN), the NAPIS Database contains information on the JB, one of many introduced pests tracked by the database. Selected information in the NAPIS Database can be used to produce current JB distribution maps.

**national operations manager (NOM).** person in charge of the national Japanese beetle program

**NCR.** see new county records (NCR) on page Glossary-5

**new county records (NCR).** data input into National Agricultural Pest Information System (NAPIS) on page Glossary-5 at the first find of a beetle infestation in a county

**new state records (NSR).** data input into National Agricultural Pest Information System (NAPIS) on page Glossary-5 at the first find of a beetle infestation in a State

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**nonpreferred hosts/nonhosts.** plants that are rarely or never fed on such as evergreens, common grains, most truck and field crops, and many of the common ornamental flowers. When beetles are abundant, plant damage may be avoided by using species immune or seldom attacked by the insect.¹¹

**nonregulated airports.** airports in the JB-regulated area where JB is not likely to enter aircraft and be transported to protected States (and other JB-free areas)

**NSR.** see new state records (NSR) on page Glossary-5

**partially JB-infested Sates.** Kansas, Minnesota, Nebraska, Oklahoma, South Dakota, and Texas.

**Ovavesicula papillae.** microsporidian, a fungal-like organism against grubs; targets the larval stage and has shown to be very effective in reducing adult JB populations in the long term

**peak emergence period.** adult beetles begin to emerge in May in southern localities, later in northern localities. Peak adult activity occurs 4 to 6 weeks after emergence starts.

**PEG.** a food-type lure using a combination of phenyl ethyl propionate, eugenol, and geraniol in a ratio of 3:7:3

**phenology.** the study of phenomena or happenings. It is applied to the recording and study of the dates of recurrent natural events (i.e., emergence of Japanese beetle populations) in relation to seasonal climatic changes

**Plant Protection Act (PPA).** from June 20,2000, modernized and streamlined the plant quarantine laws and replaced the previous legislation. Information is available in 7 USC 7701-36, with sections 14, 15, 23, 24, and 31 addressing specific issues

**Plant Protection and Quarantine (PPQ).** the operational program within APHIS responsible for preventing the spread of significant plant pests.

**PPQ Form 250.** see Aircraft Clearance or Safeguard Order (PPQ Form 250) on page Glossary-1

**PPQ Form 519.** see Compliance Agreement (CA) (PPQ Form 519) on page Glossary-3

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PPQ Form 523. see Emergency Action Notification (EAN) (PPQ Form 523) on page Glossary-3

preferred hosts. JB are gregarious general feeders on leaves, flowers, and fruits; their preferred hosts include small fruits, tree fruits, garden crops, ornamental shrubs, vines, and trees. Studies indicate adult JB feed on over 300 species of plants representing 79 families

protected States. the Western States free of JB: Arizona, California, Colorado, Idaho, Montana, Nevada, Oregon, Utah, and Washington. In cooperation with APHIS and using the authorization in 7 CFR 301.48, these nine protected States are taking action to remain free of JB.

pupal stage. third life stage of the JB

regulated airport. those airports, in the JB-infested area under quarantine, at which JB is likely to enter aircraft and be transported to JB-free areas; because of the threat to JB-free areas, these airports are “regulated” in that they must adopt certain practices to protect the JB-free areas.

regulated articles. aircraft that are at or from regulated airports

sampling protocol. the procedure used to select units from a study population to be measured. The goal of the sampling protocol is to select units that are representative of the study population with respect to the attribute(s) of interest.

second instar larvae. second stage of hatched JB larvae; length of instar is 18.5 mm, width of head is 1.9 mm

State Plant Health Director (SPHD). the APHIS–PPQ employee who has overall responsibility for Federal programs dealing with exotic and endemic pests. The SPHD works closely with personnel in the State department of agriculture.

State Plant Regulatory Official (SPRO). the authorized State official responsible for operating the State plant regulatory program.

third instar larvae. third stage of hatched JB larvae; length of instar is 32 mm, width of head is 3.1 mm

United States Department of Agriculture (USDA). the Federal agency providing leadership on food, agriculture, natural resources, and related issues.
**United States Domestic Japanese Beetle Harmonization Plan.** The National Plant Board working with USDA–APHIS–PPQ and the American Nursery and Landscape Association developed the U. S. Domestic Japanese Beetle Harmonization Plan. This plan establishes procedures for the free movement of JB host commodities.12

**United States Environmental Protection Agency (EPA).** The Federal agency leading the nation’s environmental, science, research, education, and assessment efforts.

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