Postentry Quarantine Manual
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When using pesticides, read and follow all label instructions.
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Purpose

The *Postentry Quarantine (PEQ) Manual* enables State inspectors to perform the following tasks:

- Complete appropriate form for the Permit Unit (PPQ Form 546 only)
- Complete appropriate forms for the Postentry Quarantine Unit (PEQU)
- Conduct a survey of the growing site to determine whether to approve the site
◆ Inspect postentered plant material during the growing period for pests (primarily plant pathogens)

**Scope**

The Postentry Quarantine Manual covers procedures for conducting PEQ tasks beginning with the request to approve a growing site and ending with the release or refusal of the plant material.

The manual is divided into the following chapters:

◆ **Introduction** on page 1-1

◆ **Preparation** on page 2-1

◆ **Growing Site Inspections** on page 3-1

◆ **Inspecting Postentry Quarantine Material** on page 4-1

◆ **Description of Postentry Quarantine Material Release Procedures** on page 5-1

◆ **Responsibilities of State and Federal Inspectors** on page 6-1

◆ **List of Circulars** on page 7-1

◆ **Alphabetical List of Diseases** on page 8-1

◆ **Diseases and Pathogens of Concern** on page 9-1

◆ **Disease and Pathogenic Organism Circulars** on page 10-1

The manual also includes 10 appendixes, a Glossary, and an Index.

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

The *Preparation* provides an orientation to conducting a postentry quarantine inspection including the necessary and needed forms, tools and equipment, and warnings for personal and inspectional safety.

The *Procedures* provide an overview of growing site inspections including inspector authority, site waivers, and disposal procedures.

*Inspecting Postentry Quarantine Growing Materials* provides procedures for inspecting PEQ growing materials including how plants may enter the country,
Introduction

Users

The Postentry Quarantine Manual is written for use by State inspectors performing PEQ duties for Plant Protection and Quarantine (PPQ). The secondary users of this manual are PPQ Postentry Quarantine Liaison Officers (PEQLO) and Investigative and Enforcement Services (IES) Investigators.

Related Documents

The following documents are related to this manual:

- 7 CFR 319 Subpart—Plants for Planting (Postentry Quarantine Regulation 7 CFR 319.37-23 on page G-1) and associated manual part(s)
- Compendia of nursery diseases

Code of Federal Regulations

The Code of Federal Regulations (CFRs) provide the authority for the regulatory action taken and are enforced by CBP and PPQ. The restrictions and prohibitions listed in this manual are covered by 7 CFR 319.37-23.
Application

The Postentry Quarantine Manual informs PPQ officers and State inspectors about how to:

- Approve or disapprove postentry growing sites
- Complete forms associated with the PEQ program
- Handle violations (especially violations of the conditions of entry listed on PPQ Form 546)
- Inspect nursery stock for plant pathogens
- Provide the basic knowledge of practical application for the program

Conventions

Conventions are established by custom and are widely recognized and accepted. Major conventions used in this manual follow.

Advisories

Advisories are used throughout the Postentry Quarantine Manual to bring important information to your attention. Please carefully review each advisory. The definitions coincide with American National Standards Institute (ANSI), and are in the format shown below.

- **DANGER**
  DangerTable message is used in the event of imminent risk or death of serious injury.

- **WARNING**
  WarningTable message to be used in the event of possible risk of serious injury.

- **CAUTION**
  CautionTable message is used for tasks involving minor to moderate risk of injury.

- **NOTICE**
  NoticeTable message is used to alert a reader of important information or Agency policy.

- **SAFETY**
  SafetyTable message is used for general instructions or reminders related to safety.
**Boldface**

Boldface type is used to emphasize important words throughout the *PEQ Manual*. These words include: cannot, do not, does not, except, lacks, must, neither, never, nor, not, only, other than.

**Bullets**

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

**Change Bar**

A black change bar (*see* left margin) is used to indicate a change and appears on the revised page. Unfortunately, change bars do not always appear when text is merely deleted. Change bars from the previous update are deleted when the chapter or appendix is revised.

**Chapters**

This manual contains the following chapters: Introduction; Procedures; Reference; Inspecting Postentry Quarantine Growing Material; Descriptions of Postentry Quarantine Material Release Procedures; Responsibilities of State and Federal Inspectors; List of Disease Circulars; Alphabetical List of Diseases; Plant Pathogenic Organisms of Interest on Postentry Plants; and Disease Circulars.

**Contents**

Every chapter section has a table of contents that lists the heading titles within.

**Control Data**

Control data is located at the top and bottom of each page to help manual 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 each page is the chapter title and first-level heading for that page. At the bottom of each page is the transmittal number (month, year, number), manual title, page number, and unit responsible for content. To track revisions to the *Postentry Quarantine Manual* 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 take after all conditions listed for that row are considered. Begin with the column headings and move left to right, and if the condition does not apply, continue one row at a time until you find the condition that does apply.

<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 action listed in this cell</td>
</tr>
<tr>
<td>Find the previous condition did not apply, read this column cell</td>
<td>Continue in this cell</td>
<td>TAKE 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 the 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 always appear in a box like this.

**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 footnote text cannot be listed on the same page. If a table or figure continues beyond one page, the associated footnotes will appear on the page following the end of the figure or table.

**Heading Levels**

Within each chapter there are four heading levels. The first-level heading is indicated by a horizontal line across both the left and right columns, and the heading follows directly below. The second-level heading is in the right-hand column with the text beginning below. The third-level heading is in the right-hand column with the text beginning below. The fourth-level heading is in the right-hand column followed by a period and leading into the text.
**Hypertext Links (Highlighting) to Tables, Figures, and Headings**
Figures, headings, and tables are cross-referenced in the body of the manual and are highlighted in boldface type. These appear in blue hypertext in the online manual.

**EXAMPLE** See Table 1-1 on page 1-6 in the introduction to determine where to report problems with this manual.

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

**Italics**
The following items are italicized throughout the *Postentry Quarantine Manual*:

- Cross-references to headings and titles
- 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 identifying and updating. Dashes are used in page numbering to differentiate page numbers from decimal points.

**Transmittal Number**
The transmittal number contains the month, year, and a consecutively issued number (beginning with -01 for the first edition and increasing consecutively for each update to the edition). The transmittal number is only changed when the specific chapter sections, appendixes, or glossary, tables, or index is updated. If no changes are made, then the transmittal number remains 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** 7/2011-05 is the transmittal number for this update and is located in the control data on the pages in this chapter.

7 is the month the update was issued
2011 is the year the update was issued
05 is the number (the original, new edition was 01 plus 4 updates)
Using the Manual

Review the contents of this manual to get a feel for the scope of covered material. Glance through the section you will be using and familiarize yourself with the organization of the information. Use the table of contents following each tab to find the information you need. If the table of contents is not specific enough, turn to the Index to find the topic and corresponding page number.

EXAMPLE
To find contact information for the Maryland PEQ Liaison Officer see Directory of PPQ Postentry Quarantine Liaison Officers on page A-1.

Reporting Problems With or Suggestions For the Manual
Use Table 1-2 to determine where to report problems or disagreements, or improvements that directly affect the contents of the Postentry Quarantine Manual.

Table 1-2 Reporting Issues With or Suggestions For the Postentry Quarantine 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 by email <a href="mailto:amy.l.frevert@usda.gov">amy.l.frevert@usda.gov</a></td>
</tr>
<tr>
<td>◆ Have a suggestion for improving the format (layout, spelling, etc.)</td>
<td></td>
</tr>
</tbody>
</table>
| Disagree with a policy, procedure, or the admissibility of a commodity | CBP: CONTACT the CBP Field Office Liaison through the chain of command with the reason for the disagreement and a recommendation
|                                               | PPQ: CONTACT PPQ Import Services Customer Support at 301-851-2046 or 1-877-770-5990 with the reason for the disagreement and a recommendation |
| Have an urgent situation requiring an immediate response | CBP: CONTACT the CBP Field Officer Liaison through the chain of command
|                                               | PPQ: CONTACT Anthony Man-Son-Hing via email at anthony.man-son-hing@usda.gov or call 919-855-7331 or 919-337-6338 |

Manual Updates
The Information Services Manuals Unit (ISMU) electronically issues and maintains manuals on the ISMU Web site. The online manuals contain the most up-to-date information.

Immediate update revisions to the manual are issued and distributed via email to CBP Agriculture Specialists, State liaison officers, and all PPQ employees.

Each immediate update contains the following information:
Introduction
Using the Manual

- Link to access and download the online manual
- List of the revised page numbers
- Purpose of the revision[s]
- Transmittal number

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 Printing, Distribution, and Mail Services Center in Riverdale, Maryland. Contact the Riverdale Print Shop: phone 301-851-2679; FAX 301-734-8455; or email Riverdale.Printshop@usda.gov. The Manuals Unit is not responsible for printing costs.
Chapter 2

Preparation

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Orientation

Review the *PEQ Manual* prior to conducting a PEQ inspection for the first time.

If possible, have an experienced inspector accompany you on one or more inspections until you become familiar with the job.

Ask your PEQLO to assist you with routine or difficult problems. (The success of this program depends on cooperation between State and Federal professionals.)

Obtain clear directions to the inspection site: commercial nursery, greenhouse, or hobbyist's home garden.

Contact the grower to arrange for each PEQ inspection appointment. (This is particularly important when dealing with hobbyists. Access is obtained and travel time is saved. Make cold-call inspections *only* as needed relative to your knowledge of the grower, State guidelines, and pest risk.)

Having an inspection appointment may seem unnecessary or contrary to standard nursery inspection procedures, but an appointment may reduce the likelihood of violations. Tell importers to do the following:

- Assure that PEQ tags are in their proper places
- Read his or her Controlled Import Permit for Postentry Quarantine (CIP) and remember to separate PEQ material from non-PEQ material
- Take the time to tidy growing areas and place dead PEQ material in trash bags for your examination

If importers *do not* take corrective measures prior to your inspection appointment, report and document violations as appropriate. Act to correct all violations.

**NOTICE**

If your State Department of Agriculture’s policy is to do inspections without appointment, please follow that policy for PEQ articles as well.

If you have reason to believe that correct PEQ compliance is *only* occurring prior to your announced visit, conduct cold-call inspections to determine the level of actual compliance. Report and document violations as appropriate. Act to correct all violations.
State and Federal Forms

Carry all necessary State and Federal forms.

State Nursery Inspection Forms
Depending on each State's standard operating procedures, State Nursery Inspection forms may be needed to report that contact was made with a specific grower, and any pests found and the treatments recommended.

State Quarantine Notice Forms
Depending on each State's standard operating procedures, State Quarantine Notices may be needed to report detention of PEQ material due to infection or infestation.

PPQ Form 236, “Notice of Shipment and Report of Inspection of Imported Plants to be Grown Under Postentry Quarantine”
PPQ Form 236, Notice of Shipment and Report of Imported Plants to be Grown Under Postentry Quarantine on page F-3 is an official record of what was shipped to the importer and assists in verifying the following:

◆ Date they were received
◆ Kind and quantities of plants shipped
◆ Number of PEQ tags shipped by the PIS
◆ Permit and reference numbers
◆ Pests found and treated for at the PIS
◆ Requirements necessary to complete the release of the PEQ material

When the PEQ period ends, PPQ Form 236 is used to request release of the PEQ material.

State inspectors may report inspection findings directly on the back of this form throughout the PEQ period, or they may use State forms and transfer the information before sending to the PEQU.

PPQ Form 391, “Specimens for Determination”
PPQ Form 391, Specimens for Determination on page F-7 must be used when shipping insect or disease specimens to national identifiers.
PPQ Form 546, “Agreement for Postentry Quarantine—State Screening Notice (7 CFR 319 Subpart—Plants for Planting)”

Read the agreement section of (PPQ Form 546, Agreement for Postentry Quarantine—State Screening Notice (7 CFR 319 Subpart—Plants for Planting) on page F-10) to the grower (owner or manager) when a PEQ shipment is first received or during the first inspection. Each letter (a. through j.) should be initialed by the applicant. Review this form again with the grower if you observe violations. Tactfully reemphasize AGREEMENT sections a. through j. Stress that the person who signs this form is the “legally accountable” person, and, therefore, **must** abide by all PEQ rules.

**NOTICE**

Inform the grower/accountable person that according to Federal law, no PEQ material may be legally propagated or otherwise increased and no shipment or part of a shipment may be moved to another location on the importer’s property or to any other importer’s property without prior approval from the State inspection authorities and written permission of the National Coordinator, Postentry Quarantine Program.

Forward copies 1 and 2 of the application for postentry permits (PPQ Form 546) to:

- Head, Permit Unit
- USDA, APHIS, PPQ
- 4700 River Road, Unit 136
- Riverdale, Maryland 20737

Copy 3 of the application form should be kept by the State and copy 4 given to the importer.

**NOTICE**

An applicant with a level 2 e-authentication can apply online for a Postentry Permit. The application will go first to the Permit Unit to check for completeness and whether the applicant has a history with violations. The Permit Unit then forwards to the appropriate State Department of Agriculture. The site is inspected by a State Inspector and approved or disapproved. If approved, an e-permit will be issued. If disapproved, the applicant will be informed.

PPQ Form 518, “Report of Violation”

Use PPQ Form 518, Report of Violation on page F-9 to report violations of the PEQ permit. Know that other forms exist, relative to PEQ.
APHIS Form 7060, “Official Warning Violation of Federal Regulations”
APHIS Form 7060, Official Warning, Violation of Federal Regulations on page F-2 may be used to report first-time or minor violations of the PEQ permit. APHIS Form 7060 is a formal report, more formal than a warning letter, and is used for violations.

PPQ Form 569, “Release From Postentry Quarantine”
PPQ Form 569 Release from Postentry Quarantine on page F-13 is issued by the PEQ Unit in Beltsville, Maryland, and, for CNMI, Guam, and Hawaii, the Postentry Coordinator located in Honolulu, HI. This is the form that officially releases PEQ material from quarantine.

PPQ Form 587, “Application for Permit to Import Plants or Plant Products”
PPQ Form 587, Application for Permit to Import Plants or Plant Products on page F-14 is not used when applying to import PEQ material, but it is used for genera that are not Controlled Import Permit material. Keep a supply of blank forms available for issuance to potential importers.

“Controlled Import Permit (CIP) for Postentry Quarantine”
PPQ Controlled Import Permit for Postentry Quarantine on page F-16 is valid for 3 years or until the maximum quantity of plants listed on the permit has been met, whichever comes first. The maximum quantity listed on the CIP is for the life of the permit, not each shipment. No amendments will be made to existing permits. If changes are required, the importer will have to apply for a new permit.

Tools and Equipment
Following is a list of tools and equipment needed to inspect plants being grown under postentry quarantine:

- Copies of PPQ Form 391, “Specimens for Determination”
- State Quarantine Tags, Quarantine Tape, or similar marking equipment for detaining infected PEQ material
- Copies or originals of all forms specific to the PEQ inspection
- Three or four plastic, heavy-duty trash bags for infected PEQ material disposal
Make arrangements with the importer if large quantities of plant material need to be destroyed.

Cautions and Warnings

Personal Warnings
Inspectors should always be cautious en route to and during PEQ inspections, but probably no more so than during any other work assignment.

Experienced inspectors know to look for guard dogs, pesticide residues on plants, low-hanging steam pipes, unguarded fans, and dangerous footing. But even experienced inspectors can have accidents. Therefore, take every precaution to minimize accidents, injury, and damage to self, property, and others.

Inspectional Warnings
Genera listed in 319.37-7(b) may be unfamiliar to you. You may wish to do a computer search for pictures. Your importer’s confidence in your abilities is increased if you can identify the plant(s) you are to inspect.

You may not recognize many of the plant diseases that are PEQ significant. They either do not occur in the United States, are of limited distribution, or have symptoms that are similar to endemic diseases. Inspection is based on disease signs and symptoms and it is important to recognize them. Use the
Preparation
Cautions and Warnings

If you cannot identify what is causing a symptom on a PEQ plant, take a sample to your local specialist for identification. If this person cannot identify the specimen or suspects the disease is one of those listed as quarantine significant, contact the PEQ Coordinator.

Symptoms caused by fungi, bacteria, and nematodes include wilting, blotching, spotting, chlorosis, mottling, curling, cankers, gall, and die-back. Carefully inspect the host material for spores or fruiting bodies.

Symptoms of viral diseases include mottle, vein clearing, leaf curling, chlorosis, necrotic lesions, distortions, shortening of the internodes, stunting, enations, and color breaking in the bloom. Accurate field identifications are difficult because diagnosis is based on symptoms. Generally, there are no signs (such as fruiting bodies of fungal pathogens) produced by diseases caused by viruses. And, symptoms can be confused with those caused by drought, poor drainage, malnutrition, or injury from spray materials. When virus diseases are found, examine any domestic plants of the same genus growing nearby for similar symptoms. Such comparisons will help determine if the suspected virus was introduced with the host or occurs locally.

Refer plant diseases that are not positively recognized as native or already established, or cannot be completely explained by environmental factors, insect injury, or nutritional troubles to the PEQU, Beltsville, Maryland. Pack specimens carefully before shipping to identifiers (see Pest Identification Procedures on page 4-7). Sent specimens must be characteristic of symptoms and variations observed on the PEQ plants and described in the List of Circulars on page 7-1.

In most cases, the quarantine period for PEQ material is 2 years (or 2 growing seasons). Exceptions do occur. Therefore, refer to PPQ Form 546, Agreement for Postentry Quarantine—State Screening Notice (7 CFR 319 Subpart—Plants for Planting) on page F-10 for specific information.
**Special Note Regarding PIS Inspections**

It is important to understand that intercepted plant pests are taxonomically identified to the lowest possible taxon (usually to the species level). However, PPQ acts **only** on those pests that are or are suspected of being quarantine significant. Nonquarantine plant pests are generally allowed entry due to PPQ’s lack of authority to treat these pests. Importers who receive PEQ materials infested with non-quarantine significant plant pests may complain about this policy. PPQ management is **not** indifferent to importer concerns and is reviewing this loophole. Changes are being considered to require treatments for potential viral vectors such as aphids, whiteflies, or leafhoppers at the PIS. Until this review process is complete, please understand that PPQ will **only** take action on those pests that are, by Federal law, quarantine significant.
Chapter 3

Growing Site Inspections

Contents

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Waiver of Growing Site Inspection  3-5
Disposal Procedures  3-5

Overview

Growing site inspections are conducted by State (and occasionally Federal) inspectors to preapprove the area(s) where PEQ material will be grown during the PEQ period. Growing site inspections also serve to evaluate the professional capability and intent of the grower.

Four primary conditions must be met for a site to be approved:

◆ Adequate buffer distance away from plants of the same genus and/or other genera of postentry plants
◆ Adequate space for the growth and maintenance of the total amount of PEQ material expected to be received (the amount of material is indicated on PPQ Form 546, Agreement for Postentry Quarantine—State Screening Notice (7 CFR 319 Subpart—Plants for Planting) on page F-10)
◆ Easily accessible for inspection and available during the State inspector's business hours
◆ Facility is in a location not prone to theft

Your Authority

The State Plant Regulatory Official (SPRO) or designee has final authority for approval or denial of any proposed site. Even though all primary conditions may be met, a decision to deny the approval of the site may be based on the grower's professional capability and intent or the environmental conditions that could cause exotic pests to be released into the environment.

For example, if plant theft is a local problem, this could be reason for disapproving the growing site. In this instance, the importer should be allowed
to suggest and implement remedial safeguard measures that meet your satisfaction, such as fencing the property.

If a grower has habitually violated previous State quarantines or nursery treatment orders, this, too, could be grounds for disapproval. Information on habitual violations should, at minimum, accompany the application to the Permit Unit in Riverdale, Maryland.

**PPQ Form 546**

Complete PPQ Form 546, Agreement for Postentry Quarantine—State Screening Notice (7 CFR 319 Subpart—Plants for Planting) on page F-10 *ONLY* under the following conditions:

- Accountable person who signed for a company is no longer with the company
- New importer/company wishes to obtain a Controlled Import Permit for Postentry Quarantine (CIP)
- Controlled Import Permit for Postentry Quarantine expired and needs to be renewed
- Permittee wants to change the growing site or add a growing site

**Section A**

Section A is completed by the grower/applicant. Please ask the person completing the form to print his or her name. After the form is completed, forward it to the appropriate State regulatory official.

If, after the Controlled Import Permit for Postentry Quarantine is issued, a request is made by the importer to add additional genera to the permit, the importer **must** apply for a **new** Controlled Import Permit for Postentry Quarantine.

During your site inspection read aloud and discuss the “Agreement” section of Section A and have the grower/importer initial all subsections (a. through j.) to:

- Answer all importer questions
- Ascertain that compliance is possible
- Ensure the grower understands the legal requirements
**Growing Site**

*Item a.* All plant material will be grown on premises supervised and controlled by me, located as specified in Item 5 above, and will **not** be moved or distributed without written permission of the appropriate State or Territory Official and (except Hawaii, Guam, and CNMI) the Coordinator, Postentry Quarantine Program.

Approval to move or distribute the plants **must** be sent to the Coordinator on State Department of Agriculture letterhead. For movement of PEQ plants to a grower in another State, both States will need to send approval to the Coordinator.

**Access**

*Item b.* Properly identified officers, either Federal and/or State, will be given access to the premises listed in Item 5 during the inspector's regular business hours.

**Distribution**

*Item c.* No increase of these plants by cuttings, grafting, suckers, flowers, seed or air layers will be made; there will be no distribution of the plants or increase; and no cutting of flowers for sale will be made until the plants are released from postentry quarantine, or written permission of the (as in a. above).

Approval to increase the number of plants or cut flowers **must** be sent to the PEQ Coordinator on State Department of Agriculture letterhead.

**Labeling**

*Item d.* The plant material and all increase therefrom will be labeled by specific plant name, port accession number, and date of importation.

<table>
<thead>
<tr>
<th>NOTICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>The tag should be placed on the first plant in a group of plants. Any additional tags for the same shipment can be placed anywhere within the group of plants. Labels should be removed by a State officer as soon as the release is received from the Postentry Quarantine Unit (PEQU).</td>
</tr>
</tbody>
</table>
Separation

*Item e.* The plant material will be separated from domestic stock of the same genus including such stock on adjoining premises, by no less that 3 meters (approximately 10 feet) and will be separated from other imported plants by the same distance.

**NOTICE**

Additional distance requirements should be indicated on PPQ Form 546 in the blank area of Section B-8.

Treatments

*Item f.* Any treatments prescribed by the officer, including destruction of the quarantined PEQ material or other plants growing on the premises, will be complied with to prevent the dissemination of a plant pest. (Special emphasis should be given to explain the need for control of aphids, whiteflies, leafhoppers, and other known viral vectors.)

Dead Plants

*Item g.* The appropriate State or Territory official will be notified in writing within 30 days when any abnormality is noticed in the plant material or if the plant material dies. Dead plants will be retained and collected by the State inspector for analysis. Follow disposal procedures described in Disposal Procedures on page 3-5 section in this manual.

Address Change

*Item h.* Notification of change of address will be sent to the appropriate State or Territorial official and (except Hawaii, Guam, and CNMI) the Coordinator, Postentry Quarantine Program.

Special Requirements

*Item i.* Plants of *Rubus* spp. from Europe will be grown in a screen house (16 mesh per inch minimum); plants of *Chrysanthemum* spp. and *Dianthus* spp. will be grown in a greenhouse or other enclosed building.

Growing Requirements

*Item j.* The postentry requirements will be applied to Chrysanthemum spp. for 6 months after importation, to *Dianthus* spp. for 1 year after importation, and to all other genera for 2 years after importation.
The State official completes Section B gives copy 4 to the applicant and retains the third copy. The rest is sent to the following address:

Head, Permit Unit  
USDA, APHIS, PPQ  
4700 River Road, Unit 136  
Riverdale, Maryland 20737

### Waiver of Growing Site Inspection

It is **not** critical that you conduct a growing site inspection when a specific importer is an experienced PEQ grower, and you are knowledgeable about the following:

- Professional capability and intent of the grower
- Proposed growing site
- Site has been specifically identified and delimited

In all other situations, inspect growing sites and hold discussions with the importer to assure compliance with the PEQ growing agreement. Taking these two steps will reduce the potential for violations and minimize the potential release of exotic pests into the environment.

Even with experienced PEQ importers, it is important to annually review PEQ growing requirements, especially when new genera are imported.

If PEQ material arrives at the PIS yet there has been no growing site inspection and approval, PIS officials will contact the PEQ Coordinator to discuss the matter. Usually, PEQ materials are allowed to proceed from the port of entry if a PPQ Form 546 completed by both the importer and signed by the state is faxed to the PIS, even though a Controlled Import Permit for Postentry Quarantine has **not** been issued.

### Disposal Procedures

Instruct all importers, as often as necessary, of the proper disposal procedures outlined below:

- Any and all debris or waste derived from postentry plants or plant parts **must** be burned, autoclaved, or buried at least 1 ½ to 2 feet deep; following are a few examples of such material:
  - Debris remaining after pruning (See Table 3-1 Decision Table for Handling Plant Debris or Waste on page 3-6)
Growing Site Inspections
Disposal Procedures

- Debris that collects naturally (See Table 3-1 Decision Table for Handling Plant Debris or Waste on page 3-6)
- Excess wood left from bud grafting
- Undesirable plants the grower wants to eliminate

Composting waste or debris from postentered plants or carrying waste or debris from postentered plants to a public landfill is prohibited

Importers must notify, in writing, within 30 days, State (or Federal) inspectors for an inspection when PEQ material dies or appears infected or infested

Importers must save all dead PEQ material in plastic trash bags (PEQ material may be beyond recognition when an inspection is later conducted, but safeguarding in plastic bags will reduce the likelihood of pest dissemination)

Importers or growers must never dispose of any PEQ material (including waste or debris) without the prior approval of a State or Federal inspector (if the importer or grower sees dead plants or evidence of disease, that person must contact the State inspector immediately, moreover, if the importer or grower wants to eliminate undesirable plants, he or she should contact the State inspector prior to roguing out those undesirable plants)

Use Decision Table for Handling Plant Debris or Waste to decide whether you, as a State inspector, may allow a grower to leave plant debris or waste originating from PEQ material on the ground prior to disposing of it.

### Table 3-1 Decision Table for Handling Plant Debris or Waste

<table>
<thead>
<tr>
<th>If the material or waste is:</th>
<th>And the pathogen requiring the plant or material be grown under postentry:</th>
<th>Then:</th>
</tr>
</thead>
<tbody>
<tr>
<td>A large quantity such that collection and disposal of the material would be burdensome</td>
<td>Is a bacterium or a fungus</td>
<td>Have the grower or importer collect the waste or debris and bag it prior to disposition</td>
</tr>
<tr>
<td></td>
<td>Is a virus</td>
<td>Allow the grower or importer to leave the debris on the ground</td>
</tr>
<tr>
<td>A small quantity where collection and disposal would be reasonably easy</td>
<td></td>
<td>Have the grower or importer collect the waste or debris and bag it prior to disposition</td>
</tr>
</tbody>
</table>
EXAMPLE

If a grower has planted 1,000 postentry ash trees, you require that the grower collect and bag the debris because the pest of concern, *Pseudomonas savastanoi var. fraxini* is a bacterium (Circular 22: Diseases of Fraxinus spp. on page 10-53). If, on the other hand, a grower plants 2,000 postentry lilac bushes (*Syringa* spp.), you could allow the grower to leave the plant debris on the ground because it would involve a large quantity of material, and the pest of concern is the Elm Mottle Virus (Elm Mottle Virus (Federal Quarantine Significant) on page 10-102).

Refrain from contacting PPQ Headquarters offices unless specifically authorized by PEQLO or by PPQ Headquarters personnel.
Chapter 4

Inspecting Postentry Quarantine Material

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  If PEQ Material Does NOT Arrive at an Inspection Station 4-3
General Inspection Guidelines 4-3
  Postentry Quarantine (PEQ) Plants Imported as Tissue Culture in Flasks 4-3
    Inspection Requirements 4-3
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Plant disease symptoms caused by viruses, bacteria, and fungi do not necessarily appear in the same season. Hence, inspecting PEQ material two or more times, if possible, during each growing season would be best. For example, the majority of leaf spots and leaf diseases are not well developed before summer. Virus diseases, in general, are more conspicuous in the spring. (Some virus symptoms are masked or tend to disappear in hot weather.) Cankers of woody plants are usually visible throughout the year. Thus, it is obvious that while late spring and early summer are most satisfactory for virus inspection, mid-summer to fall will give the best results for most fungus diseases.

The principle of seasonal occurrence holds for insects also. Leaf-feeding insects in larval and adult stages may appear in May and June and be entirely absent in mid-summer and later. Insects with a long season of hibernation (many sawflies, scarabs, weevils) spend a relatively short season on the above-ground portions of plants and may be missed unless two or more inspections are made. While plants are frequently fumigated when pests are intercepted at the port of entry, there is always a chance of insect pest introduction. For the first inspection following PIS inspection, submit any insect damage to PEQ material or insects not recognized for identification.

When PEQ material is examined during the growing season, inspection timing is important. Conditions must be optimum for detecting the specific plant pest involved. (A portion of this manual indicates optimal inspection periods.)

Unfortunately, two scenarios are possible:

◆ Grower receives PEQ material through legal channels
◆ Grower receives PEQ material through the mail or by a courier service and avoids PIS inspection, recording, tagging, and any necessary treatments (fortunately in some of the later cases, regulatory officials are notified or in some way learn that this has occurred)

How Plants May Enter

If PEQ Material Arrives at an Inspection Station
A detailed inspection is not required when the PEQ material arrives at the grower/importer's location unless the State official so desires. If an inspection is done, report findings directly on the back of PPQ Form 236.
If PEQ Material Does NOT Arrive at an Inspection Station

Notify the PEQLO or State Plant Health Director (SPHD) immediately. The SPHD or PEQLO will insure that the shipment is sent to the closest inspection station no matter the number of items. If the importer does not have a Controlled Import Permit for Postentry Quarantine, the application form (PPQ Form 546) must be completed, both parts A & B before the shipment can be released from the inspection station. Violation proceedings may or may not be justified, and should be decided on a case-by-case basis.

**NOTICE**

Send all shipments to the closest inspection station. If this is not possible, e.g., the plants have been planted in the field, PPQ must issue an Emergency Action Notice (EAN) and destroy the shipment.

General Inspection Guidelines

**Postentry Quarantine (PEQ) Plants Imported as Tissue Culture in Flasks**

1. Postentry quarantine begins when the plants are removed from the flasks, planted in growing media, and placed in the field, greenhouse, or screenhouse.
2. Any plants not removed from the flasks must be destroyed by an approved method.
3. The only plants that will be released at the end of the PEQ are the ones that have been planted and inspected by the State and/or PPQ.

**Inspection Requirements**

Inspect plants for evidence of exotic pests at least once during the first year and at least once during the second year for plants required to be grown in postentry quarantine for 2 years. Inspect at least once for plants required to be grown in quarantine for less than 2 years (e.g., Chrysanthemum spp. for 6 months, Hydrangea spp. for 9 months, Dianthus spp. for 1 year).

**Optional Inspection**

When the postentry shipment first arrives at the growing site (optional), perform the following:

1. Compare the bill of sale or invoice with PPQ Form 236. If you find any discrepancy in the number of plants or their kinds, contact the PEQLO to resolve the discrepancy or to investigate the incident.
2. Inspect plants that will be growing in proximity to the postentered material. Look especially for vectors of viruses—aphids, leafhoppers, and
Inspecting Postentry Quarantine Material
General Inspection Guidelines

whiteflies. If you find such vectors, have the grower control these pests quickly but when practical.

3. If you detected any violations during your inspection, get with your PEQLO to investigate and document the violation.

First Inspection

During The First Growing Season
It is best if you inspect the postentered material twice during the first growing season.

1. To prepare for your inspection, look up the scientific name of the postentered plant(s) in Plants Growing in Postentry Quarantine on page H-1. Use the information under the appropriate columns to schedule your inspections and to know for what symptoms to be on the alert. Schedule your inspections according to your local climate and weather patterns. If not listed in Disease and Pathogenic Organism Circulars on page 10-1 (fruits and nuts overall), generally inspect the plants for symptoms of diseases at different times of the growing season.

2. Enter the results of your inspection on the back of the PPQ Form 236—even if those results are negative.

Second Inspection

During The Second Growing Season
It is best if you inspect the postentered material twice during the second growing season.

1. To prepare for your inspection, look up the scientific name of the postentered plant(s) in Appendix H, Plants Growing in Postentry Quarantine on page H-1. Use the information under the appropriate columns to schedule your inspections and to know for what symptoms to be on the alert. Schedule your inspections according to your local climate and weather patterns. If no specific symptom is listed in the symptom column in Appendix H Plants Growing in Postentry Quarantine on page H-1, generally inspect the plants for symptoms of diseases at different times during the growing season.

2. Enter the results of your inspection on the back of PPQ Form 236—even if those results are negative.

3. Based on the inclusive inspection results during the two growing seasons, recommend (or don't recommend) release of the postentered material. If you recommend release, sign the appropriate Block on the bottom of the back side of PPQ Form 236. Get your supervisor's concurrence and have him or her sign the form in the appropriate Blocks next to yours. If both
you and your supervisor agree that the plants should not be released from detention, contact your PEQLO.

4. Count all the plants, if feasible, that are alive from the original shipment. Enter both numbers on the back of PPQ Form 236 as “23 plants alive out of the original 98.”

5. Send the completed and signed PPQ Form 236 to your PEQLO. That person will review the form and send it to the PEQU. This Unit and the Postentry Coordinator for Hawaii, Guam, and CNMI are the only officials authorized to release the material to the grower or importer.

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**Detailed Inspection Procedures**

**Inspection of Existing Documents**

1. Thoroughly inspect all documents to verify the amount and kind of plant material grown.
   
   A. Review all permit conditions. Examples can be located in Figure F-10 through Figure F-10.

2. Have the importer explain and/or correct any discrepancies observed.

3. Replace lost documents by contacting the PEQ Coordinator. Additional tags, as needed, can also be obtained by contacting the Coordinator.

**Inspection of Growing Site**

1. Determine if the growing site is indeed the approved site as stipulated in the original request.

2. If the importer is in compliance, do nothing.

3. If the importer is not in compliance, have the importer correct the situation to your satisfaction.

4. Report any serious violations to the PEQLO.

5. If a new growing site is approved for an existing permit, the State PEQ should forward the new PPQ Form 546 to the Permit Unit in Riverdale, Maryland. Attach a note stating: “PPQ Form 546 is a revision to Permit Number [fill in number].”

Use Table 4-1 when inspecting PEQ plants or plants adjacent to PEQ plants.
Table 4-1 Pest Findings and Appropriate Action

<table>
<thead>
<tr>
<th>If you find:</th>
<th>Then you¹:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vector insect (whiteflies, aphids, or leafhoppers)</td>
<td>INSTRUCT the owner to control the pest immediately. If he or she does not comply, issue a violation notice. Submit a sample of the pest to the State or University entomologist for identification</td>
</tr>
<tr>
<td>Nonvector insect</td>
<td>Submit a sample of the pest to the State or University entomologist for identification</td>
</tr>
<tr>
<td>Symptoms or sign of PEQ disease or PEQ suspect disease (see Plants Growing in Postentry Quarantine on page H-1)</td>
<td></td>
</tr>
<tr>
<td>Symptoms of signs of non-PEQ disease</td>
<td></td>
</tr>
</tbody>
</table>

¹ If the State or University entomologist or plant pathologist does not recognize the insect or the symptoms or signs of the disease to be something that has been reported in that State, immediately contact the National PEQ Coordinator.

**PEQ Plants Inspection**

1. Inspect the PEQ plants for insects and diseases. Count the plants.
2. If you find insects such as whiteflies, aphids, or leafhoppers, have the grower control them immediately since many are known vectors of viruses. Importer compliance is critical.
3. Collect pest specimens for determination and submit to specialist identifiers (see Submitting Invertebrate Pests for Identification on page 4-8 and Submitting Plant Diseases for Identification on page 4-10).
4. Report all of your findings on the back of PPQ Form 236. Record the general condition of the plants and the cause of death of any plants on PPQ Form 236.

**NOTICE**

If you determine the grower/importer can no longer continue growing PEQ material before the material is released, there are two options available to the grower: 1) dispose of all PEQ material using approved disposal methods and contact the PEQLO and Coordinator or PEQP; 2) sell or give the PEQ material to another approved PEQ material grower within the same State with State approval. Contact the Coordinator of PEQP to obtain written approval and PPQ Form 236 for the replacement grower.

**Nearby Plants Inspection**

1. Inspect nearby plants for insects and signs and symptoms of disease.
2. Report any findings to the importer and request treatments for pest elimination.
3. If you find insects such as whiteflies, aphids, or leafhoppers, have the grower control them immediately since many are known vectors of viruses. Importer compliance is critical.
4. Collect pest specimens for determination and submit to specialist identifiers (see Submitting Invertebrate Pests for Identification on page 4-8 and Submitting Plant Diseases for Identification on page 4-10).

5. If the importer fails to control potential vector pests upon your request, document the violation. You may also quarantine surrounding areas if infested.

6. Dispose of dead and diseased PEQ material and any other plant material deemed infected/infested with quarantine-significant pests by applying the disposal procedures established in this manual.

**NOTICE**

The plant material will be separated from domestic stock of the same genus, including such stock on adjoining premises, by no less than 3 meters (approximately 10 feet) and will be separated from other imported plants by the same distance.

**PEQ Tags Inspection**

Look for PEQ tags. Replace lost or missing tags. The PEQLO can request replacement tags by contacting:

Anthony Man-Son-Hing  
National Coordinator, Postentry Quarantine Program  
USDA–APHIS–PPQ–Field Operations  
920 Main Campus Drive, Suite 200  
Raleigh, NC 27606  
Tel: 919-855-7331  
Cell: 919-337-6338  
Fax: 919-855-7393

Confiscate and destroy any old PEQ tags that no longer label active PEQ material.

**NOTICE**

Lack of tag could be an indication the shipment was not inspected at an inspection station. If the State inspector does not have a PPQ Form 236 for this shipment and the grower cannot produce this document, a decision will need to be made. If the shipment has just arrived and can be sent to the closest inspection station, do so. If it has been planted on site, destroy it. Contact the SPHD for aid in doing an Emergency Action Notice (EAN).

**Pest Identification Procedures**

Approach each inspection with the question, “Does this importation carry any pest that is new or rare in the United States?” A new pest may be present in a single plant. It is your task to find it.
Take specimens you cannot identify to your local identifier specialists. PPQ Form 391, Specimens for Determination on page F-7 must be completed for any specimens they cannot identify and they must be sent by overnight mail.

When suspect or actual pests are found, follow the guidelines below.

**Submitting Invertebrate Pests for Identification**

Use the following procedures for preparing specimens for identification. Treat or safeguard all host material to eliminate pest risk. Rearing intercepted specimens is prohibited without the proper authority. Never attempt to rear plant pests without authorization from the following:

Permits, Registration, Imports, and Manuals (PRIM) Staff  
4700 River Road, Unit 133  
Riverdale, Maryland 20737-1236

**Arthropods**

For guidance in preserving insects, refer to any of the following publications:

- *An Introduction to the Study of Insects*, Borror, Triplehorn, and Delong

Use Table 4-2 on page 4-8 to determine how to preserve your specimen.

<table>
<thead>
<tr>
<th>If specimen belongs to this order:</th>
<th>Then preserve specimen using this method:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acarina</td>
<td>In alcohol</td>
</tr>
<tr>
<td>Coleoptera</td>
<td>See Preserving Specimens in Alcohol on page 4-9</td>
</tr>
<tr>
<td>Dermaptera</td>
<td></td>
</tr>
<tr>
<td>Diptera</td>
<td></td>
</tr>
<tr>
<td>Heteroptera</td>
<td></td>
</tr>
<tr>
<td>Homoptera¹</td>
<td></td>
</tr>
<tr>
<td>Hymenoptera</td>
<td></td>
</tr>
<tr>
<td>Isoptera</td>
<td></td>
</tr>
<tr>
<td>Lepidoptera (immatures)</td>
<td></td>
</tr>
<tr>
<td>Orthoptera (immatures)</td>
<td></td>
</tr>
<tr>
<td>Thysanoptera (adults)²</td>
<td></td>
</tr>
<tr>
<td>Homoptera on host material (scale insects and immature psyllids)</td>
<td>Dry mounting</td>
</tr>
<tr>
<td>Lepidoptera (adults)</td>
<td>See Preserving Dry Specimens on page 4-9</td>
</tr>
<tr>
<td>Orthoptera (adults)</td>
<td></td>
</tr>
</tbody>
</table>
Preserving Specimens in Alcohol

*Adults.* Kill adults by placing them in 70% alcohol.

*Larvae.* Use the following instructions to kill larvae:

1. Place larvae in water.
2. Slowly bring water to boiling point.
3. Allow specimen to cool down.
4. Place specimen in a vial with alcohol.

Select shoulder-type vials over shell vials because they are stronger and provide better protection for the specimens. Fill vials three-quarters full with alcohol and make sure the stoppers fit securely. Bleed air pressure when necessary. For delicate specimens, place wadded paper within the vials to minimize specimen movement. Use screw-cap vials for small specimens. Avoid using cork stoppers because they allow alcohol to evaporate and could result in specimen loss during extended storage.

Preserving Dry Specimens

Make sure all specimens are dead. Use one of the following killing agents or seek instructions from the Identifier for alternative killing measures:

- Cyanide
- Ethyl acetate
- Trichoroethylene

**CAUTION**

Label all killing bottles with the “POISON.” Use killing agents with care and follow the label directions.

Pin adult specimens of *Lepidoptera* and *Orthoptera* on pinning blocks before shipping. Pin the styrofoam blocks to the bottom of the pinning box. Use small pinning boxes and place these, snugly padded, inside a shipping box. Seek instructions from the Identifier for additional information.

Partially dry host material with insects (e.g., scale insects and whiteflies) before placing in the container. Unless the host material is thoroughly dry, pack to permit drying after closure of container without damaging specimens.
**Nematodes**

Use the following instructions when preserving nematodes:

1. If you are forwarding nematode-infested host material, place material in a plastic bag to prevent the host material from drying.

2. Separate nematodes from infested material and place in a vial of water. Slowly apply heat until the nematodes stop moving. **Do not** overheat!

3. Prepare either of the fixatives 3% formaldehyde or TAF (see Table 4-3).

4. Add to the vial containing the specimens a volume of double strength fixative equal to the volume of water in the vial.

5. Place cysts of *Globodera* spp., mature females of *Meloidogyne* spp., and other non-wormlike nematodes, directly into single strength fixative without heating.

**Submitting Plant Diseases for Identification**

Use Table 4-4 as a guide when examining plants.

### Table 4-3 Instructions for Preparing Fixatives

<table>
<thead>
<tr>
<th>If preparing this fixative:</th>
<th>Follow this recipe:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3% formaldehyde</td>
<td>1 part formalin + 12 parts water</td>
</tr>
<tr>
<td>TAF</td>
<td>7 ml formalin + 2 ml triethanolomine + 91 ml water</td>
</tr>
</tbody>
</table>

### Table 4-4 Comparing Symptoms

<table>
<thead>
<tr>
<th>Symptoms caused by fungi, bacteria, and nematodes:</th>
<th>Symptoms caused by viruses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>◆ Blotching</td>
<td>◆ Bloom color breaking</td>
</tr>
<tr>
<td>◆ Cankers</td>
<td>◆ Chlorosis</td>
</tr>
<tr>
<td>◆ Chlorosis</td>
<td>◆ Distortions</td>
</tr>
<tr>
<td>◆ Curling</td>
<td>◆ Enations</td>
</tr>
<tr>
<td>◆ Die-Back</td>
<td>◆ Leaf curl</td>
</tr>
<tr>
<td>◆ Galls</td>
<td>◆ Mottle</td>
</tr>
<tr>
<td>◆ Mottling</td>
<td>◆ Necrotic lesions</td>
</tr>
<tr>
<td>◆ Spotting</td>
<td>◆ Shortening internodes</td>
</tr>
<tr>
<td>◆ Wilting</td>
<td>◆ Stunting</td>
</tr>
<tr>
<td></td>
<td>◆ Vein clearing</td>
</tr>
</tbody>
</table>
Virus symptoms are similar to:

- Drought
- Malnutrition
- Poor drainage
- Spray injury

**Selecting Material**

Because diseases have complex life cycles and specimens of different stages of the disease life cycle are helpful in making identifications, select material showing as many stages of disease life cycle as possible. Early stages of the disease may show important diagnostic signs and symptoms, while older material may have the perfect stage of a fungus. Send an ample amount of diseased material.

Since some diseases may be identified by symptoms, when possible, ship disease specimens in a natural state to the Identifier. If the host material becomes dried, molded, shriveled, or decayed, symptoms may be modified or destroyed. If the material is soft or pulpy, partially dry the material and pack between sheets of stiff, absorbent paper to keep the diseased area flat. **Do not** fold leaf specimens. Partially dry succulent leaves before shipping.

For virus suspects, prepare the sample as follows:

1. Remove a branch with leaves or whole plant showing symptoms. Leaves or whole plant should **not** be dry or brittle.
2. Place in a resealable, plastic bag (**no** wet paper towels). Remove as much of the air as possible and close tightly.
3. Forward as quickly as possible to your local virologist.

If there is **no** state virologist, forward the sample along with PPQ Form 391 by overnight express to:

- Dr. Joseph Foster
- USDA, APHIS, PPQ
- Building 580 Powder Mill Rd.
- Beltsville, MD 20705
FAX or email a copy of PPQ Form 391 to the National Coordinator of Postentry Quarantine Programs:

Anthony Man-Son-Hing
National Coordinator, Postentry Quarantine Program
USDA–APHIS–PPQ–Field Operations
920 Main Campus Drive, Suite 200
Raleigh, NC 27606
Tel: 919-855-7331
Cell: 919-337-6338
Fax: 919-855-7393
Email:Anthony.Man-Son-Hing@usda.gov

PPQ Form 391 “Specimens for Determination”
See PPQ Form 391, Specimens for Determination on page F-7 for an example of Form 391

NOTICE
PPQ Form 391 is the only form approved for use by the U.S. National Museum when submitting specimens for determination. All other forms may be rejected and may cause identification delays. Complete a second or third form if you submit two or three different pests for determination. (Each form and specimen may need to go to different identifiers working in different labs.)

Table 4-5 Instructions for PPQ Form 391 (page 1 of 2)

<table>
<thead>
<tr>
<th>Block:</th>
<th>Instructions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Collection number</td>
<td>Use any numbering system that corresponds to your State's inspection and inter-</td>
</tr>
<tr>
<td></td>
<td>ception activities (optional)</td>
</tr>
<tr>
<td>2. Date</td>
<td>Enter as appropriate.</td>
</tr>
<tr>
<td>3. Submitting Agency</td>
<td>Enter as appropriate.</td>
</tr>
<tr>
<td>4. Name of sender</td>
<td>Enter as appropriate.</td>
</tr>
<tr>
<td>5. Type of property</td>
<td>Enter as appropriate.</td>
</tr>
<tr>
<td>6. Address of sender</td>
<td>Enter as appropriate.</td>
</tr>
<tr>
<td>7. Name and address of property or owner</td>
<td>Enter as appropriate.</td>
</tr>
<tr>
<td>8. Reason for identification</td>
<td>◆ Mark box B or C (the one that best describes your reason for submitting this</td>
</tr>
<tr>
<td></td>
<td>◆ Mark box L and add the words “Postentry Material”</td>
</tr>
<tr>
<td>9. Explanation</td>
<td>If prompt or urgent identification is requested, please provide a brief explanation under Block 22—remarks</td>
</tr>
<tr>
<td>10. Host information</td>
<td>Give scientific name of the host material</td>
</tr>
<tr>
<td>11. Quantity of host</td>
<td>◆ Write the exact number of plants that were received by the importer</td>
</tr>
<tr>
<td></td>
<td>◆ Write an estimated number of plants affected by the pest you are submitting for identification</td>
</tr>
</tbody>
</table>
Table 4-5 Instructions for PPQ Form 391 (page 2 of 2)

<table>
<thead>
<tr>
<th>Block:</th>
<th>Instructions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>12. Plant distribution</td>
<td>Mark the box that best describes the amount of host material in the nursery, greenhouse, or immediate environment</td>
</tr>
<tr>
<td>13. Plant parts affected</td>
<td>Mark the box or boxes that indicate where on the host you actually found the pest</td>
</tr>
<tr>
<td>14. Pest distribution</td>
<td>Mark the box that best describes the amount of pest infestation</td>
</tr>
</tbody>
</table>
| 15. Unnamed block—this block is **only** used for submission of insects, nematodes, or mollusks. Skip this block if you are submitting diseased specimens for determination |◆ Mark the box that tells whether the pest is an insect, nematode, or mollusk.  
◆ Write in the appropriate life stage box how many alive or dead specimens were present at the time of your inspection. |
| 16. Sampling method           | Use words such as:                                                          |
|                               | ◆ Berlese Funnel                                                            |
|                               | ◆ Centrifuge                                                                |
|                               | ◆ Dissection                                                                |
|                               | ◆ Filtration                                                                |
|                               | ◆ Hand Sampling                                                             |
| 17. Type of trap and lure     | **Do not** complete this block unless it specifically applies               |
| 18. Trap number               | **Do not** complete this block unless it specifically applies               |
| 19. Plant pathology—plant symptoms | This block is **only** used for submission of plant pathology specimens. Mark the box that best describes what you observed during your inspection. |
| 20. Weed density              | **Do not** complete this block unless it specifically applies.               |
| 21. Weed growth stage         | **Do not** complete this block unless it specifically applies.               |
| 22. Remarks                   | Write the PEQ permit number, reference number, country of origin, and any other location information here that would help you or others find the PEQ material at a later date. Place urgent shipping information here (from Block 9). |
| 23. Tentative determination   | Write the scientific name of the pest. In the case of viruses or when you **do not** know the scientific name, the common name of the pest is acceptable. **Never** leave this block blank. At least indicate virus, fungus, disease, etc. |
| 24. Determination and notes   | **Do not** write in this area                                               |
PPQ Form 236 “Notice of Shipment and Report of Inspection of Imported Plants to be Grown Under Postentry Quarantine”

Recording Inspection Results


Complete only the back of this form in the area entitled “Inspection Report.”

Table 4-6 Instructions for PPQ Form 236

<table>
<thead>
<tr>
<th>Block:</th>
<th>Instructions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plants imported</td>
<td>Write the genus and species of the host imported</td>
</tr>
<tr>
<td>No.</td>
<td>Write the number of live plants received by the importer</td>
</tr>
<tr>
<td>Date and findings</td>
<td>If at all possible, use one box for each inspection—record the following information:</td>
</tr>
<tr>
<td></td>
<td>◆ Write any pests observed</td>
</tr>
<tr>
<td></td>
<td>◆ Write any noticeable growth conditions observed</td>
</tr>
<tr>
<td></td>
<td>◆ Write the inspection date</td>
</tr>
<tr>
<td></td>
<td>◆ Write the number of live plants remaining</td>
</tr>
<tr>
<td></td>
<td>When you require treatment for arthropods, including insects, provide a copy of the State inspection form to the PEQLO.</td>
</tr>
<tr>
<td>Recommend for release</td>
<td>Do not complete this section until after the final PEQ inspection—release procedures are covered in Description of Postentry Quarantine Material Release Procedures on page 5-1</td>
</tr>
<tr>
<td>Released from detention</td>
<td>Do not write in this section of the report</td>
</tr>
</tbody>
</table>
Use the following criteria when releasing healthy PEQ material from quarantine:

1. State inspector completes a final inspection (record on the back of PPQ Form 236, copies 4 and 5, the number of plants remaining).
2. Final inspection should report “no quarantine-significant pests found.”
3. State inspector completes copies 4 and 5 of PPQ Form 236. Once the copies are completed, the State inspector gives the copies to his or her supervisor. The State supervisor reviews and signs both copies of the completed form. The State then forwards the completed and signed copies to the PEQLO. (See PPQ Form 236, Notice of Shipment and Report of Imported Plants to be Grown Under Postentry Quarantine on page F-3.) If the State Department of Agriculture does not want to have a copy of the PPQ 236 signed by the Coordinator, Postentry Quarantine Program, one copy should be forwarded to the PEQLO and the other destroyed.
4. PEQLO reviews copies 4 and 5 of PPQ Form 236 received from the State. If the PEQLO concurs with the State, the officer recommends release and writes on or stamps copies 4, 5, and 6 (copy 6 only if the PEQLO accompanied the State Inspector on one or both of the inspections) with “Recommend Release” and signs all three copies. The three copies of the signed form (4, 5, and 6) are forwarded to the PEQP. (See PPQ Form 236, Notice of Shipment and Report of Imported Plants to be Grown Under Postentry Quarantine on page F-3.)
5. Completed PPQ Form 236 **must** be reviewed and signed by the Coordinator for the Postentry Quarantine Program. Mail or email scanned copies to the following address:

Anthony Man-Son-Hing  
National Coordinator, Postentry Quarantine Program  
USDA–APHIS–PPQ–Field Operations  
920 Main Campus Drive, Suite 200  
Raleigh, NC 27606  
Phone: 919-855-7331  
Cell: 919-337-6338  
FAX: 919-855-7393  
email: Anthony.Man-Son-Hing@usda.gov

**NOTICE**

It is very important that all copies of PPQ Form 236 be removed from both the State and PEQLO’s files when a shipment is recommended for release.

6. Importer receives a formal release notice (PPQ Form 569) from the PEQP. (Copies are sent to State and PEQLO.)

**NOTICE**

PEQ material **must not** be sold until the release process is complete.

**NOTICE**

If State inspectors hold/quarantine PEQ material beyond the normal detention period for further observation or final treatments, etc., the PEQLO and the PEQP should be notified.
Chapter 6

Responsibilities of State and Federal Inspectors

Contents

Overview 6-1
Liaison Officer Responsibilities 6-1
State Inspector Responsibilities 6-2

Overview

The PEQ program is a cooperative Federal–State undertaking. By agreement, State inspectors who have specialized training do field inspections of PEQ material. (Generally, State inspectors are more knowledgeable about local growing conditions and circumstances and have a working relationship with the importers.) Federal officers provide support and administrative roles.

Liaison Officer Responsibilities

◆ Assist State inspectors in difficult matters especially with regard to inspections, interceptions, PEQ material disposal, and violations
◆ Assist State inspectors with inspections of PEQ material when State inspectors are sporadically unable to perform this function
◆ Assist State inspectors when extending quarantine periods due to signs, symptoms, or pest infestations found during final inspections
◆ Concur or deny requests for PEQ releases sent by State inspectors on behalf of importers; send approved requests to PEQU (inaccurate or incomplete PPQ Form 236s must be returned to the State officials for correction or completion)
◆ Maintain a file on all released PEQ material for a period of time established by the PEQU (the period is generally 2 years)
◆ Review all PEQ documents prepared by State and Headquarters Units and process according to established procedures
◆ Train and assist State inspectors in proper PEQ inspection procedures, distribute PEQ information and new manual parts to State inspectors, and maintain an active file on all material currently under PEQ quarantine
When delays in receiving permits occur, contact the following:

Head, Permit Unit  
USDA, APHIS, PPQ  
4700 River Road, Unit 136  
Riverdale, Maryland 20737

When delays occur with regard to inspections or other difficulties, contact the following:

Anthony Man-Son-Hing  
National Coordinator, Postentry Quarantine Program  
USDA–APHIS–PPQ–Field Operations  
920 Main Campus Drive, Suite 200  
Raleigh, NC 27606  
Tel: 919-855-7331  
Cell: 919-337-6338  
Fax: 919-855-7393

State Inspector Responsibilities

◆ Conduct all PEQ inspections according to established guidelines, guidelines are found in this manual and in M 319.37-19, and is also available from the PEQLO and PPQ

◆ Conduct the PEQ site inspection; if a new growing site is approved for an existing permit, the State PEQ official should forward the new PPQ Form 546 to the Permit Unit in Riverdale, Maryland, however, attach a note stating that PPQ Form 546 is revising the former permit—including the permit number

◆ Document and report importer violations to PEQLO

◆ Extend quarantine periods according to PPQ direction when signs, symptoms, or pests are present during the final PEQ inspection or when a shipment is commingled with a later-arriving shipment

◆ Forward PPQ forms to the State supervisor who will send the forms to the PEQLO for final review and processing, this includes denials of requests for growing sites

◆ If you receive an improperly completed PPQ Form 236 from the PIS, contact the PEQ Coordinator

◆ Instruct all importers in proper PEQ material handling procedures

◆ Maintain an active file on all material currently under PEQ quarantine

◆ Seek assistance and training from PEQLO especially in difficult matters dealing with inspections, interceptions, PEQ material disposal, and violations
Submit unidentifiable pest specimens and disease samples to local identifier authorities. If the local identifier is unable to identify the specimen submitted, forward the specimen to the PEQU for identification.
List of Circulars

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Circulars  7-1

Introduction

Use this chapter as well as chapters 8, 9, and 10 as job aides to identify plant diseases. Disease and Pathogenic Organism Circulars on page 10-1 describes diseases that are either common, quarantine significant, or both. Additional circulars will be added to this manual periodically. See Alphabetical List of Diseases on page 8-1 for an alphabetized list of diseases and see Diseases and Pathogens of Concern on page 9-1 for a list of diseases not included in chapter 10.

Circulars

Circular 1: Diseases of Abelmoschus spp., Althaea spp., and Hibiscus spp.

◆ Bhendi Yellow Vein-Mosaic Agent (Federal Quarantine Significant) on page 10-2
◆ Cotton Anthocyanosis Agent (Federal Quarantine Significant) on page 10-4
◆ Cotton Curliness on Hibiscus on page 10-5
◆ Cotton Leaf Curl Agent (Federal Quarantine Significant) on page 10-5
◆ Hibiscus Leaf Curl Agent on Hibiscus (Federal Quarantine Significant) on page 10-8
◆ Okra Mosaic Virus (Federal Quarantine Significant) on page 10-8
◆ Okra Yellow Leaf Curl Agent (Federal Quarantine Significant) on page 10-8

Circular 2: Diseases of Acacia spp.

◆ Acacia Rust (Federal Quarantine Significant) on page 10-8
Circular 3: Diseases of Acer spp.
◆ Maple (Acer) Leaf Spot (Federal Quarantine Significant) on page 10-9
◆ Maple (Acer) Variegation Agent (Federal Quarantine Significant) on page 10-10
◆ Xanthomonas acernea (Federal Quarantine Significant) on page 10-11

Circular 4: Diseases of Actinidia spp.
◆ Actinidia Rust (Federal Quarantine Significant) on page 10-11
◆ Pseudomonas syringae pv. actinidiae (bacterial canker of kiwi fruit) on page 10-13

Circular 5: Diseases of Aesculus spp.
◆ (Aesculus) Horse Chestnut-Variegation Virus (Federal Quarantine Significant) on page 10-14

Circular 6: Diseases of Anacardium spp.
◆ Xanthomonas campestris pv. mangiferaeindicae on page 10-16

Circular 7: Diseases of Berberis spp., X Mahoberberis spp., and Mahonia spp.
◆ Black Stem Rust (Federal Quarantine Significant) on page 10-17

Circular 8: Diseases of Blighia spp.
◆ Okra Mosaic Virus (Federal Quarantine Significant) on page 10-8

Circular 9: Diseases of Bromeliaceae spp.
◆ Bromeliaceae on page 10-19

Circular 10: Diseases of Brugmansia spp. and Datura spp.
◆ Colombian Datura Virus (Federal Quarantine Significant) on page 10-19
◆ Datura Shoestring Virus on page 10-20

Circular 11: Diseases of Carica spp.
◆ Papaya (Carica) Leaf Reduction Virus on page 10-21

Circular 12: Diseases of Cedrus spp.
◆ Douglas Fir Canker (Federal Quarantine Significant) on page 10-22

Circular 13: Diseases of Chrysanthemum spp. (Dendranthema), Leucanthemella serotina, and Nipponanthemum nipponicum
◆ Chrysanthemum White Rust (Federal Quarantine Significant) on page 10-25
Circular 14: Diseases of Corylus spp.
- Apple Proliferation Phytoplasma (Federal Quarantine Significant) on page 10-28
- Filbert (Corylus) Blight on page 10-34

Circular 15: Diseases of Crataegus spp.
- Crataegus monogyna and Mespilus germanica on page 10-36

Circular 16: Diseases of Crocosmia spp.
- Gladiolus Rust (Federal Quarantine Significant) on page 10-36
- Uredo gladioli-buettneri (Federal Quarantine Significant) on page 10-42

Circular 17: Diseases of Dianthus spp.
- Carnation Wilt on page 10-43
- Dianthus Virus Diseases on page 10-44
- Leaf Rot of Carnation on page 10-48

Circular 18: Diseases of Dimocarpus spp.
- Witches’ Broom on page 10-49

Circular 19: Diseases of Diospyros spp.
- Circular Leaf Spot of Oriental or Japanese Persimmon on page 10-51

Circular 20: Diseases of Eucalyptus spp.
- Pestalotia disseminata (Federal Quarantine Significant) and Leaf Chlorosis Virus on page 10-51

Circular 21: Diseases of Euonymus spp.
- Euonymus Mosaic (Euonymus-Variegation) Agent (Federal Quarantine Significant) on page 10-52

Circular 22: Diseases of Fraxinus spp.
- Ash Canker Disease (Federal Quarantine Significant) on page 10-53
- Fraxinus Other Virus Reports on page 10-56
- Fraxinus Variegation Virus on page 10-58

Circular 23: Diseases of Gladiolus spp.
- Gladiolus Rust (Federal Quarantine Significant) on page 10-36
- Puccinia gladioli [Castagne] (Federal Quarantine Significant) on page 10-58
- Puccinia mccleanii [Doidge] (Federal Quarantine Significant) on page 10-61
List of Circulars

Circular 24: Diseases of *Humulus* spp.
- Hop Nettlehead Strain of Arabis Mosaic Virus on page 10-64
- Verticillium Wilt on page 10-66

Circular 25: Diseases of *Hydrangea* spp.
- Hydrangea Rust (Federal Quarantine Significant) on page 10-67

Circular 26: Diseases of *Jasminum* spp.
- Bacterial Leaf Spot of Jasmine on page 10-69
- Chlorotic Ringspot, Phyllody, Yellow Ring Mosaic Disease (Federal Quarantine Significant) on page 10-69
- Jasmine Variegation Agent (Federal Quarantine Significant) on page 10-69
- Sampaquita Yellow Ringspot Mosaic Disease (Federal Quarantine Significant) on page 10-70

Circular 27: Diseases of *Juniperus* spp.
- Douglas Fir Canker (Federal Quarantine Significant) on page 10-22
- Juniper Pear Rust (Federal Quarantine Significant) on page 10-71
- Juniper Rust on page 10-72
- Needlecast Disease (Federal Quarantine Significant) on page 10-75

Circular 28: Diseases of *Larix* spp.
- Douglas Fir Canker (Federal Quarantine Significant) on page 10-22
- European Larch Canker (Federal Quarantine Significant) on page 10-76

Circular 29: Diseases of *Ligustrum* spp.
- Ligustrum Mosaic Agent (Federal Quarantine Significant) on page 10-76

Circular 30: Diseases of *Litchi* spp.
- Phytophthora litchii (Federal Quarantine Significant) on page 10-78
- Witches’ Broom on page 10-49
Circular 31: Diseases of *Malus* spp. and *Pyrus* spp.
- Apple Branch Canker on page 10-79
- Apple Canker on page 10-81
- Apple Mosaic Virus on page 10-82
- Apple Proliferation Phytoplasma (Federal Quarantine Significant) on page 10-85
- Chlorotic Leafspot Virus on page 10-85
- Rough Bark (Phomopsis Canker) (Federal Quarantine Significant) on page 10-86
- Rubbery Wood Phytoplasma (Federal Quarantine Significant) on page 10-88
- Valsa ceratosperma (*V. Mali*) (Federal Quarantine Significant) on page 10-88

Circular 32: Diseases of *Mangifera* spp.
- Ceratocystis manginecans (sudden decline of mango) on page 10-89
- Ceratocystis mangicola (*Sordariomycetes: Microascales*) on page 10-90
- Ceratocystis mangivora (*Sordariomycetes: Microascales*) on page 10-90
- Fusarium sterilihyphosum (Federal Quarantine Significant) on page 10-91
- Fusarium tpiense (*Sordariomycetes: Hypocreales*) on page 10-92
- Pseudofusicoccum stromaticum (*Dothideomycetes: Botryosphaeriales*) on page 10-93
- Xanthomonas campestris pv. mangiferaeindicar on page 10-93

Circular 33: Diseases of *Morus* spp.
- Mulberry Rust (Federal Quarantine Significant) on page 10-94
- Mulberry Mosaic Agent (Federal Quarantine Significant) on page 10-95

Circular 34: Diseases of *Olea* spp.
- Olive Latent Ringspot Virus on page 10-96
- Olive Partial Paralysis Virus on page 10-96
- Olive Sickle Leaf Virus on page 10-97

Circular 35: Diseases of *Passiflora* spp.
- Cucumber Mosaic Virus on page 10-98
- Passion Fruit (*Passiflora*) Mosaic Virus on page 10-100
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Circular 36: Diseases of *Philadelphus* spp.
- Elm Mottle Virus (Federal Quarantine Significant) on page 10-102

Circular 37: Diseases of *Picea* spp.
- Douglas Fir Canker (Federal Quarantine Significant) on page 10-22
- Rhododendron-Spruce Needle Rust *Chrysomyxa ledi* (Alb. & Schw.) by var. *rhododendri* (DC) Savile (Federal Quarantine Significant) on page 10-102
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Circular 38: Diseases of *Pinus* spp.
- Douglas Fir Canker (Federal Quarantine Significant) on page 10-22
- *Hemicycliophora dhanachandi* (Hemicycliophoridae) on page 10-104
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Circular 39: Diseases of *Populus* spp.
- Cytospora tritici (Soradariomycetes: Diaporthales) on page 10-107
- Poplar (Populus) Bacterial Canker (Federal Quarantine Significant) on page 10-108

Circular 40: Diseases of *Prunus* spp.
- Apple Proliferation Phytoplasma (Federal Quarantine Significant) on page 10-85
- European Rusty Mottle of Cherry (Federal Quarantine Significant) on page 10-109
- Plum Pox Virus (Federal Quarantine Significant) on page 10-110

Circular 41: Diseases of *Pseudolarix* spp.
- European Larch Canker (Federal Quarantine Significant) on page 10-76

Circular 42: Diseases of *Pseudostuga* spp.
- Douglas Fir Canker (Federal Quarantine Significant) on page 10-22

Circular 43: Diseases of *Punica* spp.
- Bacterial Blight on Pomegranate on page 10-115
- *Xiphinema granatum* (Longidoridae) on page 10-116

Circular 44: Diseases of *Quercus* spp.
- White Rot and an Undescribed Gall-Forming Rust (Federal Quarantine Significant) on page 10-117
Circular 45: Diseases of *Ribes* spp. (Grossularia)
- Black-Currant Reversion Agent (Federal Quarantine Significant) on page 10-117

Circular 46: Diseases of *Rosa* spp.
- Cytospora rosarum (Sordariomycetes: Diaporthales) on page 10-119
- Rose Wilt Agent (Federal Quarantine Significant) on page 10-120

Circular 47: Diseases of *Rubus* spp.
- Raspberry Leaf Blotch Virus (RLVB) on page 10-122
- Rubus Stunt Phytoplasma (Federal Quarantine Significant) on page 10-122

Circular 48: Diseases of *Salix* spp.
- Virus Chlorosis on page 10-127
- Watermark Disease (Federal Quarantine Significant) on page 10-127

Circular 49: Diseases of *Sorbus* spp.
- Leaf Distortion on page 10-130
- Mountain Ash Variegation Agent (Federal Quarantine Significant) on page 10-130
- Ringspot Mosaic of Sorbus on page 10-131

Circular 50: Diseases of *Syringa* spp.
- Elm Mottle Virus (Federal Quarantine Significant) on page 10-102

Circular 51: Diseases of *Ulmus* spp.
- Elm Mottle Virus (Federal Quarantine Significant) on page 10-102

Circular 52: Diseases of *Vaccinium* spp.
- Diaporthe australafricana (Sordariomycetes: Diaporthales) on page 10-132

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Diseases and Pathogens of Concern
On Postentry Genera With No Circulars

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Introduction

The following list of hosts and plant pathogenic organisms includes those for which there are no circulars.
**Abelmoschus spp. (okra)**

- Cotton anthocyanosis agent
- Okra mosaic virus
- Okra yellow leaf curl agent

**Blighia**

- Okra mosaic virus

**Bromeliaceae**

- *Puccinia pitcairniae* Lagh.
- *P. tillandsiae* Cummins & Pollack—in Florida
- *Uredo nidularii* P. Henn
- *Ustilago tillandsiae* Patterson

**NOTICE**

The family Bromeliaceae is on the list as postentry for Hawaii only.
Carya spp.

- Witches’ broom

Figure 9-1  Symptoms of witches’ broom on Carya spp.

Cedrus spp.

- *Fusarium fuliginosporum* Sibilia
Chaenomeles spp.

- Apple chlorotic leaf spot virus
- Apple ring spot agent
- Quince sooty ringspot agent
- Quince stunt agent—probably a complex disease caused by quince sooty ringspot agent and apple chlorotic leaf spot virus

Crataegus wattina

- Unknown agent

Figure 9-2 Symptoms of chlorotic ring and line pattern caused by an unknown agent on Crataegus wattina leaf
Crocosmia spp.

- *Uredo gladioli-buettneri* Bub.
- *Uromyces nyikensis* Syd. & P. Syd.

Cydonia spp.

- Quince sooty ringspot agent

Figure 9-3  *Cydonia* spp. with symptoms of quince sooty ringspot agent on quince C7/1 leaf; healthy leaf on left

- Quince stunt agent—probably a complex disease caused by quince sooty ringspot agent, apple chlorotic leaf spot virus, and quince yellow blotch agent
- Quince yellow blotch agent
Gladiolus spp.

- *Uredo gladioli-buettneri* Bub.
- *Uromyces nyikensis* Syd. & P. Syd.

Hibiscus spp.

- Cotton anthocyanosis agent
- Hibiscus leaf curl agent
Humulus spp.

- Unknown virus

![Figure 9-5 Symptoms of streaking on leaves caused by virus on Humulus spp.](image)

Jasminum spp.

- Chlorotic ringspot yellow ring mosaic disease
- Sampaquita yellow ringspot mosaic disease

Juglans regia

- Cherry leaf roll virus—a disease of concern on Prunus spp.
Figure 9-6  Chrome yellow mottle symptoms caused by cherry leaf roll virus on *Juglans regia* foliage

Figure 9-7  *Juglans regia* foliage showing chlorotic ring patterns, a symptom caused by cherry leaf roll virus
**Larix spp.**

- *Lachnellula willkommii* (Harteg) Dennis

**Malus spp.**

- Apple ring spot agent
- Apple chlorotic leaf spot virus (= plum bark split strain of apple chlorotic leaf spot virus)
- Apple green crinkle agent
- Apple chat fruit agent

**Morus spp.**

- Mulberry dwarf phytoplasma (witches’ broom)

**Philadelphus spp.**

- Elm mottle virus

**Picea spp.**

- *Chrysomyxa ledi* (deBary) var. *rhododendri* (deBary) Savile—reported in the U.S. on Rhododendron

**Pinus spp.**

- *Cronartium ribicola* J.C. Fischer

**Prunus spp.**

- Arabis mosaic virus
- Cherry leaf roll virus
- European stone fruit yellows phytoplasma
- Plum bark split strain of apple chlorotic leaf spot virus (= apple chlorotic leaf spot virus)
- Raspberry ringspot virus
- Strawberry latent ringspot virus
- Tomato blackring virus
Diseases and Pathogens of Concern
Pseudolarix spp.

**Pseudolarix spp.**
- *Lachnellula willkommii* (Harteg) Dennis

**Pyrus spp.**
- Apple ring spot agent (RPP33:731)
- Pear blister canker viroid (RPP39:596)
- Pear bud drop agent (RPP41:466 and RPP45:753o)

**Salix spp.**
- *Erwinia salicis* (Day) Chester

**Syringa spp.**
- Elm mottle virus

**Ulmus spp.**
- Elm mottle virus

**Watsonia spp.**
- *Uredo gladioli-buettneri* Bub.
- *Uromyces nyikensis* Syd. & P. Syd.
Chapter 10

Disease and Pathogenic Organism Circulars

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- Cotton leaf curl agent (federal quarantine significant) 10-5
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- Okra yellow leaf curl agent (federal quarantine significant) 10-8

**Bhendi Yellow Vein-Mosaic Agent (Federal Quarantine Significant)**

**Synonyms**
*Ochrovena hibiscae* Capoor, Hibiscus yellow vein-mosaic virus
Hosts

Distribution
Bangladesh, India, and Sri Lanka

Symptoms
Alcea rosea. There is faint vein-clearing of the young leaves followed by swelling of the veins at several points of the undersides of the leaves. The vein swelling gradually extends to nearly all veins which become thickened and gnarled as the leaf grows. The thickened veins are a deep green in color and appear opaque when seen against the light.

A description of the symptoms on shrubby forms of Hibiscus has not been found. They would probably be, in part, similar to those on okra (Abelmoschus esculentus) which follows.

A. esculentus
The first symptom is clearing of the small veins, and then of the larger ones, the ill-defined, yellowish-green to pale yellow areas later extending into the mesophyll. In severely diseased plants, the young leaves develop generalized chlorosis rather than a mosaic pattern. All growth produced after infection is stunted. The leaves are undersized and the petioles are short. Flowering is sparse and few fruits are formed. Most of the leaves on a diseased plant develop thickening of the veins on the lower side but no foliar growths or enations are formed.

Transmission
The white fly, Bemisia tabaci Genn. (B. gossypiperda Misra and Lamba); by grafting.
Figure 10-1 Example of virus-infected *Hibiscus* spp.; NOT Yellow-Vein Virus, but when such as this is found, it should be submitted for identification

**References**


**Cotton Anthocyanosis Agent (Federal Quarantine Significant)**

In progress.
Cotton Curliness on Hibiscus

Synonyms
Gossypium virus 2

Hosts
Gossypium hirsutum L., G. maritima, G. vitifolium Lam. and probably other Gossypium species., Hibiscus cannabinus L., and Solanum dulcamara L.

Vectors
Aphis gossypii, A. laburni, Epitretranychus althaea, and Myzus persicae

Distribution
Azerbaijan and Russia (Siberia)

Symptoms
The symptoms are similar to those of cotton leaf curl, except in the following particulars:

- Enations are absent
- Hosts include S. dulcamara, a plant outside the family Malvaceae
- Reduced vein thickening
- Varieties showing resistance are not the same
- Vectors are different

References

Cotton Leaf Curl Agent (Federal Quarantine Significant)

Synonyms
Gossypium virus 1 and Ruga gossypii Holmes

Hosts
Abelmoschus esculentus (L.) Moench (Hibiscus esculentus L.), Althaea rosea L. Cav., (Althaea rosea Cav.), Gossypium barbadense L. (G. vitifolium), G. barbadense L. (G. peruvianum Cav. & G. vitifolium Lam.), G. somalense (Gürke) J. B. Hutch., Hibiscus cannabinus L., H. sabdariffa L. and Malvaviscus arboreus Cav. There is evidence that Sida alba L. and S. cordifolia L. may also be hosts.
Vectors
The white flies, *Bemisia tabaci* (Gennadius) (*B. gossypiperda* M. & L.) and *B. goldingi*.

Distribution
Africa

Symptoms
*Gossypium.* On *G. barbadense*, which includes Sea Island cotton and Egyptian cotton including Sakel, the disease is most severe and takes somewhat different forms than on *G. hirsutum*, commonly called American cotton.

Severely infected Sakel plants exhibit a characteristic twisted appearance, particularly in the petioles and fruiting branches. The plants tend to become abnormally tall with elongated and irregularly curved internodes. In extreme cases there may be practically no lateral growth on the upper parts, accompanied with bud shedding. Occasionally, however, severe infection gives rise to stunting rather than elongation of the plant. Curiously, this stunted expression of the disease is characteristic of its expression on certain varieties of American cotton. These show shortened internodes and a bunchy-top type of growth.

Sterility may be caused in infected plants as a result of suppression of the buds or their death soon after formation.

American cotton, is somewhat resistant to leaf curl and shows more variety in its symptoms. Some varieties develop a typical leaf curling with or without small enations, others a leaf mosaic, and yet others both types of symptoms.

The mosaic type of cotton leaf curl begins as a clearing of the veins. The chlorotic areas increase in size and frequently appear all over the leaf surface with a tendency to concentrate along the main veins, or they may be few and concentrated in certain areas of the leaf. They are most prominent on the upper surface and vary in color from pale green to light yellow to nearly white. In some instances, the whole leaf may appear yellow with puckered margins. The uneven distribution may result in asymmetrical growth and distortion.

Leaf curl and crinkle symptoms (on *G. barbadense*) first appear as isolated local thickenings of the veins, which are darker green or more opaque than normal veins. This symptom is best seen on the underside of the leaf viewed by transmitted light. As more and more of the veins are involved, they become thickened and appear gnarled and abnormally prominent. The margins of the leaf then curl upward or, less frequently, downward. In extreme cases enations develop on the veins on the lower surface of the leaf. These are cup-like or expanded pads of tissue that may attain a diameter up to one half of an inch.
The upper side of the leaf departs less from the norm. It may show a wrinkled appearance due to a slight sinking of the veins, and of course, it is affected by any curling of the margins. Similar symptoms may appear on the bracts and, in a reduced form, on the corolla.

_Alcea rosea_ plants often have strongly thickened veins and curl considerably in the later stages.

_Hibiscus esculentus_ plants have leaves showing conspicuous net-vein thickening with small inconspicuous enations. Curling may or may not be present.

The disease does little damage to _Malvaviscus arboreus_ plants. A small amount of vein thickening and leaf curling occurs.

On _Sida_ there may be a slight amount of thickening (presumably of the veins). Occasionally there is leaf curling.

Most of the information presented is taken from Tarr's monograph.

**NOTICE**

Laird and Dickson report the disease, leaf crumple virus, of cotton described in California is very similar to cotton leaf curl virus and may prove to be a strain of this disease.

**References**

Circular 2: Diseases of Acacia spp.


Hibiscus Leaf Curl Agent on Hibiscus (Federal Quarantine Significant)
In progress.

Okra Mosaic Virus (Federal Quarantine Significant)
In progress.

Okra Yellow Leaf Curl Agent (Federal Quarantine Significant)
In progress.

Circular 2: Diseases of Acacia spp.

◆ Acacia rust (federal quarantine significant) 10-8

Acacia Rust (Federal Quarantine Significant)
August 2005

Causal Organism
Uromycladium tepperianum (Sacc.) McAlpine

Synonyms
Uromyces tepperianus Sacc.

Hosts
Acacia spp., Albizia spp., and Racosperma spp.

Distribution
Australia, Java, New Caledonia, New Zealand, Papua New Guinea, and South Africa

Symptoms
Spermogonia. Spermogonia are minute, brownish becoming black, globose and 150 µm in diameter.
**Telia.** Telia develop on galls on leaves, branches, inflorescences and fruits. Infection causes swollen distorted galls up to 18 x 6 cm and witches’ brooms of different shapes and sizes. The telia are cinnamon to chocolate brown in color and powdery in appearance.

**Description**

**Spermatia.** Spermatia are hyaline and ellipsoid.

**Teliospores.** Teliospores are composed of a cluster of three probasidial cells at the top of a single pedicel, depressed globose to globose. They are cinnamon brown in color, thickly vertically striate, margin is crenulate with the wall 2 to 3 µm at the apex. They are 14 to 22 µm high and 18 to 25 µm wide with one apical germ pore. The pedicel is hyaline, septate, and deciduous.

**Notes**

Aecia and uredinia are unknown.

**References**


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### Circular 3: Diseases of Acer spp.

- Maple (*Acer*) leaf spot (federal quarantine significant) 10-9
- Maple (*Acer*) variegation agent (federal quarantine significant) 10-10
- *Xanthomonas acernea* (federal quarantine significant) 10-11

**Maple (Acer) Leaf Spot (Federal Quarantine Significant)**

Revised Sept. 1987; restructured Feb. 1996

**Causal Organism**

*Xanthomonas acernea* Owaga Burk

**Synonym**

*Pseudomonas acernea* Owaga

**Hosts**

*Acer buergeranum* (*Acer trifidum*) Hook & Arn. (and by inoculation 13 other *Acer* spp., *Aesculus turbinata* Blume, and *Koelreuteria paniculata* Laxm)

**Distribution**

Japan
**Symptoms**
The leaves show irregular, water soaked, later pale gray or black spotting, and finally turn black and shrivel.

**Characters**
Non-spore forming rod, 0.5 to 1 x 2-.6 µm (.8 x.4), and aerobic, uniflagellate, gram and aniline positive (?), liquefying gelatin, clearing milk *not* coagulating it, producing some acid, no gas from six sugars and glycerine, reducing nitrates and forming Hs. Colonies first round smooth, white, margin entire turning citron yellow in 2 days at 32 °C. Thermal death point 59 °C.

**References**

**Maple (Acer) Variegation Agent (Federal Quarantine Significant)**

**Hosts**
*Acer negundo* L. *A. pseudoplatanus* L. *A. rufinerve* Sieb. & Zucc.

**Distribution**
Europe and Japan

A similar disease from Italy was reported by Goldanich (1954) affecting a number of *Acer negundo* trees. The leaf mottling varied from small dots to star-shaped spots that at times became confluent.

There is also a report from Czechia by Smolak that mosaic and leaf deformation of *Acer pseudoplatanus* and *A. negundo* is present in a park in Podebrady.

**Symptoms**
“Yellow variegation of the leaves” (Brierley 1944). “Characterized by mottled leaves, peppered with very small, more or less round, light green spots. On some plants the spots were smaller than 1.5 mm in diameter and so numerous that they were difficult to distinguish and give a chlorotic appearance to the plants. On other plants at least some of the spots attain approximately 3 mm in diameter.” (Atanasoff 1935).
A disease of *Acer rubrum* caused by the peach rosette virus was reported in Georgia in 1960 (Knight, K.G. P.D.R. 44:220). Thirty infected trees were noted in 1953 and by 1959, all had died. The trees were characterized by being stunted, having dense green foliage in the spring that turned reddish in the summer and yellowish before the tree’s death.

**Transmission**
By budding and grafting

**Properties**
Not determined

**References**
2. Brierley, P. 1944. Viruses described primarily on ornamental or miscellaneous plants. P.D.R. Suppl. 150:145; 150; 184-85; 414; 436-37; 437; 448-49; 475.
5. CFR 319.37§2.

*Xanthomonas acernea* (Federal Quarantine Significant)
In progress.

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**Circular 4: Diseases of *Actinidia* spp.**

- *Actinidia* rust (federal quarantine significant) 10-11
- *Pseudomonas syringae* pv. *actinidiae* (bacterial canker of kiwi fruit) 10-13

**Actinidia Rust (Federal Quarantine Significant)**
October 2005

**Causal Organism**
*Pucciniastrum actinidiae* Hirats.f

**Synonyms**
None
Hosts
Actinidia spp.

Distribution
People’s Republic of China, Japan, and Taiwan

Symptoms
Uredinia. are located on the lower leaf surface scattered or grouped on yellow or yellowish brown, discolored areas, sometimes thickly scattered over the whole surface of the leaf. They are round, minute, 0.08-0.2 mm across, located under the epidermis, and open when mature by a central pore. They are pale yellow in color.

Telia. are located on the lower surface of the leaf and are under the epidermis in dense clusters limited by the leaf veins. They are often spread over the whole leaf surface and are yellowish brown to brown in color.

Description
Urediniospores. are obovate, ellipsoid or oblong, 18 to 27 x 12 to 16 µm, walls 1.5 to 2 µm thick, minutely echinulate, and subhyaline, with germ pores 7 to 10 µm mostly scattered and obscure.

Teliospores. are intercellular, subglobose, oblong or cuneiform, laterally adherent. They are divided by 2 to 8 (mostly 4) vertical or oblique septa, 20 to 30 µm high, 17 to 18 µm across with walls uniformly thin, smooth, and pale yellow.

Notes
The spermagonial and aecial stages of this rust are unknown.

References
**Pseudomonas syringae pv. actinidiae** (bacterial canker of kiwi fruit)

**Causal Organism**
*Pseudomonas syringae pv. actinidiae*

**Synonyms**
None

**Hosts**
*Actinidia* spp.

**Distribution**
Italy, China, Japan, Korea, Republic of

**Symptoms**
Disease characterized by cankers on kiwi fruit

**Distribution**
In spring and early summer, the pathogen develops in expanding shoots and leaves. Small cankers develop on extending vines and leaves develop angular leaf spots surrounded by chlorotic haloes. In winter and early spring, extending cankers form on trunks and branches.

**Transmission**
Like all pathovars of *P. syringae*, *P. syringae pv. actinidiae* is present in infected plant material and, therefore, is usually introduced into new regions in nursery material. The pathogen can be dispersed in aerosols and can be carried between trees and adjacent orchards in wind-driven rain. As a wound-infecting pathogen, it can also be transmitted on orchard equipment such as pruning implements. Data is lacking on the epidemiology of the disease. It is suspected that it is spread by heavy rainfalls, strong winds, animals, and humans. Over long distances, trade of infected planting material can spread the disease. However, infected fruits cannot be totally excluded but seem very unlikely.

**Notes**
Propagative material of Actinidia spp., except seeds, are currently prohibited from Japan and Taiwan due to a rust (*Pucciniastrum actinidiae* Hiratusuka), and are under postentry quarantine from all other countries except Canada, Australia, and New Zealand.

**References**
Circular 5: Diseases of Aesculus spp.

- (Aesculus) Horse chestnut-variegation virus (federal quarantine significant) 10-14

(Aesculus) Horse Chestnut-Variegation Virus (Federal Quarantine Significant)
Revised and restructured Feb. 1996

Synonyms
None

Host
Aesculus hippocastanum Linn.

Distribution
Czechia, Germany, Romania, Slovakia, and the United Kingdom of Great Britain and Northern Ireland

Symptoms
Yellow-leaf variegation House (5) wrote, “A tree of rich golden foliage which far surpassed anything of the sort I have seen for richness of effect and color.” Other records of this variegation deal with its transmission.

Transmission
By grafting and budding, infection may occur following budding even when the bud fails to grow. In the experiment reported by House (5) the variegation passed upward in the stock, but not downward.
Figure 10-2  *Aesculus hippocastanum* (horse chestnut) tree; virus causes a general yellow appearance

Figure 10-3  *Aesculus hippocastanum* (horse chestnut); leaf with banding pattern, a symptom of Yellow Oak Leaf Vein Virus

References


4. Brierley, P. 1944. Viruses described primarily on ornamental or miscellaneous plants. P.D.R. Suppl. 150:145; 150; 184-85; 414; 436-37; 437; 448-49; 475.


Circular 6: Diseases of Anacardium spp.

◆ Xanthomonas campestris pv. mangiferaeindicae 10-16

**Xanthomonas campestris pv. mangiferaeindicae**

June 2011

**Causal Organism**

*Xanthomonas campestris pv. mangiferaeindicae* (Gammaproteobacteria: Xanthomonadales)

**Synonyms**

*X. citri* pv. mangiferaeindicae

**Host**

*Mangifera indica* (mango) and *Anacardium occidentale* (cashew)

**Notes**

*Xanthomonas campestris pv. mangiferaeindicae* is an economically important pathogen of mango and *Anacardium occidentale* (cashew) and is reportable in the PEST ID database

**Symptoms**

Raised, angular, black lesions

**Distribution**

Africa, Asia, Australia, Brazil, Burkina Faso, and New Zealand

**References**

Circular 7: Diseases of Berberis spp., X Mahoberberis spp., and Mahonia spp.

◆ Black stem rust (Federal quarantine significant) 10-17

Black Stem Rust (Federal Quarantine Significant)

Causal Organism
Puccinia graminis Pers.

The black stem rust quarantine requires that nurseries that ship immune or resistant species of Berberis, Mahonia, or Mahoberberis into protected states must contain no susceptible species of these genera. The postentry detention of Berberis, Mahonia, and Mahoberberis is to facilitate determining whether introduced plants are true to name and immune or resistant to P. graminis.

We are concerned with enforcing postentry regulations on black stem rust at the pycnial and aecial stages of the rust organism, which is its only expression on Berberis, Mahonia, and Mahoberberis. Discussion of the uredial and telial stages is, therefore, omitted. Descriptions of these may be found in any general text on plant diseases or the rust fungi.

Synonyms
(Listed by Arthur (1934); others may be found in Sydow Lycoperdon poculiforme Jacq., L. lineare Schr., Aecidium berberidis Pers., Puccinia linearis Rohl., P. poculiformis Wettst., Diacoma poculiforme Ktze.

Hosts
Pycnial and aecial stages are on Berberis spp. (except B. thunbergii and its varieties) and Mahonia.

Uredial and telial stages, according to Arthur (1934), are on at least 108 species of Gramineae including wheat, rye, and barley.

Distribution
Cosmopolitan following the distribution of its host plants

The pycnial and aecial stages are very rare in the southern states. Stakman et al. (1918) have shown that this is due to the lack of viable teliospores in the spring.

Symptoms
On Berberis, Mahonia, and Mahoberberis (after Heald with amendments from Arthur (1920))
**Pycnial.** The rust appears first on the upper surface of the leaf as a small, circular, yellowish spot that increases in size to 2 to 5 mm or slightly larger. The affected tissue is swollen, becomes margined with a brighter yellow or reddish-purple color, and shows a central cluster of minute, honey-colored pustules on the upper surface (later turning brownish or nearly black) from which droplets of pycnial nectar ooze. The pustules (pycnia) are 90 to 110 µm in diameter and bear ostiolar filaments 30 to 60 µm long.

**Aecial.** (After Arthur (1920)) Aecidia on leaves, stems, and fruits, on the underside of the leaves in crowded, circular groups 1 to 6 mm across, on discolored, slightly thickened spots, cupulate or cylindric 0.2 to 0.3 mm in diameter, sometimes 2 mm long, but usually much shorter, wall colorless, the margin erose (toothed) slightly recurved; peridial cells oblong 16 to 23 x 19 to 26 µm, the outer wall thick 10 to 12 µm, smooth and transversely striate, the inner wall 2 to 4 µm thick, moderately verrucose, squarely abutted; aeciospores angular, globose or oblong 15 to 19 x 16 to 23 µm; wall colorless, 1 to 1.5 µm thick, considerably thicker above, 5 to 9 µm, finely and closely verrucose appearing smooth when wet.

**References**


Circular 8: Diseases of *Blighia* spp.

◆ Okra mosaic virus (federal quarantine significant) 10-8

Circular 9: Diseases of *Bromeliaceae* spp.

◆ Bromeliaceae 10-19

**Bromeliaceae**

The restriction on Bromeliads applies only to Hawaii. It is a precautionary measure to protect Hawaii from the possible introduction of injurious pests of Bromeliads, particularly, *Ananas sativus* Schult., the pineapple. The latter is a major crop of the islands.

Circular 10: Diseases of *Brugmansia* spp. and *Datura* spp.

◆ Columbian Datura virus (federal quarantine significant) 10-19

◆ Datura shoestring virus 10-20

**Colombian Datura Virus (Federal Quarantine Significant)**

May 6, 1974; restructured Mar. 1996

Brugmansia and Datura are reservoirs for many viruses that attack plants belonging to the family Solanaceae. Some of the viruses may be latent, inciting no symptoms in Datura, while others will show a wide range of symptoms in leaves such as chlorosis, mosaic, twisting, vein-clearing, curling, rugosity, and necrosis. There may also be various other abnormalities as shoot proliferation, stunted flowers, and stunted plants. Consequently, it might be difficult to associate a virus-like symptom with a virus common name without considerable testing.

**Synonyms**

None
Hosts

*Brugmansia X candida* Pers. (*D. candida*) & var. 'Culebra', *B. sanguinea* (Ruiz & Pav.) D. Don (*D. Sanguinea*), and probably other species of arborescent Datura. Virus symptoms were experimentally produced on several indicator plants.

Distribution

Colombia

Symptoms

Kahn and Bartels (1968) report that Datura plants show vein-banding or chlorotic flecking on expanded leaves followed by mottling. Either the leaves become rugose and slightly distorted or the plants recover. When the plants recover, symptoms often reappear on new growth.

Description

The virus particle is a flexuous rod in the Potato virus Y group, around 720 mille microns.

Transmission

The virus is transmitted mechanically, i.e., plants touching one another or a person touching an infected plant and then a noninfected one.

Vector

The green peach aphid, *Myzus persicae* Sulzer.

Reference


**Datura Shoestring Virus**

May 6, 1974; restructured Mar. 1996

Brugmansia and Datura are reservoirs for many viruses that attack plants belonging to the family Solanaceae. Some of the viruses may be latent, inciting no symptoms in Datura, while others will show a wide range of symptoms in leaves such as chlorosis, mosaic, twisting, vein-clearing, curling, rugosity, and necrosis. There may also be various other abnormalities as shoot proliferation, stunted flowers, and stunted plants. Consequently, it might be difficult to associate a virus-like symptom with a virus common name without considerable testing.

Synonyms

None
Hosts

Distribution
India

Symptoms
According to the report by Giri and Agrawal (1971), Datura leaves develop mosaic and severe blistering, while new leaves show distortion and deformation and are reduced to shoestring-like structures. The plants become severely stunted.

The symptoms on *Nicotiana glutinosa* are similar to Datura, but less severe. When the leaves of *N. tabacum* white burley are inoculated with the virus, they develop local chlorotic lesions, that spread and become necrotic; and the plants die within 3 to 5 days. The inoculated leaves of *N. rustica* show veinal necrosis, mottle, and necrotic spots; the stems become necrotic and the leaves start falling and the plant collapses.

Transmission
Mechanically transmissible

References

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**Circular 11: Diseases of *Carica* spp.**

- Papaya (*Carica*) leaf reduction virus 10-21

**Papaya (Carica) Leaf Reduction Virus**

Synonyms
None

Hosts
*Carica papaya* L.

Distribution
India
Symptoms
Singh (1969) reports that the first symptom of the disease is vein-clearing of the young leaves, followed by translucent areas developing and adjoining the veins, and by the lamina puckering. The raised areas are dark green in color. The subsequently developed leaves are deformed and reduced in size, and show pronounced distortion. In extreme cases, the entire leaf is reduced to a thread-like appearance at the top of the plant, which is characteristic of the disease. Infected plants are very much stunted and latex flow is reduced.

Older leaves on a diseased plant turn brown and fall off, and the entire stem becomes denuded, with only a small cluster of thread-like leaves at the top (Singh 1969).

Jensen (1949) and Singh (1969) refer to numerous papaya virus diseases from at least 15 countries, including, in the U.S., Florida, Hawaii, and Puerto Rico. Although some of the symptoms are like those of PLRB, these viruses appear to be distinct from the virus disease reported by Singh (1969).

Transmission
By sap

Vector
Myzus persicae (Sulzer)

References
Hosts


Distribution

Belgium, Czechia, Denmark, France, Germany, United Kingdom of Great Britain and Northern Ireland, Ireland, Italy, Netherlands, New Zealand, Norway, Slovakia, Sweden, Russia, and U.S. (Pacific Northwest)

Wicker recently reported finding *P. pseudotsugae* cankers on *Larix occidentalis* in the intermountain region of the Pacific Northwest.

Symptoms

Three distinct forms of injury have been recorded:

**Blighting of Terminal Shoots.** Terminal shoots blighting has been recorded on seedlings and young plants. The tips of the trunk and the branches are the usual points of invasion and these die back for a length of 10 to 16 in. The needles on the invaded parts first turn brownish-yellow, then become dry and fall. In the tender young tissues, invasion is direct, no wound is necessary. The fungus invades the cortex and cambium, but does not penetrate the wood. With the death of the cambium, growth of the infected part ceases, and as a result, there is, at the margin of the diseased tissue, a strong thickening of the cork cells. (For an illustration of this effect see *Phytopath* 19:986). Pycnidia develop abundantly especially near the base of the diseased part. The seedlings may wither away at once, or adventitious buds may commence growth only to be killed in turn. The disease tends to be concentrated in certain parts of the seed bed or nursery.

**Girdling of Branches and Trunks.** Girdling occurs at some intermediate point on the branch or trunk. The girdle seldom reaches a length of 6 inches. Above and below, the tissues continue to grow for a time, and especially above, develop a characteristic swelling. In the end, the parts above the girdled area die from lack of nourishment.
Cankers of Larger Trunks and Branches. Cankers may develop on the larger trunks and branches. On hosts that develop cankers, except Larix, these cankers may attain a size 6 x 7.5 in., but on Larix they reach 6.5 x 13.5 in. in area. If the cankers are numerous and fairly large, the tree may be killed. Isolated cankers may be healed over as the fungus is not perennial in the bark.

The above symptoms are those shown by Pseudotsuga. Boudru states that other hosts react somewhat differently to the disease: Abies show trunks and branches girdling; Tsuga show young leader withering; Cedrus show trunks and branches girdling and terminal bud blighting; and on Larix, only cankers are found usually following wounds caused by pruning or rodents. Larix cankers often exude an abundance of resin.

Wilson (1930) states that it is improbable that P. pseudotsugae will be found on imported Cedrus as it so far has not been found on trees under 20 years old.

Description

Phacidiopycnis pseudotsugae. Apothecia frequently associated with pycnidial locules, innate in the stroma, developing under, but not concrete with, the periderm, one or more ascocarpic areas in a stroma that become erumpent and occur in colonies on discolored areas of the trunk or branch, ascocarps discoid, black, carbonous, 0.25 to 1.0 mm in diameter, at first covered by a pulverulent, olivaceous, stromatic layer that becomes loosened in irregular lobes above the sporulating tissue and finally torn away. At maturity, the darkened hymenium is fully exposed; asci cylindric-club shaped, elongate-stalked, thin-walled, 8-spored, 80 to 135 x 8 to 12 µm; ascospores irregularly uniseriate, continuous, occasionally one or two septate, hyaline, guttulate, elliptic or elliptic-fusiform, ends obtuse or subacute, 10 to 18.8 x 2.8 to 6 µm; producing bud spores in the ascus, these are short, elliptic, or rod-shaped, continuous, hyaline, 3.4-4.8 x 1.0-1.6 µm; paraphyses very numerous, filamentous, septate, tips slightly swollen, simple or occasional branched near the apex, outranking the asci, greenish in mass, tips uniting forming a pale olivaceous epithecium; hypothecium shallow; free unbranched hyphae within the dark, pseudo-parenchymatous excipulum producing microspores comparable in size and shape to those in the asci, spores formed singly from individual hyphal cells on fine isthmi.

Phomopsis pseudotsugae. Pycnidia black, globose, solitary or in groups of 2 or 3, the cavity is divided into more or less completely formed locules, and is from 100 to 500 µm in diameter. At maturity, they become erumpent through small cracks in the bark. The conidia are hyaline, elliptical, fusoid, obtuse at both ends and measure 5.5 to 8.5 x 2.5 to 4 µm. They are extruded in whitish, often coiled cirrhi (threads).
References


Circular 13: Diseases of Chrysanthemum spp. (Dendranthema), Leucanthemella serotina, and Nipponanthemum nipponicum

◆ Chrysanthemum white rust (federal quarantine significant) 10-25

Chrysanthemum White Rust (Federal Quarantine Significant)
Revised and restructured Feb. 1996

Causal Organism
Puccinia horiana P. Henn

Hosts
Chrysanthemum spp. (Dendranthema), Leucanthemella serotina (L.) Tzvelev, and Nipponanthemum nipponicum (Franch. ex. Maxim) Matsuma

Distribution
Argentina, Brazil, Canary Islands, Chile, Colombia, Europe, Republic of South Africa, Uruguay, Venezuela, and all countries, territories, and possessions of countries located in part or entirely between 90° and 180° east longitude.

Symptoms
P. horiana produces large, white waxy spots on the undersurface of chrysanthemum leaves. It is much more dangerous to the chrysanthemum industry than P. chrysanthemi, the common chrysanthemum rust found in the United States, because it attacks new shoots early in the spring and the climatic factors favorable to the rapid spread of the organism are prevalent at this time of the year. (Kusano)
**Description**

The telial stage of the rust is the one encountered. Aecia and uredia are unknown. The disease spreads from plant to plant by means of sporidia produced by the teliospores.

According to Saccardo (1888) the teliospores are oblong-clavate with a broadened or obtuse to obtuse-pointed apex; base cuneate to applanate; slightly constricted at the septum, hyaline to yellowish, smooth. Spores range from 30 to 45 x 13 to 17 µm with a persistent, pale pedicel up to 40 µm long. Tai and Wei (1933), however, give teliospore sizes as 34 to 57 x 13 to 19 µm.

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**Figure 10-5** *Puccinia chrysanthemi* on *Chrysanthemum* spp.; orange to brown spots on lower leaf surface; common disease; submit specimens
Table 10-1 may serve as an aid in distinguishing between the common chrysanthemum rust and chrysanthemum white rust.

Table 10-1  Comparison of Chrysanthemum Rust and Chrysanthemum White Rust

<table>
<thead>
<tr>
<th>Species:</th>
<th>P. horiana:</th>
<th>P. chrysanthemi:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sori color</td>
<td>White to yellow</td>
<td>Chocolate brown</td>
</tr>
<tr>
<td>Uredospores</td>
<td>None</td>
<td>Commonly found</td>
</tr>
<tr>
<td>Teliospore size</td>
<td>34 to 57 x 13 to 19</td>
<td>34 to 57 x 18 to 28</td>
</tr>
</tbody>
</table>

NOTE: For signs see Figure 10-6 For signs see Figure 10-5

NOTICE

P. horiana is relatively fast moving and, under ideal greenhouse conditions, should appear, if present, within a few weeks. Hence, we believe that greenhouse-grown chrysanthemums regardless of the time of year, may be released after 6 months, if inspection at the end of that time reveals no sign of the rust. Greenhouse growing is required for postentry chrysanthemum growing (see Figure F-9).

P. horiana is favored by short day conditions and spreads rapidly under moist, overcrowded conditions. Investigations of the epidemiology of the disease in Japan showed that the optimum temperature for teliospore germination is between 13 °C to 22 °C. And the incubation period of the disease is 10 days.

References


Circular 14: Diseases of Corylus spp.

- Apple proliferation phytoplasma (federal quarantine significant) 10-28
- Filbert (Corylus) blight 10-34

**Apple Proliferation Phytoplasma (Federal Quarantine Significant)**

**Synonym**
Witches’ broom, rozet (rosette), brooming

**Time of Year to Inspect**
Anytime while in leaf

**Specific Symptoms**

**Hosts**
*Catharanthus roseus*, *Corylus* spp., *Cynodon dactylon*, *Malus domestica*, *Prunus avium*, *P. armeniaca*, *P. domestica* (these *Prunus* species are possible hosts of apple proliferation—further testing to confirm is necessary), and *Vitis vinifera*
Plant. Buds set in August and September start growing in the fall. Infected branches leave trunk at a more acute angle than do healthy branches. For symptoms of this possible infection of the apple proliferation phytoplasma on *Prunus* see Figure 10-7 and Figure 10-8.

![Figure 10-7 The wilting of cherry (possibly caused by apple proliferation phytoplasma)](image)

1 Photo reprinted with the permission of Dr. Natasa Mehle of the National Institute of Biology, Ljubljana, Slovenia.
Infected leaves are smaller, stipules enlarged. Color is usually yellowish-green or reddish. For the classic symptoms of enlarged stipules on *Malus* spp., see Figure 10-9 and Figure 10-10.

*Leaf.* Figure 10-8  Progresses to death of the tree (possibly caused by apple proliferation phytoplasma)

Figure 10-9  Enlarged stipules of an infected *Malus* plant
Branch/Trunk. Clusters of bushy shoots. Infectious agent stimulates axillary buds on young shoots. Short internodes are produced. For this disease on Prunus, see Figure 10-11.

Figure 10-10 Enlarged stipules of an infected Malus plant (left) compared to the regular-sized stipules on an uninfected plant (right)

Figure 10-11 The necrosis on cross-section of branches of cherry (possibly caused by apple proliferation phytoplasma)
**Fruits.** Reduced in size.

**Flowers.** Produced later in the season than on healthy plants. For this disease on *Prunus* flowers, see Figure 10-13.
Transmission
Grafting, root fusion, and the psyllids *Cacopsylla melanoneura* (Forster), & *Cacopsylla costalis* (Forster), and the leafhopper *Fieberiella florii* (Stal). Only the leafhopper occurs in North America.

Discussion
This disease reduces the production of marketable fruit by as much as 95% in Europe. Rosetting and shortening of internodes may also be caused by aphid or leaf hopper injury. The causal agent of this disease is not a virus, but a phytoplasma. Evidence of several different strains has been shown.

Distribution
Throughout Europe and in Turkey.

References


**Filbert (Corylus) Blight**
Revised and restructured Feb. 1996

**Causal Organism**
*Anisogramma anomala* (Peck) E. Muller

**Synonyms**
*Diatrype anomala* Peck

**Hosts**
*Corylus americana* Marsh. (Hazelnut), *Corylus avellana* L. (Filbert)
Distribution
Eastern United States and Pacific Northwest

Symptoms
Humphrey's (1893) description of the disease appears to be the most complete. “It appears in the form of protuberances with elliptical bases that burst the bark and arise rather thickly from the affected portion of the branch, which is sunk below the surface of the healthy part.” A section shows that the protuberances (stroma) “contain numerous black flask-like structures, whose tips reach the surface of the protuberance.” “It is very noticeable that in the part of the branch occupied by the fungus, the inner bark (elsewhere a distinct band of tissue) is shrunken to a narrow black line between the wood and the bark. This reduction in the thickness of the inner bark explains at once why the surface of the affected parts is sunken below the rest of the surface and shows that the chief seat of vegetative activity of the fungus is in the rich growing conductive tissues” (Cambium).

According to Barss (1921) the ends of the branches are killed by girdling, the smaller twigs are attacked first and 2 or 3 years pass before the top is completely killed. He also states that the blight does not occur on Corylus rostrata Ait. or C. californica Rose.

Description
A specimen collected by G.P. Clinton, at Westerville, CT in 1902 was examined at the New York Botanical Gardens herbarium. This specimen showed large, oval stroma, 4 mm long by 3 mm wide and about 1 mm high. The stroma were wart-like and arranged more or less in two parallel rows usually on one side of the stem, but on one stem the two rows were nearly opposite. The torn epidermis stood up around the base of the stroma. The top or disc was roughened by the ostioles, (the exposed upper extremities of the beaks of the perithecia). The ostioles may have been scattered irregularly over the disc or been in an oval arrangement.

Pustules prominent, subrotund or elliptic, erumpent, 2 to 5 mm in diameter, wood subsunken, surrounded by a black layer, disc convex or slightly depressed, rough, brownish or blackish, powdery white at last; perithecia crowded, immersed in the stroma, now and then elongate; ostiole stalked and loose, often radiately sulcate, black; asci short, thick, soon disappearing; spores hya-line, elliptic, continuous, 7 to 9 mu long.

References


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**Circular 15: Diseases of *Crataegus* spp.**

- *Crataegus monogyna* and *Mespilus germanica* 10-36

**Crataegus monogyna and Mespilus germanica**

*Crataegus monogyna* Jacq. is a host of two or more *Gymnosporangium* rusts but Fischer failed in his experiments to inoculate it with *G. fuscum*. In this respect, it is similar to *Mespilus germanica* L. A negative result is indicative but not conclusive, therefore, cannot be dismissed. *Gymnosporangium* rusts are rather easily detected but their separation is usually work for a specialist. Rusts on these hosts should be referred to the Postentry Quarantine Unit.

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**Circular 16: Diseases of *Crocosmia* spp.**

- Gladiolus rust (federal quarantine significant) 10-36
- *Uredo gladioli-buettneri* (federal quarantine significant) 10-42

**Gladiolus Rust (Federal Quarantine Significant)**

August 2005

**Causal Organism**

*Uromyces transversalis* (Thum.) (G. Winter)

**Synonyms**

*Uredo transversalis* Thum., *Uromyces watsoniae* P. Syd & Syd

**Hosts**

*Crocosmia* spp., *Gladiolus* spp., *Tritonia* spp., and *Watsonia* spp.
Distribution
This rust is apparently indigenous to eastern and southern Africa. It has also been reported from Morocco, southern Europe (questionably from France and Spain, possibly established in Italy, Malta and Portugal) South America (Argentina and Brazil), Martinique, Australia, and New Zealand. It was recently intercepted from Mexico.

Symptoms
Uredinia are round to oblong or irregular and transverse on the leaf surface. They may be found on the upper or lower leaf surface. The uredinia are 0.5 to 1.5 mm long and 0.5 to 2 mm broad. At first they are covered by the blistered epidermis that splits. They are yellowish-orange in color.

Telia. Telia are minute, black and remain covered by the epidermis and grouped (small to larger groups). The groups may be scattered, in cavities on the leaf surface and are separated by golden-brown, palisade-like paraphyses (sterile upward growing, basally attached hyphal elements). The paraphyses are 50 to 112.5 µm in diameter and 55 to 75 µm deep with spores in 3 to 4 closely packed rows.

Description
Urediniospores are variable in form and size. They may be ovate, ellipsoidal or oblong and are 14 to 26 x 13 to 25 µm. The cell wall is hyaline and typically 1.5 to 2 µm thick and closely and minutely verruculose. There are germ pores, but they are obscure and 6 to 8 in number and scattered.

Teliospores. Teliospores are ovate, ellipsoid or pyriform, and less frequently globose often irregular or angular through mutual pressure. They are light brown, darker (often chestnut brown) near the apex. The apex of the teliospores is rounded, truncate or broadly conical, base usually attenuate, less frequently rounded. They are (17.5 to) 20 to 25 (to 34) x (14 to) 15 to 17.5 (to 21) µm with the cell wall smooth, usually 2 µm thick, 4 to 6 (to 8) µm at the apex. The pedicel is semi-persistent, hyaline, or tinted at the apex and is 45 µm long and 2 µm thick.
Figure 10-14  Uredinia of *Uromyces transversalis*
Figure 10-15  *Uredinia* (across the width of the leaf) and telium (dark) of *Uromyces transversalis*
Figure 10-16  Uredinia, erumpent, across the width of the leaf of *Uromyces transversalis*
Figure 10-17  Uredinia (across the width of the leaf) of *Uromyces transversalis*
Notes
Spermogonia and aecia are unknown.

References

*Uredo gladioli-buettneri* (Federal Quarantine Significant)
In progress.

Circular 17: Diseases of *Dianthus* spp.

- Carnation wilt 10-43
- Dianthus virus diseases 10-44
- Leaf rot of carnation 10-48

Figure 10-18  Uredinia (yellowish) and telia (dark) of *Uromyces transversalis*
Carnation Wilt

Causal Organism
*Phialophora cinerescens* (Wollenw.) Van Beyma

Synonym
*Verticillium cinerescens* Wollenw.

Hosts
*Dianthus* spp. *Dianthus chinensis* L. (Chinese Pink), and *D. barbatus* L (Sweet William) are said to be very susceptible, *D. caryophyllus* L. (Carnation) highly resistant, and *D. deltoides* L. immune. *D. nardiformis*, *D. balbisii*, *D. (hyssopifolius) monspessulanus*, and *D. cinitus* also reported as hosts (RAM 43:760). Hosts in other genera include: *Silene latifilia* spp. alba (Mill.) Greuter and Burdet (*Melandrium album*) (RAM 38:290) and *Saponaria officinalis* L., *Petrocoptis grandifloria*, A. Braun ex Endl., *Viscaria sartorii* and *Silene compacta* Fisch. Ex Hornem. (RAM 43:760).

Distribution
Bulgaria (RPP 61:627); Denmark (RAM 38:389); France (RAM 38:368); Italy (RAM 40:226); Poland - one farm (RAM 45:2860); Netherlands (RAM 38:118); Romania (RPP 63:165); United Kingdom of Great Britain and Northern Ireland (RAM 38:480, 42:26); (RAM 43:2360); Russia (RPP 58:3320); and Germany (RAM 41:230).

Symptoms
The leaves of infected plants are wilted, wrinkled and chlorotic. Cross-sections of the stem show brown discoloration of the vascular ring. The foregoing symptoms are similar to those caused by *Fusarium dianthi* Prill. and Del., but the leaf chlorosis caused by *Phialophora cinerescens* is less marked and there is a tendency for localization of the vascular discoloration in the tracheids and vessels. No extensive rotting of the pith and cortex is found. The stems may develop kinks at the nodes and the internodes may be somewhat shortened.

As there are other wilts of Dianthus caused by several species of Fusarium, a key devised by Wickens (1935) for separating those diseases follows.

**Key to Wilt and Desiccation of Leaves and Shoots.**
1. Vascular discoloration throughout the collar and wilting shoots—Go to 2.
   No extensive vascular discoloration—Go to 3.
2. Vascular discoloration followed by a dry “sheddy” rot of affected wood and cortex—*Fusarium* wilt (*F. dianthi*)
No later development of tissue rotting—*Phialophora* wilt (*P. cinerescens*)

3. Indiscriminate rotting of the collar stem rot—(*Fusarium* spp., *F. culmorum*, *F. herbarum*)

   Not as above—other diseases or disorders
   
   Note—invasion is through the roots from the soil. In experiments, inoculated plants remained apparently healthy for as long as 13 weeks.

**References**


**Dianthus Virus Diseases**

**Hosts**

*Dianthus caryophyllus* L. (Carnation) and *D. barbatus* L. (Sweet William)

*Etched Ring.* Whitish etched necrotic flecks and rings, usually oval or dumbbell shaped, resembling ringspot. May be small irregular rings and streaks on flowers and axillary stems. Some varieties show conspicuous necrotic blotches of irregular shape, usually pale fawn in color with darker brown maroon edges on the leaves; sphere shaped; world wide
Figure 10-19 Carnation etched ring virus on Dianthus spp.; atypical; note white lines in first and third leaves
Figure 10-20  Carnation etched ring virus on *Dianthus* spp.; note typical symptoms showing etched rings in first leaf
Latent. No symptoms

Mosaic. Yellowish to gray brown leaf mottle, coalescence of several spots may be followed by necrosis of centers; plants are stunted and flowers may be striped or spotted.

Mottle. Mild mottling or no symptoms; may cause flower breaking in some varieties; sphere shaped; world wide.

Necrotic Fleck. 1400 to 1700 nm long; in Japan 1973.

Ringspot. Gray rings or irregular chlorotic spots, may be several concentric rings, streaking, reddening, and leaf distortion; sphere shaped; world wide.

Streak. Yellowish or reddish spots and streaks, parallel to veins; lower leaves may be heavily spotted and turn yellow.

Vein Mottle. Vein clearing in young leaves that may develop into chlorotic spots that follow veins; 790 nm long; world wide.

Figure 10-21 Carnation etched ring virus on Dianthus spp.; severe symptoms
**Yellows.** Caused by a combination of streak and mosaic viruses; affected plants show both the mottling and spotting characteristics of the two viruses.

**NOTICE**

There is still some confusion about the identity, nomenclature, distribution, and symptomatology of these viruses. Combinations of viruses are commonly found in a single plant. The symptoms produced in such cases may **not** be clear cut. Carnation ringspot virus, vein mottle virus, and mottle virus (event when latent) significantly reduce the yield and quality of flowers in the variety "William Sim.”

Available evidence indicates that some of these viruses, especially etched ring and ringspot, are **not** widely distributed in the United States.

Most carnation viruses are sap transmissible and indexing techniques can make positive determination. This procedure, however, is **not** practical for postentry quarantine control.

**References**


**Leaf Rot of Carnation**

**Causal Organism**

*Heteropatella valtellinensis* (Trav.) Wr.

**Synonyms**

*Excipulina valtellinensis* Trav., *Heteropatella dianthi* Budd & Wakef., and *Pseudodiscosia dianthi* Host & Laub.

**Hosts**

*Dianthus caryophyllus* L. (carnation)
Distribution
United Kingdom of Great Britain and Northern Ireland, The Netherlands, Germany, Italy, Canada (British Columbia), and the United States (Washington state)

Symptoms
Both surfaces of the leaves show large discolored patches that are soft and brown, or when dry, bright whitish-gray. The patches occur either as transverse bands or extended over the whole terminal part of the leaf, which as a result, becomes withered and cracked. Similarly discolored spots occur frequently on the stems, flower stalks, bracts, and sepals. Very small, round, rather dark gray spots are present in large numbers on both sides of the diseased part of the leaves. These spots are, for the most part, so indistinct as to be hardly recognizable. They are more easily seen if the leaf is held up to the light. They then appear as rather closely grouped circular areas, transparent, and like a spot of grease lying in the leaf, nearly one-half a millimeter in diameter with a more or less distinct point in the middle. This point is frequently covered by a tiny, waxy, whitish or yellowish-gray, wart-shaped or conical granule. When the diseased leaves are placed in a moist chamber, this granule, viewed with a hand lens, is often seen to resemble a longer or shorter tendril-like string of sausages.

Due to the rotting leaves, affected plants have an unhealthy appearance, but healthy leaves are often present scattered about among the decaying ones. The decaying leaves may appear soft and wet, or dry and firm depending on the atmospheric humidity. The infected leaves often crack near the base and may fall off if the plant is lifted or shaken. The youngest leaves, while still clasped together, may present a pure white color for a considerable length down the leaf. This white color later changes to gray.

References

Circular 18:Diseases of Dimocarpus spp.

◆ Witches’ broom 10-49

Witches’ Broom
Feb. 8, 1974; restructured Mar. 1996

Synonyms
None
**Hosts**
*Dimocarpus longan* Lour. (Longan), *Litchi chinensis* Sonn. (Lychee), (it is possible to transmit the agent to *L. chinensis* by grafting).

**Distribution**
China, Hong Kong

**Symptoms**
According to a report by Li (1955), the disease was first recognized in 1948 in Southeast China. As far as is known, this is the only disease reported on longan fruit trees growing in China and Hong Kong. The longan is cultivated for its fruit; and the wood is a valuable source of timber.

Infected trees observed by Li (1955) usually showed narrow and crinkled leaves with different degrees of yellowing along the veins. These symptoms are especially evident on young leaves. On young twigs, malformed leaves usually fall off prematurely while buds at the basal portion of the same twig soon develop into shoots with very short internodes. These again carry deformed thread-like leaves that also fall of prematurely, leaving a bunch of leafless twigs resembling a witches' broom.

Flowering panicles show a crowded condition of the flowers, which are deformed and soon drop off. The flowerless panicles then resemble a broom. These conditions seriously reduce the production of fruit. So and Zee (1972) report (from Hong Kong) that infected trees show leaves with symptoms of malformation and vein clearing, and accompanied by systemic necrosis and slight blisters. On the new growth, young leaves of diseased trees are smaller than healthy ones, duller in color, and with rolled margins. Although the virus appears to be systemic, So and Zee (1972) found that not all branches of an infected tree will show symptoms of the disease.

**Transmission**
The agent may be transmitted by grafting and by seed from diseased trees.

**Vector**
The lychee stink bug is suspected as a vector in the transmission of the virus.

**References**
Circular 19: Diseases of Diospyros spp.

- Circular leaf spot of Oriental or Japanese persimmon (federal quarantine significant) 10-51

Circular Leaf Spot of Oriental or Japanese Persimmon

Synonyms
None

Causal organism
*Myocosphaerella nawae*

Hosts
*Diospyros kaki* (Japanese persimmon)

Distribution
China, Japan, Korea, Republic of, Spain

Symptoms
Fungus is characterized by circular necrotic spots on the leaves and defoliation. Early fruit maturation and premature abscission are associated with early symptom development in the trees. Fungus is consistently isolated from the margins of leaf lesions.

References

Circular 20: Diseases of Eucalyptus spp.

- *Pestalotia disseminata* (federal quarantine significant) and leaf chlorosis virus 10-51

**Pestalotia disseminata** (Federal Quarantine Significant) and Leaf Chlorosis Virus

Two diseases of eucalyptus are leaf chlorosis virus and *Pestalotia disseminata* Thum.

*P. disseminata* is said to cause leaf dropping or blight of infected trees. Any virus disease or any spotting or blight of eucalyptus leaves with which a *P. disseminata* is associated should be investigated and called to the attention of the Postentry Quarantine Unit.
Circular 21: Diseases of *Euonymus* spp.

- Euonymus mosaic (euonymus-variegation) agent (federal quarantine significant) 10-52

**Euonymus Mosaic (Euonymus-Variegation) Agent (Federal Quarantine Significant)**

Revised and restructured Mar. 1996

**Causal Organism**

*Marmor euonymi* Holmes

**Synonyms**

Euonymus infectious chlorosis (virus) Baur

**Hosts**

*Euonymus japonicus* Thunb., *E. fortunei* (Turez.) Hand.-Mazz. (*E. radicans* Sieb.)

**Distribution**

Europe and Japan

**Symptoms**

According to Baur (1908), infected leaves show a rather wide yellow border and the center is mottled green or greenish-yellow; also, young leaves show a yellow venation rather distinctly. As the leaves become older, the discoloration can only be detected by transmitted light. The pattern is like that of the variegated *Euonymus japonica* var. *aureo-marginata* Hort.

Brierley (1944) gives the following description attributing it to Rischkow (1927). “Chlorosis appears as pale streaks, continuous or interrupted, along the veins of young leaves. These mask with further growth of leaf, but pale flecks appear in the mesophyll which persist in fully-expanded leaves.

**NOTICE**

Noninfectious variegated varieties of euonymus also occur. These show a white or yellow margin surrounding the normal green central portion of the leaf. The distinguishing feature of the infectious variegation is the mottling of the central green area, which is best seen by transmitted light.
## Circular 22: Diseases of Fraxinus spp.

- Ash canker disease (federal quarantine significant) 10-53
- Fraxinus other virus reports 10-56
- Fraxinus variegation virus 10-58

### Ash Canker Disease (Federal Quarantine Significant)
Revised and restructured Mar. 1996

#### Causal Organism
*Pseudomonas savastanoi* var. *fraxini* (Brown) Dowson

#### Synonyms
*Pseudomonas fraxini* (Brown) Skor., *Bacterium savastanoi* var. *fraxini* N.A. Brown
Hosts

*Fraxinus* spp. including *F. ornus* L., *F. velutina* Torr., *F. excelsior* L., and *F. americana* L. (A. Alba)

Distribution

Europe

Symptoms

The following description is a slightly condensed version of that given by Skoric (1938): At first, very young cankers show only one or two vertical splits in the periderm and the cell layers below it, but later, cross splits appear and the cankers become open showing the browned and blackened tissues. In later stages, the bark is more and more broken down and blackened and the wood beneath becomes blackish or browned with many cracks or splits. At the same time, the bark at the margin shows intensive growth and hypertrophy, and the annual rings in the vicinity of the canker are enlarged.

The cankers are of two types with occasional intermediate forms. In Yugoslavia, the sunken or depressed type is the most common. The verrucose type described by Van Vliet (1931) occurs but is less prevalent. At a longer or shorter distance from the old canker there are swellings, usually a few millimeters or at most one centimeter in width, covered by undamaged bark. Beneath the bark the tissue is diseased and discolored.

In the early stages of the disease, young cankers are usually found near leaf scars, but some also develop between the internodes. They often form in a vertical line, which is thought to be due to distribution by rain water running down the trunk or branch. Small cankers of the sunken type develop in 1 or 2 years, but large cankers are found only after from 10 to 30 years. When infection occurs in young trees dwarfing results, the tree does not grow beyond 1 or 2 meters tall.

According to Riggenbach, the first symptom of the bacterial infection is noted as a reddish discoloration of the cortex followed by the development of pale, elliptical spots on the stems and branches. The expansion of the spots is accompanied by an elevation of the center and a rupturing of the surface into longitudinal fissures.

Brown (1932) states, “The cankers of the European ash vary in size from small cracks with thickened margins to irregular fluted outgrowths several inches in length and width, with cavities extending into the wood. They increase in size and number from year to year on both trunk and branches.” Cankers are also said to occur occasionally on the leaves and petioles.
In another description taken from a paper by Van Vliet (1931), some anatomical details not found in those above are included. The cankers are of three forms: verrucose; depressed; and intermediate between the first two types. The verrucose cankers assume the form of large or small protuberances the entire surface of which appears covered with warts. The depressed cankers are holes in the wood surrounded by jagged edges of bark; they are of varying depth, mostly circular, but occasionally much elongated. The transitional forms include on the one hand, depressed cankers with verrucose edges, and on the other, sunken areas with a marked tendency to healing over.

In the verrucose cankers the diseased bark is composed chiefly of brown canker tissue, within which only a narrow strip is healthy. In those of the depressed type the canker tissue is restricted to the inner cortical layers on the edge of the canker. The diseased tissue contains many cork layers running approximately parallel to the cambium and often visible to the naked eye as pale lines. Between the cork layers are cavities filled with bacterial slime. Fungus hyphae and masses of needle crystals may also be present in the cavities. The much-swollen wood below the proliferated cortex is brown and dull, the annual rings are separated from one another by a brown line.

References

Fraxinus Other Virus Reports

Plakidas reported an apparently lethal virus causing a witches’ broom of Fraxinus berlandieri in Louisiana. Cuttings from the infected tree failed to root, but the virus was transmitted by inarching. The resulting plants formed abnormal leaves and soon died. The original infected tree was destroyed.

Novak reports from Czechia that virus symptoms on ash were transmitted to privet.

Rosette of Fraxinus americana was reported from the Botanical Gardens in Minsk, Byelorussia by Kuprevicz (1947). Although transmission tests were not indicated, symptoms consisted of apical rosetting, stunting, underdeveloped stems, deformed leaflets with down-curled margins, and small, necrotic spots. In addition, the root system was poorly developed.

Two viruses of ash have been reported by Ciferri et al. (1961) from Italy. The first, transmissible by chip-budding is named “necrotic leaf curl.” Symptoms consist of vein clearing followed by necrosis, chlorotic spots of the leaf blade that become necrotic, leaf malformations, and aborted witches’ brooms. The second disease, named “chlorotic marbling,” is characterized as a chlorotic marbling of the leaves, especially the upper surfaces. Infection is most severe on apical leaflets resulting in some deformations.

Figure 10-23  Witches’ broom on F. americana; healthy (left); foliar chlorosis (right), reduced leaf size and branch proliferation
Disease and Pathogenic Organism Circulars
Circular 22: Diseases of Fraxinus spp.

References

1. Brierly, P. 1944. Viruses described primarily on ornamental or miscellaneous plants. P.D.R. Suppl. 150:145; 150; 184-85; 414; 436-37; 437; 448-49; 475.


Fraxinus Variegation Virus

Synonym
Fraxinus infectious chlorosis (Baur)

Hosts
Fraxinus spp.

Distribution
Bulgaria, United Kingdom of Great Britain and Northern Ireland, and Germany

Symptoms
Systemic yellow chlorotic leaf spotting

Transmission
Grafting

Circular 23: Diseases of Gladiolus spp.

◆ Gladiolus rust (federal quarantine significant) 10-36
◆ Puccinia gladioli [Castagne] (federal quarantine significant) 10-58
◆ Puccinia mccleanii [Doidge] (federal quarantine significant) 10-61
◆ Uromyces gladioli [Henn.] (federal quarantine significant) 10-62
◆ Uromyces nyikensis [Syd. & P. Syd.] (federal quarantine significant) 10-63

Puccinia gladioli [Castagne] (Federal Quarantine Significant)
August 2005

Synonyms
Aecidium valerianellae Biv., Uredo gladioli (Duby)

Hosts
Gladiolus spp. and Valerianella spp.
**Distribution**
Reported on *Gladiolus* from Europe and Asia. Although telia of *Puccinia gladioli* on *Gladiolus* have **not** been reported from the U.S., the aecial state (*Aecidium valerianellae*) on *Valerianella* has been reported from the western U.S. as well as Europe and Asia.

**Symptoms**
*Telia.* Are on reddish spots, sometimes limited by the veins, minute, rounded, and densely crowded to actually running together to form a crust up to 1 cm long. They can be found on the upper or lower surface of the leaf. They often cover much of the leaf surface and are compact and chestnut brown to black in color. The paraphyses (sterile, upward-growing basally attached, hyphal elements) are cylindric to slightly club shaped, brown, and up to 80 µm long.

![Figure 10-25 Puccinia gladioli telia](Source: USDA–ARS)
Description

Teliospores. Are ellipsoid to clavate, apex round to acute, slightly constricted at the septum and gradually narrowing below the septum. They are 36 to 60 x 16 to 27 µm. The cell wall is smooth pale brown in color, 2 to 3 µm thick and up to 10 µm at the apex. Sometimes mesospores are present 24 to 40 x 17 to 17 µm. The pedicel is hyaline, persistent, and 10 to 60 µm long.

Notes

Uredinia are unknown on Gladiolus spp., spermogonia and aecia are found on Valerianella spp.

At this time this rust is not listed in CFR 319.37-2 as a federal quarantine significant disease on Gladiolus. If this rust is added to that the list, the genus Valerianella spp. will also be regulated from Europe and Asia.

References

**Puccinia mccleanii [Doidge] (Federal Quarantine Significant)**

August 2005

**Synonyms**

None

**Hosts**

*Gladiolus ludwigi* (Hook)

**Distribution**

South Africa

**Symptoms**

*Telia.* Can be scattered or grouped, rounded to oblong, and sub-epidermal with the teliospores bursting through and surrounded by the epidermis thus presenting a powdery appearance. They can be on the upper or lower leaf surface. The telia are located between and sometimes transverse to the veins. When the telia are scattered, each can be up to 0.5 mm long and, when grouped, cover up to 1 cm of leaf surface. They are chestnut brown in color and are without paraphyses (a sterile, upward-growing, basally attached hyphal element).

![Figure 10-27 Puccinia mccleanii telia on leaf](Source: USDA–ARS)
Description
Teliospores are oblong-clavate to oblong, sometimes constricted at the septum. The upper cell of the teliospores is rounded truncate, attenuated or oblique-attenuated at apex, and the lower probasical cell frequently narrower, cinnamon brown, lighter cinnamon brown in color at the base of the spore. The spores are (35 to) 50 to 60 (to 70) x (12.5 to) 14 to 17 (to 20) µm. The cell wall is 1 to 2 µm thick with the apex sometimes thicker at 4 (to 7) µm. The pedicel is up to 45 µm long, easily broken, and light cinnamon in color.

Notes
Spermogonia, aecia, and uredinia are unknown.

References

Uromyces gladioli [Henn.] (Federal Quarantine Significant)
August 2005

Synonyms
Uromyces geissorrhiza Henn., U. babianae (Doidge), U. romuleae (Van der Byl and Werderm), U. romuleae (Doidge)
Hosts

Distribution
Central and Southern Africa

Symptoms
Uredinia. Can be scattered or in grouped, irregularly round to oblong, often running together measuring up to 0.5 mm in length. They can be on the upper or lower leaf surface. The uredinia are sub-epidermal with the spores bursting through the epidermis and are yellow in color.

Telia. Can be scattered or in linear groups, oval or oblong, often irregular, and up to 1 mm in length. They can be on the upper or lower leaf surface. The telia are sub-epidermal and compact with the spores covered by the epidermis, dark brown to black in color and are without paraphyses (a sterile, upward-growing, basally attached hyphal element).

Description
Urediniospores. Are globose, subglobose or ovate, and subhyaline to pale golden brown in color. These spores are 20 to 25 x 15 to 23 µm. The cell wall is hyaline and 2 to 3.5 µm thick, minutely verrucose with scattered germ pores 6 to 9 (obscure).

Teliospores. Are chestnut brown in color, globose, subglobose, ellipsoid, ovoid, or angular through mutual pressure. The apex is usually rounded, sometimes truncate or conical. The base is round or attenuate. The spores are 20 to 37 (to 40) x 18 to 26 µm. The cell wall is smooth, 2 to 3.5 µm thick, 5 to 9 µm thick at the apex. The pedicel is persistent, brown in color near the apex, and 5 to 7 mm wide up to 75 µm long.

Notes
Spermogonia and aecia are unknown.

References

Uromyces nyikensis [Syd. & P. Syd.] (Federal Quarantine Significant)
In progress.
Circular 24: Diseases of *Humulus* spp.

- Hop nettlehead strain of Arabis mosaic virus 10-64
- Verticillium wilt 10-66

**Hop Nettlehead Strain of Arabis Mosaic Virus**

**Synonyms**
*Chlorogenus humuli* (Holmes), Humulus Virus 2, Silly-Hill Disease Virus

**Host**
*Humulus lupulus* L.

**Distribution**
Hop nettlehead strain of Arabis mosaic virus was first described in 1895. It has been recognized in England for over 50 years. Similar, if not identical, diseases are reported from Czechia, Germany, Poland, Bulgaria, Slovakia, Tasmania, and Russia.

Citations may be found in the literature where hop nettlehead strain of Arabis mosaic virus, infectious sterility, and Krauselkrankheit are used synonymously. Present knowledge leaves this open to doubt.

English workers, as reported by Talboys (1964), recognize infectious sterility as being confined to eastern continental Europe. They feel that Krauselkrankheit, reported in Germany and other areas of eastern Europe, may be due to zinc deficiency. Furthermore, they are of the opinion that hop nettlehead strain of Arabis mosaic virus does not occur in continental Europe but is probably present in the United States.

Hoerner (1949,1954) reports virus diseases in New York and on the Pacific coast with symptoms similar to those associated with hop nettlehead strain of Arabis mosaic virus.
Symptoms
(After Blattny 1935, Burgess 1964): Shortly after new growth starts, infected plants are characterized by their many weak vines and nettle-like leaves. Infected plants do not climb well and if severely infected, they are bunched on the lower 3 to 5 feet of the support. The stems are spindly, stiff, and short. These symptoms are more evident early in the season while the weather is cool. Symptoms may become masked as the temperature increases.

Leaves are undersized and closer together than normal. Younger leaves may exhibit an upcurling of the margins. There may be a slight vein clearing evident and the leaves may stand out stiffly from the stem.

Cone production is greatly reduced. Blattny (1935) has stated that the only reliable external sign of the disease is the sterility of infected hop plants during 3 consecutive years.

From reports in the literature it is apparent that symptoms vary from hill to hill, with the time of year observations are made, and with the amount of growth the plant has made.

Transmission
Hop nettlehead strain of Arabis mosaic virus can be transmitted by grafting. Burgess (1964) questions whether or not it might be mechanically transmitted in instances where adjacent vines may rub together. There is also some question as to the virus being soil-borne.

Recent investigations by Legg (1964), and Legg and Ormerod (1964) indicate that hop line pattern virus predisposes hops to infection by hop nettlehead strain of Arabis mosaic virus or that hop line pattern virus is a component of hop nettlehead strain of Arabis mosaic virus itself. Further studies revealed that split leaf blotch virus plus hop line pattern virus did not produce nettlehead, so evidently split leaf blotch virus is not a component of nettlehead.

Hop line pattern virus has been proven to be soil-borne. This confirms the earlier theory suggested by Burgess that nettlehead may be soil-borne.

References
5. Legg, J.T. 1964. Hop line-pattern virus in relation to the etiology and
203(4949):1021-22.

**Verticillium Wilt**

**Causal Organism**
A strain of *Verticillium albo-atrum* (Reinke and Barth)

**Synonyms**
*Verticillium albo-atrum* of hops, fluctuating strain, *Verticillium albo-atrum* of
hops, progressive strain

**Hosts**
The hop strain can probably parasitize many or most of the same plants as the
parent species but to a varying extent.

**Distribution**
England, Germany, New Zealand, and Tasmania

The report from Tasmania names *V. dahliae* as the causal organism, but this
species is **not** uniformly treated as distinct from *V. albo-atrum*. The disease
causd is similar. The first reports from New Zealand also named *V. dahliae* as
the fungus involved, but this was later corrected to *V. albo-atrum*. Present
research (Talboys) indicates that morphological characteristics can be used to
clearly distinguish between the two species. As a result, more workers are
accepting *V. albo-atrum* as the species involved in hop wilt.

**Symptoms**
The virulent or progressive form appears on a few plants. The lower leaves
show “first yellowing and then gradual death of more and more leaves on the
vines until eventually the whole plant is dead.”

Sometimes the tissue between the veins turns dark brown while that along the
veins remains yellow giving a characteristic effect the English call “tiger
striping.” The dead leaves fall off leaving the stem bare. In the stem, the
vascular tissue becomes brown, at first on one side, but later it may all be
involved. The infected plants are doomed. The Fuggle variety is very
susceptible. This is one of the most valuable commercial varieties. Some
progress has been made in developing resistant varieties.
The fluctuating form of the disease is milder. The leaves show no
discoloration, but there is usually swelling in the vines, and browning of the
vascular tissue is evident. Although the infected plants may wilt, they
eventually recover and are rarely killed.

References
Malling Res. Sta. for 1949.
1021-22.

Circular 25: Diseases of *Hydrangea* spp.

- Hydrangea rust (federal quarantine significant) 10-67

**Hydrangea Rust (Federal Quarantine Significant)**
August 2005

**Causal organism**
*Puccinia glyceriae* S. Ito

**Synonyms**
*Aecidium hydrangeae-paniculatae* (Dietel)

**Hosts**
*Hydrangea paniculata* (Siebold) and *Glyceria* spp.

**Distribution**
Japan

**Symptoms**
Spermogonia located mostly on the upper surface of the leaf and located in
orange-yellow lesions.

Aecia located mostly on the lower surface of the leaf are cup shaped and pale
yellow in color. The cells of the wall of an aecium are 24 to 32 x 16.5 to 22 µm.
The outer wall has a pronounced warty appearance and the inner wall is much
less so.

**Description**
Spermata are yellow to brown in color, sub-epidermal, and flask shaped.

Aeciospores are globose to broadly ellipsoid. They are 19 to 26.5 x 15 to 22
µm with walls 0.7 to 1.2 µm thick and are hyaline and finely verrucose.
Notes
The uredinial and telial stages of this rust are found on species of *Glyceria* (Poaceae).

References

Circular 26: Diseases of *Jasminum* spp.
- Bacterial leaf spot of jasmine 10-69
- Chlorotic ringspot, phyllody, yellow ring mosaic disease (federal quarantine significant) 10-69
◆ Jasmine variegation agent (federal quarantine significant) 10-69
◆ Sampaquita yellow ringspot mosaic disease (federal quarantine significant) 10-70

**Bacterial Leaf Spot of Jasmine**

**Causal Organism**  
*Xanthomonas jasminii* (Rangaswami & Erwaran)

**Synonyms**  
None

**Hosts**  
*Jasminum sambac* (L.) Ait.

**Distribution**  
India (Madras State)

**Symptoms**  
The disease first appears as minute water-soaked lesions on the upper leaf surfaces. These lesions soon become yellowish-green in color and enlarge in size. The spots may then coalesce to form linear or irregular spots that give a characteristic mosaic-like appearance to the leaf. On each leaf several spots may be closely crowded, but in some varieties there may be only a few localized spots. In the case of several affected plants, there is defoliation and stunted growth. Transverse sections of the leaves clearly show the presence of bacteria in the infected tissue. No other species appears to be attacked by this bacterium.

**References**  

**Chlorotic Ringspot, Phyllody, Yellow Ring Mosaic Disease (Federal Quarantine Significant)**  
In progress.

**Jasmine Variegation Agent (Federal Quarantine Significant)**  

**Synonyms**  
None
Hosts
Jasminum officinalis L., J. humile var. Revolutum (Sims), J. Stokes, J. resolutum Sim

Distribution
Belgium, United Kingdom of Great Britain and Northern Ireland, and Germany

Symptoms
“Yellow variegation in the leaves and young branches” (Brierley 1944). In 1713, a clergyman, John Lawrence, described it as follows: “You will find here and there some leaves tinged with yellow, even on other branches not inoculated, till by degrees in succeeding years the whole tree, even the very wood of all the branches, shall be most beautifully stripped and dyed with yellow and green intermixed.”

A similar disease, but differing in that ring spots are among the symptoms, has been reported in the Rio Grande Valley of Texas (Hort. Soc. Jour. 14:187-88).

Transmission
By budding and grafting

References
2. Brierley, P. 1944. Viruses described primarily on ornamental or miscellaneous plants. P.D.R. Suppl. 150:145; 150; 184-85; 414; 436-37; 437; 448-49; 475.

Sampaquita Yellow Ringspot Mosaic Disease (Federal Quarantine Significant)
In progress.

Circular 27: Diseases of Juniperus spp.
- Douglas fir canker (federal quarantine significant) 10-22
- Juniper pear rust (federal quarantine significant) 10-71
- Juniper rust 10-72
- Needlecast disease (federal quarantine significant) 10-75
Juniper Pear Rust (Federal Quarantine Significant)
Revised and restructured Feb. 1996

Causal Organism
Gymnosporangium asiaticum (Miyabe ex Yamada)

Synonyms

Hosts
Telial. Juniperus chinensis. L.


Distribution
Eastern Asia and United States (East and West coasts)

Symptoms
Pycnial. On the upper surface of the leaves, on spots, first small, punctiform and orange-yellow in color, gregarious in groups 2.5 mm in diameter, few in number, pycnospores small fusoid.

Aecial. On the underside of the leaf opposite the pycnia on thickened, well-developed, brown spots having a beautiful, yellowish-red margin, very slender, 3 to 6 mm high, cinereous; peridium tubular, not recurved in dehiscence, irregularly torn at the end, liberating reddish-brown aeciospores.

Telial. On the leaves (needles) of Juniperus, forming reddish-brown, gelatinous masses, dark chestnut when dry, pulvinate. It may be added that the telia are small when dry measuring about 2 mm high and 1 mm thick, but when wet, they are swollen to about 15 to 20 mm in length and proportionate width. Good illustrations may be found in Jackson's (1916) paper.

Description
Aeciospores. Globose to broadly ellipsoid, often slightly angular 17 to 25 µm in diameter, the wall is yellow, finely and densely verrucose, 1.5 to 2.5 µm thick, and about 6 to 8 pores, slightly thickened.
**Teliospores.** Broadly to narrowly ellipsoid, 2 celled, slightly constricted, 32 to 47 x 15 to 25 µm. The wall is yellow to cinnamon in color, 1 to 1.5 µm thick, pores 2 per cell by the septum.

![Image](image.jpg)

**Figure 10-31 Gymnosporangium asiaticum on Juniperus; telial spores**

**References**


**Juniper Rust**

December 13, 1965; restructured Feb. 1996

**Causal Organism**

*Gymnosporangium japonicum* Syd.
**Synonyms**

*Gymnosporangium photinia* (Kern), *Roestelia photinia* P. Henn., *R. pourthiaeae*

**Hosts**

*Telial.* *Juniperus chinensis* L., *J. chinensis* var. *pfitzeriana*, Spaeth. Possibly others


**Distribution**

China, France, Holland, Japan, Korea, Republic of, Siberia, United States (coastal areas)

**Symptoms**

*Aecial.* Described from herbarium material; no published description found. They appear on the upper surface of the leaf as reddish-yellow spots with a darker center. The darkening is caused by the presence of the tiny black pycnia that erupt through the epidermis. The spots are round with an indefinite margin, and measure 2 to 3 mm in diameter. On the lower surface the spots are yellowish to cinnamon-brown in color and are much swollen in the center; the swollen area is occupied by the aecia that are clustered there and appear to the eye as slender, light-colored hairs projecting down and outward. On the specimen examined, they are about 2 mm long.

*Telial.* The telia are born on the stems and twigs of *Juniperus* on fusiform swelling or galls. Dried telia are cinnamon-brown in color and appear villous or felty due to the telial horns.
**Description**

*Aecia hypophyllous*, in crowded or somewhat annular groups on thickened discolored spots, cylindric, .4 to .5 mm in diameter by 2 to 3 mm high, peridium soon becoming irregularly lacerate and cancellate often to base, erect or slightly spreading; peridial cells seen in both face and side views, broadly lanceolate or oval in face view, 29 to 32 x 64 to 90 µm, oblong in side view, 23 to 32 µm thick, coarsely rugose on both inner and side walls, the ridges becoming much higher on the side walls and extending clear across. Outer wall 1.5 to 2 µm thick, inner and side wall 5 to 7 µm; aeciospores, 18 to 21 x 19 to 23 µm, wall pale cinnamon-brown in color, 1.5 to 2 µm thick, and very finely verrucose.
Telia caulicolous, appearing on gradual fusiform enlargements scattered irregularly wedge-shaped, often incised at apex and lacunose below, 3 to 5 \( \mu \text{m} \) high, cinnamon-brown in color, teliospores 2-celled ellipsoid, 18 to 22 by 57 to 66 \( \mu \text{m} \), not or very slightly constricted, usually narrowed above and below, wall pale cinnamon-brown, rather thin, 1 to 1.5 \( \mu \text{m} \); pores 2 in each cell, near the septum.

References

Needlecast Disease (Federal Quarantine Significant)
Revised and restructured Feb. 1996

Causal Organism
Stigmina deflectens Karst Ellis

Synonyms
Exosporium deflectens Karst.

Hosts
Juniperus spp.

Distribution
Austria, Finland, Romania, United States (South Dakota)

Symptoms
Minute brownish fruiting bodies of the fungus are arranged along the sides of the median veins of the upper side of the needles, but these fruiting bodies do not appear until the leaves have begun to turn brown.

As both the leaves of Juniperus and the fruiting bodies are very small, and because many other rather similar fungi may also be present on the leaves, it is unlikely the disease can be recognized by the macroscopic symptoms. If there is reason to suspect S. deflectens is present, submit for microscopic examination.
any twigs showing dead brown leaves and needle shedding to the Postentry Quarantine Unit.

Description
Stomata up to 200 µm wide, and dark brown in color. Conidiophores are 6 to 15 x 2.5 to 4 µm with up to 4 annellations. Conidia are brown in color, verruculose, 2 to 3 septate, 11 to 19 x 4 to 5.5 µm.

References
5. CFR 319.37§2 (1-1-95).

Circular 28: Diseases of *Larix* spp.

◆ Douglas fir canker (federal quarantine significant) 10-22
◆ European larch canker (federal quarantine significant) 10-76

**European Larch Canker (Federal Quarantine Significant)**
In progress.

Circular 29: Diseases of *Ligustrum* spp.

◆ *Ligustrum* mosaic agent (federal quarantine significant) 10-76

**Ligustrum Mosaic Agent (Federal Quarantine Significant)**
Revised and restructured Feb. 1996

**Synonyms**

**Hosts**
*Ligustrum vulgare* L. (common privet)

**Distribution**
Europe
**Symptoms**
Clear yellow leaf spotting (Brierly 1944) and systemic chlorotic spotting (Holmes 1939) have been reported. Baur (1907) wrote that the chlorotic plants he produced by budding and grafting had “yellow spotted leaves” as those found on *Ligustrum vulgare* var. *aureovariegatis*.

Another virus designated as “crinkle mosaic” (Schmelzer 1962) and regarded as a strain of Arabis mosaic virus was obtained from expressed leaf sap of plants infected by crinkle mosaic. This virus produces marked necrotic symptoms on a number of different hosts.

**Transmission**
By budding and grafting; not transmitted through the seed.
References


3. Brierley, P. 1944. Viruses described primarily on ornamental or miscellaneous plants. P.D.R. Suppl. 150:145; 150; 184-85; 414; 436-37; 437; 448-49; 475.


Circular 30: Diseases of Litchi spp.

◆ Phytophthora litchii (federal quarantine significant) 10-78

◆ Witches’ broom 10-49

Phytophthora litchii (Federal Quarantine Significant)

July 2012

Synonyms

Peronophythora litchii

Hosts

Dimocarpus longan (longan); Litchi chinensis (litchi/lychee)

Distribution

China, Thailand, Vietnam, Taiwan, Japan, and Papua New Guinea

Symptoms

Fruit has downy blight; droopy leaves and leaf blight; immature plants present with water-soaked lesions that turn into brown, round, or irregular lesions (approximately 3 to 5 cm long), mature plants present with dark brown lesions on the stem and numerous sporangia on sporangiophores

References

Circular 31: Diseases of *Malus* spp. and *Pyrus* spp.

- Apple branch canker 10-79
- Apple canker 10-81
- Apple mosaic virus 10-82
- Apple proliferation phytoplasma (federal quarantine significant) 10-85
- Chlorotic leafspot virus 10-85
- Rough bark (phompsis canker) (federal quarantine significant) 10-86
- Rubbery wood phytoplasma (federal quarantine significant) 10-88
- *Valsa ceratosperma (V. mali)* (federal quarantine significant) 10-88

**Apple Branch Canker**
Revised and restructured Feb. 1996

**Causal Organism**
*Valsa ceratosperma* (Tode ex Fr.) Maire (perfect state), *Cytospora sacculus* (Schwein.) Gvritischvili (imperfect state)

**Synonyms**
*Valsa mali* (Miyabe and Yamada)

**Hosts**
*Malus pumila* Mill., M. X. zumi Mats. Rehd. (*Populus nigra* Linn., *Salix sachalinensis* Friedr. Schmidt., *Prunus serrulata* Lindl., and *P. yedoensis* Mats. have been inoculated successfully, but infection died out within one year.)

**Distribution**
Japan, China, and Korea, Republic of

**Symptoms**
In the early spring, the bark presents a swollen, water-soaked appearance especially when wet. The spots are brownish in color, irregular or nearly oblong in circumference, with gradual drying, the somewhat elevated canker becomes slightly sunken, more or less darkened, and cracked on the surface. Cankers are usually found on the upper side of large limbs of older trees. A large number of small, black pycnidia appear in late May on recent lesions, and spore horns are visible approximately one month later. A girdling type of injury has also been observed on weakened branches and small twigs. Girdling is rare in the first year of infection.
Description
Pycnidia and perithecia of the pathogen occur in a stroma in the bark, punctiform or wart-like, of various sizes (in culture 1 to 3 mm in diameter), junction with the sound tissue indefinite, black; pycnidia deeply immersed in the stroma, divided into many irregular chambers (Togashi 1924) flask-shaped (Tanaka 1919), opening by a slender, canal-like neck, 80 to 200 µm in diameter; conidia cylindrical or allantoid, obtuse at both ends, 4 to 10 x 8 to 1.7 µm (Togashi 1924), expelled in yellow (Togashi 1924), buff (Tanaka 1919) cirrhi; perithecia circinate surrounding the pycnidial cavity, flask-shaped, long-necked, with black walls, the necks thickened above and slightly protruding, 100 to 250 µm in diameter; asci numerous, clavate, often pedicellate, 24 to 42 x 5.5 to 15 µm hyaline, 8-spored, aparaphysate; ascospores cylindrical, slightly curved continuous, hyaline, 7 to 10 x 1.4 to 2.1 µm.

Notes
The disease is reported to have seriously damaged a large number of apple trees in Japan, where it is said to have appeared following the introduction of American apple varieties. Its appearance at that time might be explained either by the introduction of the disease on the American varieties, or by increased virulence of a Japanese fungus on an introduced host. Suggesting the first of these explanations, Togashi (1924) states the Valsa mali corresponds better to the description of the disease described by Leonian (1921) in New Mexico than does V. leucostoma (Pers.) Fr. to which Leonian (1921) attributed it. This statement apparently applies only to the disease caused by the fungus and its visible symptoms as Leonian (1921) did not give the characters of the organism, V. leucostoma, in his paper. The description of the latter fungus (Saccardo 1888) shows differences in the shape of the asci, and in the size of the ascospores.

References

**Apple Canker**

**Causal Organism**
*Perfect State*. *Physalospora piricola* Nose

*Imperfect State*. *Macrophoma kwetsukai* Hara

**Hosts**
*Malus sylvestris* Mill. (apple) *Pyrus communis* L. (pear)

**Symptoms**

*On Trunks and Branches*. Lesions are nearly circular to elliptical except when, by coalescence, they become irregular in shape. Separated from the sound tissue by a crack or crevice around the margin, and slightly depressed, brown to gray in color, many fruiting bodies on the surface, which is raised at the center and, at the last, broken open.

*On Leaves*. Brown to dark brown spots are formed that are rather round or elliptical surrounded by a ring, but when the spots become confluent, they take irregular shapes.

**Description**

(after Nose 1933) Perithecia, ostiolate, carbonous, black, spherical or semispherical, 230 to 300 µm high by 130 to 280 µm wide (average 245 x 229 µm); asci 8-spored, several of different ages, develop on the base, long clavate wall rather thin except at the apex, inner wall grooved, 93 to 121.3 x 20.3 to 23.2 µm (average 114.4 x 22.2 µm); ascospores distichous, elliptical, hyaline or greenish-blue in color, continuous, 21.7 to 22.6 x 10.4 to 12.2 µm (average 22.2 x 11.4 µm) no gelatinous sheath; paraphyses many, hyaline, simple, 2.9 to 6.1 µm thick.

Pycnidia submerged, ostiole short, carbonous, dark brown nearly spherical, 170 to 250 high x 200 to 250 µm wide (average 184 to 204 µm); conidiophores lining the whole wall, clavate, hyaline, continuous, simple, 11.6 to 31.9 x 2.9 to 4.4 µm (average 20.30 x 3.19 µm); pseudoparaphyses hyaline, non-septate unbranched 34.8 to 63.8 x 2 to 3.5 µm (average 47 x 2.9 µm); conidia fusoid or long elliptic, hyaline, continuous, 21.8 to 31.9 x 6.7 to 8.7 µm (average 26.5 x 7.5 µm).

Perithecia and pycnidia may be intermixed on the same lesion.
References

Apple Mosaic Virus

Synonyms
Infectious variegation, line patter, mottle leaf, mosaic chlorosis, pear ring patter mosaic, *Pyrus* virus 2

Time of Year to Inspect
Within 6 weeks after leaves are fully out

Symptoms
*Plant.* Somewhat stunted compared to healthy plants of the same age.

*Leaf.* Has many forms of mottling. Small irregular yellow-to-cream spots that stand out vividly against the dark green of normal tissue. Spots turn brown and become necrotic as the season progresses. Bands of yellow may develop along the larger veins.

*Stems.* None

*Fruit.* None

*Flowers.* None

Transmission
Mechanical and grafting

Discussion
There are several strains of apple mosaic virus. In New Zealand tests, severely infected trees, after several years of production, yielded only 33% of the fruit of healthy trees grown under similar situations.

Distribution
Argentina, Australia, Austria, Belgium, Brazil, British Isles, Bulgaria, Canada, Chile, China, Czechia, Denmark, Finland, France, Germany, Holland, India, Italy, Japan, Kenya, Latvia, New Zealand, Norway, Poland, Rhodesia, Romania, South Africa, Sweden, Switzerland, Turkey, United States, Russia, and Serbia (formerly Yugoslavia).
Figure 10-34 Distribution of apple mosaic virus

Figure 10-35 Bark cankers (right) on second-year wood of Pyrus variety of “Winter Nelis” caused by pear blister canker viroid
References


Figure 10-36 Roughening, brown mottling and blistering (right) of second-year wood of Pyrus spp. “pattern”; symptoms caused by pear blister canker viroid


**Apple Proliferation Phytoplasma (Federal Quarantine Significant)**

**Causal Organism**
*Candidatus Phytoplasma mali* (Seemuller & Schneider) (federal quarantine significant)

**Host**
*Corylus avellana*

**Symptoms**
Yellowing, sparse foliage, stunting, dieback, and general decline

For further information, *See Apple Proliferation Phytoplasma (Federal Quarantine Significant)* on page 10-28.

**Chlorotic Leafspot Virus**

**Hosts**
*Malus* spp.

**Distribution**
Canada and United States
Symptoms
This is a virus disease of apple that might be confused with apple mosaic. In this disease the patterns are quite similar to the line pattern and flecking expressions of apple mosaic but the color does not progress to yellow or white. In fresh leaves the lines and flecks are a faint grayish-white in color.

According to Welsh and Keane (1961) “Leaves of infected trees have chlorotic flecks associated with veins and veinlets. These are usually accompanied by leaf puckering and dwarfing. Symptoms are most severe on the leaves that develop early in the season.” Chlorotic leafspot symptoms have also been associated with stem pitting symptoms.

References

Rough Bark (Phomopsis Canker) (Federal Quarantine Significant)
Revised and restructured Mar. 1996

Causal Organism
Perfect state. Diaporthe perniciosa Em. Marchal

Imperfect state. Phomopsis mali Roberts

Synonyms
D. eres Nitschke and D. mali Miura

Hosts
Malus spp. and Pyrus spp.

Distribution
Japan, Europe, and North America

Symptoms
Pale, discolored spots are produced on the leaves measuring 1 to 2 cm in diameter. Spotted leaves become curled, and finally fall before their time.
On the fruits, mature spots measure 2 to 8 mm in diameter. They are round, solitary, or irregularly coalescent, more or less sunken, usually deeper in color than the surrounding tissue. The underlying tissue is brown to dark-brown in color, of spongy texture, and has a slightly bitter taste.

**Description**

*D. perniciosa.* Produces perithecia on twigs that are spheroid or oblate spheroidal, 300 to 450 µm in diameter, outer wall intensely black, inner wall light brown, beaks long, conspicuously hairy near the end; asci fusoid, obtuse above, somewhat pedicellate below, 45 to 52 x 5 to 10 µm, 8-spored; ascospores biserial, fusoid, both ends obtuse, 1-septate, constricted, 2-nucleate in each cell (guttulate) hyaline, 11 to 13 x 3.5 to 4.5 µm.

**Phomopsis.** Pycnidia of the Phomopsis state on decayed fruit, numerous, irregular, scattered or in concentric zones, later covered by white or olivaceous-white, cottony hyphae, semi-spherical, 70 to 220 x 70 to 130 µm, conidia issuing in a pinkish-brown cirrus or mass, of two kinds A-spores ellipsoidal, acute at both ends, continuous, hyaline, guttulate at both ends, 7 to 9 x 3 to 4 µm; B-spores filiform, slightly curved, or may be hooked near the end cylindrospores are also produced. Chlamydospores in chains, cinereous or greenish, thick-walled, granulate, 10 to 14 x 5 to 8 µm; cylindrospores straight or curved, tapering towards the apex, pale pinkish-brown in mass, colorless or greenish when alone, 2 to 7 septate, occasionally constricted at the septum, 38 to 80 x 3 to 4 µm.

**References**

Rubbery Wood Phytoplasma (Federal Quarantine Significant)

**Hosts**
*Malus* spp.

**Distribution**
Australia, Canada (British Columbia), Denmark, England, Italy, New Zealand, Norway, Sweden, Switzerland, The Netherlands, and United States (experimental plantings only)

**Symptoms**
(after Brase and Gilmer 1959) Affected trees are slightly stunted and their branches and trunks are very definitely rubbery when touched or bent. In each case the side branches developing from the trunk showed the characteristic “bottle-neck” growth habit associated with rubbery wood; that is, thickening at a point near the origin with an abrupt and pronounced taper of the growth from there outward.

Smith (1972) stated that “affected maiden trees frequently develop a vigorous side branch from a point a few inches above ground level and this branch may outstrip the leader.” The wood is not fully lignified as can be seen when a branch is cut across and properly stained. No diagnostic fruit or leaf symptoms have been recognized.

**References**

Valsa ceratosperma (V. Mali) (Federal Quarantine Significant)
In progress.

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**Circular 32: Diseases of *Mangifera* spp.**

- *Ceratocystis manginecans* (sudden decline of mango) 10-89
- *Ceratocystis mangicola* (Sordariomycetes: Microascales) 10-90
- *Ceratocystis mangivora* (Sordariomycetes: Microascales) 10-90
- *Fusarium sterilhyposhosum* (federal quarantine significant) 10-91
- *Fusarium tupiense* (Sordariomycetes: Hypocreales) 10-92
**Ceratocystis manginecans (sudden decline of mango)**

**Causal Organism**
*Ceratocystis manginecans*

**Synonyms**
Mango killer

**Hosts**
*Mangifera indica*

**Distribution**
Oman, Pakistan, and United Arab Emirates; is now spreading from the eastern region of Sharjah Emirate to the Bathnah, Masafi, Dhena, Dabaa, and Kalbaa regions.

**Symptoms**
Disease characterized by sudden browning and wilting of leaves on mango trees, branches gradually drying out until the whole plant dies.

**Transmission**
The primary insect vectors are fungal-feeding insects (*Nitidulidae, Coleoptera*) not associated with particular plants. Ambrosia beetles such as *Xyleborus* and *Hypocryphalus* species may facilitate the fungal dispersal by tunneling through infested wood and expelling frass with fungal spores.

The pathogen can also be transmitted through various kinds of infected host debris, i.e., infected insect frass and sawdust spread by wind, rain, or running water. The pathogen can also be transferred from wood or wood packaging material on infected insect frass, sawdust, or on cutting tools and other equipment.

**Notes**
The fungus prevents the movement of water and nutrients from the roots to the branches and twigs of the mango tree. The fungus is currently a reportable, actionable pest. Postentry quarantine status applies to plants being grown for fruit production only.
Ceratocystis mangicola (Sordariomycetes: Microascales)
November 22, 2011

Hosts
Mangifera indica (mango)

Distribution
Brazil

Symptoms
Symptoms of mango blight including wilting of stems, leaves, and flowers

Notes
Associated with the wood-boring beetle Hypocryphalus mangiferae (Coleoptera: Curculionidae). Little information is available regarding the host range and distribution. Ceratocystis mangicola (Sordariomycetes: Microascales) is listed as reportable in the PEST ID database.

Reference

Ceratocystis mangivora (Sordariomycetes: Microascales)
November 22, 2011

Hosts
Mangifera indica (mango)

Distribution
Brazil

Symptoms
Symptoms of mango blight including wilting of stems, leaves, and flowers

Notes
Associated with the wood-boring beetle Hypocryphalus mangiferae (Coleoptera: Curculionidae). Little information is available regarding the host range and distribution. Ceratocystis mangivora (Sordariomycetes: Microascales) is listed as reportable in the PEST ID database.
**Reference**

**Fusarium sterilihyphosum (Federal Quarantine Significant)**

**Causal Organism**
*Fusarium sterilihyphosum*

**Synonyms**
Mango malformation disease (MMD)

**Hosts**
*Mangifera indica*

**Distribution**
Southern Senegal (Kolda, Sedhion, and Ziguinchor regions), Egypt, and South Africa

**Symptoms**
Disease characterized by malformation of flowers that prevent fruit from setting by transforming flowers into leaves as well as malformation on seedlings and even on big trees, causing distortion of the apical buds and mummification.

**Transmission**
The disease is normally spread over long distances by infected seedlings or grafting buds. Locally, infested parts spread the disease to the entire tree or orchard. Flowers, seedlings, branches, and leaves and older trees show symptoms of MMD where fungus develops spores (a primary source of infection) especially during the rainy season. Spores are spread by mango mites or by the wind to infect other trees and orchards.
Notes
There are two additional identified fungus species known to cause MMD: *F. mangiferae* and *F. subglutinans*. There is also another species that has never been identified and reported, but is similar to *F. sterilhyphosum* in outward appearance. Research is being conducted to identify this new species. *F. mangiferae* is reportable/actionable pending APHIS evaluation of implementing official control with input from the National Plant Health Board. Commonwealth regulatory issues may exist. *F. subglutinans* (teleomorph: *Gibberella subglutinans*) is nonquarantine significant.

Within 3 years MMD could reportedly cause losses of up to 98% of mango production in Senegal, not to mention the probability of affecting the West African region which is already under attack of fruit fly species such as: *Bactrocera invadens*, *B. cucurbite*, *Ceratitis cosyra*, and *C. capitata*.

References
1. International Institute of Tropical Agriculture (IITA)
2. U.S. Department of Agriculture (USDA)
3. International Plant Diagnostic Network (IPDN)
4. Agricultural Services and Producer Organizations Program (PSAOP)
5. Dr. Lamine Senghor, Laboratory of Plant Pathology at the Ministry of Agriculture’s Direction de la Protection des Vegetaux (Crop Protection Directorate (DPV))

**Fusarium tupiense** (Sordariomycetes: Hypocreales)
July 2012

Causal Organism
*Fusarium tupiense* (Sordariomycetes: Hypocreales)

Symptoms
Mango malformation disease including vegetative parts and flowers

Distribution
Brazil

References
**Pseudofusicoccum stromaticum (Dothideomycetes: Botryosphaeriales)**

September 14, 2011

**Causal Agent**

*Pseudofusicoccum stromaticum* (Dothideomycetes: Botryosphaeriales)

**Hosts**

*Mangifera indica* (mango); *Eucalyptus* spp.; and *Acacia mangium* (black wattle)

**Distribution**

Brazil and Venezuela

**Symptoms**

Dieback

**Notes**

*Pseudofusicoccum stromaticum* (Dothideomycetes: Botryosphaeriales) is not known to occur in the United States.

**References**


**Xanthomonas campestris pv. mangiferaeindicae**

June 2011

**Causal Organism**

*Xanthomonas campestris* pv. *mangiferaeindicae* (Gammaproteobacteria: Xanthomonadales)

**Synonyms**

*X. citri* pv. *mangiferaeindicae*

**Host**

*Mangifera indica* (mango) and *Anacardium occidentale* (cashew)

**Notes**

*Xanthomonas campestris pv. mangiferaeindicae* is an economically important pathogen of mango and *Anacardium occidentale* (cashew) and is reportable in the PEST ID database
Symptoms
Raised, angular, black lesions

Distribution
Africa, Asia, Australia, Brazil, Burkina Faso, and New Zealand

References

Circular 33: Diseases of *Morus* spp.

◆ Mulberry rust (federal quarantine significant) 10-94
◆ Mulberry mosaic agent (federal quarantine significant) 10-95

**Mulberry Rust (Federal Quarantine Significant)**

**Synonyms**

**Hosts**
*Broussonetia* spp. and *Morus* spp.

**Distribution**
Afghanistan, China, India, Indonesia, Japan, Korea, Myanmar, Pakistan, Philippines, Taiwan, Thailand, and Timor-Leste

**Symptoms**
*Aecia*. Located on both the upper and lower surface of the leaf. They can be solitary or in groups, sometimes densely clustered on leaves, buds, and branches, also on the veins and petioles. They can be in elongated clusters up to one centimeter long causing distortion and excessive host tissue growth. The aecia are cup shaped and deeply immersed in the plant tissue.

**Description**
*Aecia*. peridia are prominent, easily splitting vertically with the cells oblong to polygonal, 14 to 31 x 10 to 21 µm the inner wall 0.5 to 1 µm thick and verrucose. The outer wall is 3.5 µm thick, smooth to finely verrucose.

*Aeciospores*. angularly globose to ellipsoid, densely and minutely verrucose, hyaline to pale yellow. They are 11 to 20 x 9 to 17 µm with walls 1.5 µm thick.
Notes
Spermogonia, uredinia, and telia are unknown.

References

Mulberry Mosaic Agent (Federal Quarantine Significant)
Revised and restructured Feb. 1996

Synonyms
Mulberry mosaic, mulberry virosis virus, mulberry dwarf phytoplasma, mulberry mosaic agent

Hosts
Morus alba L., Morus spp.; possibly Broussonetia papyrifera (L.) Vent.

Distribution
China, India, Japan, Korea, Republic of, Thailand, and Russia

Symptoms
Chlorotic patches of various sizes and shapes are found on the leaves. Diseased leaves are very much puckered and become papery. Malformation of the leaves is also very characteristic of the disease particularly on the younger leaves. Tu (1932) adds that the plants may be stunted and the leaves mottled. Brierley (1944), crediting Endo and Kurasawa (1937), states that there may be enations on the under surface of the leaves and that rosetting and proliferation of lateral buds may occur. Intracellular bodies occur in epidermal and mesophyll cells.

Transmission
By grafting

References
1. Brierley, P. 1944. Viruses described primarily on ornamental or miscellaneous plants. P.D.R. Suppl. 150:145; 150; 184-85; 414; 436-37; 437; 448-49; 475.
Circular 34: Diseases of *Olea* spp.

- Olive latent ringspot virus 10-96
- Olive partial paralysis virus 10-96
- Olive sickle leaf virus 10-97

**Olive Latent Ringspot Virus**

This virus is naturally occurring and produces no symptoms in *Olea*. It has been reported from Italy. The virus particle is a sphere of about 28 nm in diameter. The virus was experimentally transmitted by sap inoculation to seven species of common virus indicators. Infection can be determined only by virus indexing.

**NOTICE**

Additional symptomless infections of *Olea* are caused by the viruses Arabis mosaic, cherry leaf roll, and strawberry latent ringspot.

**References**


**Olive Partial Paralysis Virus**

Revised and restructured Mar. 1996

**Synonyms**

None

**Hosts**

*Olea europaea* L., *Ligustrum sinense* Lour.

**Distribution**

Argentina

**Symptoms**

The disease known as “partial paralysis” of olive was reported by Nicolini and Traversi (1950) to be of serious concern to olive growers in Argentina.

The first symptoms observed on young plants consist of chlorotic, curled leaves on secondary twigs to which they remain adhering on desiccation. Later the entire branch shrivels from the tip downward. A dark reddish-purple band
appears on the bark. Later, other branches manifest this same condition and the plant ultimately dies.

Leaf tips often show a yellow bronzing spreading toward the middle, which terminated abruptly, leaving the rest of the leaf apparently normal. The necrotic area remains firmly attached. Many leaves, especially of the new buds, show a mosaic pattern with darkening of the midrib.

Symptoms vary from year to year depending on growing and climatic conditions. Under favorable conditions, diseased trees appear to recover.

Sections of twigs from diseased plants have a strong fermentation odor. Many rootlets are decayed. Internally there is a progressive disorganization of the cambium and phloem. The thin cambium zone increases in width due to the rapid multiplication of cells. Disorganization of the cambium ensues and may extend, in severe cases, as far as the secondary xylem, which becomes chestnut to nearly black in color. Heavy starch deposits may be found in the palisade and spongy tissues of leaves. The number of chloroplasts is reduced. Malformations are confined to the young cells.

A very similar disease, progressive decline of olive, is reported from Italy by Biraghi and Naldi (1948). It has not been proven that the disease is caused by a virus.

**Transmission**
The virus was transmitted to privet (*Ligustrum sinense*) by grafting buds or scions.

**References**

**Olive Sickle Leaf Virus**
The disease, in a severe form, could be a threat to the olive industry in the United States.

What appears to be the same disease has been reported in Chile, Italy, Greece, Portugal, the United States (California), and possibly Israel.

Ciferri et al. (1953), McCartney (1973), and Thomas (1958) describe various malformations of olive leaves. The various symptoms include leaves that are
sickle-shaped, chlorotic, deformed, blotched, streaked, curved, puckered, and are light-green in color with white markings.

Affected branches may be stunted and the amount of the fruit reduced. The disease appears in individual branches. Diseased plants are bushy in appearance.

References

Circular 35: Diseases of Passiflora spp.
◆ Cucumber mosaic virus 10-98
◆ Passion fruit (Passiflora) mosaic virus 10-100
◆ Passion fruit (Passiflora) woodiness virus 10-100

Cucumber Mosaic Virus

Synonyms
Marmor passiflorae Holmes., passion fruit woodiness virus, Passiflora virus 1 (Noble) K.M. Smith, passion fruit bullet disease virus

Hosts
Passiflora caerulea L., P. edulis Sims., alba Link and Otto., P. foetida L., P. suberosa L. and P. subpeltata Ort. (P. Alba)

Distribution
On Passiflora in Australia (New South Wales and Victoria), Kenya, New Zealand, and United States (California). The distribution on other hosts is very widespread.
Symptoms
The symptoms are most pronounced in the cooler months, sometimes disappearing in the summer. The whole plant or only individual branches may be affected. The first symptom is downward curling of the terminal leaves. This is followed by light-colored spotting or vein clearing of the young leaves. Cleared areas along the veins increase in width until leaves or portions of them become chlorotic. Small, irregular or circular islands of dark-green are sometimes present on such leaves. In subsequent years, symptoms are not so conspicuous, but young leaves show distortion and savoying. Scattered light-colored areas or vein clearing may also be present. Older leaves are crinkled, misshapen, and smaller than normal. Plants are stunted. According to Smith (1972), the stems, particularly in the region of the terminal shoots, may develop mottled dark-green areas that strongly contrast with the normal green of the stems.

The fruits of infected plants are smaller than normal, malformed, and the surface may be roughened and cracked. In contrast to the somewhat ovate normal fruit, they tend to be spherical, hence the name, bullet disease. They are hard when cut and sections of the rind are found to be thickened and woody. The contents are either dry or the pulp is reduced and insipid.

It is unlikely that fruits will be found on the plants in detention; therefore, the stem and leaf symptoms will be the most useful.

NOTICE
Although cucumber mosaic virus is present in California on Passiflora and on other hosts in other States, its destructive nature on Passiflora would destroy the usefulness of infected plants for all ordinary purposes.

References
Passion Fruit (*Passiflora*) Mosaic Virus

**NOTICE**

This disease is not known to be present in the United States.

**Synonyms**

None. However, this disease was confused with passion fruit woodiness virus and discussed under that name by workers in Queensland, Australia.

**Hosts**


**Distribution**

Nigeria and Australia (Queensland)

**Symptoms**

The symptoms are similar to those of cucumber mosaic virus on *Passiflora* spp. Martini (1962) states that leaf mottling is the *only* reliable symptom. This seems to overlook the fruit symptoms.

**Notes**

The two diseases can be distinguished, according to Martini (1962), by indexing to various host plants. Passion fruit mosaic virus is systemic *only* in *Passiflora*, and also by the size and shape of the purified virus particles. Neither of these tests can be used in the field. Therefore, the practice should be to destroy plants if found showing these symptoms. If plants imported for scientific purposes should be involved, the case should be referred to the Postentry Quarantine Unit for consideration.

**NOTICE**

Although cucumber mosaic virus is present in California on *Passiflora* and on other hosts in other States, its destructive nature on *Passiflora* would destroy the usefulness of infected plants for all ordinary purposes.

**References**


**Passion Fruit (*Passiflora*) Woodiness Virus**

Revised and restructured Feb. 1996
Hosts

Distribution
Australia (Queensland, New South Wales, and Western Australia) and Suriname

Symptoms
Causes mosaic, ringspots, rugosity and leaf distortion of *P. edulis*. The fruits are frequently distorted and the pericarp hard and thick. The productive life of the plants is greatly decreased. *P. suberosa* is a much more tolerant host.

Description
Virus particles are flexuous rods about 750 x 12 nm.

Transmission
By sap and grafting.

Vectors
In a nonpersistent manner by the aphids *Myzus persicae* (Taylor) and *Aphis gossypii* (Greber).

Notes
Both passion fruit woodiness virus and cucumber mosaic virus (description following) cause leaf mosaic and woody fruit symptoms. Electron microscopy can differentiate between the two since passion fruit woodiness virus is a flexuous rod and cucumber mosaic virus is a spherical particle. However, infection by both can occur. To determine if this has happened, inoculating and reading the resulting symptoms on diagnostic hosts can confirm or deny this occurrence.

References
Circular 36: Diseases of Philadelphus spp.

- Elm mottle virus (federal quarantine significant) 10-102

**Elm Mottle Virus (Federal Quarantine Significant)**
In progress.

Circular 37: Diseases of Picea spp.

- Douglas fir canker (federal quarantine significant) 10-22
- Rhododendron-spruce needle rust *Chrysomyxa ledi* (Alb. & Schw.) by var. *rhododendri* (DC) Savile (federal quarantine significant) 10-102
- Spruce (*Picea*) needle (cushion) rust 10-102

**Rhododendron-Spruce Needle Rust Chrysomyxa ledi (Alb. & Schw.) by var. rhododendri (DC) Savile (Federal Quarantine Significant)**
In progress.

**Spruce (Picea) Needle (Cushion) Rust**

**Causal Organism**
*Chrysomyxa abietis* (Wallr.) Unger

**Synonyms**
*Barclayella deformans* Diet., *C. deformans* Jacz. (3) (see notes), *Blennoria abietis* Wallr., *Sphaeria navicularis* Wallr., *Caeoma piceum* Hartig, *Uredo epidermoidalis* Hartig

**Hosts**

**Distribution**
Austria, Belgium, Bulgaria, Czechia, Denmark, France, Finland, United Kingdom of Great Britain and Northern Ireland, Germany, Hungary, Japan, Norway, Russia, Slovakia, Sweden, Switzerland, and once found in the United States in Louisville, Kentucky where spruce and fir do not occur naturally.
Symptoms
The following description is taken chiefly from Sorauer’s (1932) account. On the needles of the current year's growth there appears, by the end of June, at first dull, but later, bright-colored, cross bands. (Some authors say that the cross bands, or spots, are brown at first.) The infected tissue stands out in strong contrast with the healthy tissue, bright yellow against green. In May of the second year, the fungus matures and two orange-red sori develop parallel to each other, but slightly separated. The sori break through the epidermis of the host as they ripen, exposing the spores that are soon scattered. The yellow-spotted needles then wither and fall.

Description
The fungus telial sori linear, in rows, waxy, yellowish-red, seated in yellow spots; teliospores cylindric, above slightly thickened (clavate), often branched, sometimes simple, up to 100 mm long by 9 to 12 µm wide, up to 12 cells, wall hyaline, contents yellowish-red in color; basidiospores globose, 4 to 6 µm in diameter, golden-red in color. The above description is according to Saccardo (1888). The description found in Sydow's monograph of the Uredinales (1923) gives a slightly different account. A free translation follows. Telial sori on the lower side of the leaf, seated on yellow or yellowish-red spots, elongate,. 5 to 10 µm long .3 to .5 µm wide, and .5 µm high, golden to reddish brown in color; teliospores in chains reaching 70 to 100 µm long, oblong, smooth, 20 to 3 x 10 to 15 µm, wall hyaline, 1 µm thick.

NOTICE
Despite its name, this rust is predominately a disease of Picea (spruce) rather than Abies (fir). No alternate host is known. In addition to the record of its presence in Louisville, KY, there is a doubtful record that it was present on Abies canadensis (Picea candensis BSP) in Essex County, MA, in 1883. (Weir 1923).

References
Circular 38: Diseases of *Pinus* spp.


**Hemicycliophora dhanachandi** *(Hemicycliophoridae)*

December 2010

**Species**
Nematode

**Synonym**
*H. dhanachandi*

**Host**
*Pinus roxburghii* (chir pine); but little information is currently available regarding further host range

**Distribution**
India; but little information is currently known about further distribution

**Notes**
New nematode species isolated from soil around the roots of *Pinus roxburghii* (chir pine) plants in India. Nematodes in the genus *Hemicycliophora* feed on a wide range of plant species, damaging roots, and reducing plant growth. It is listed as reportable in the PEST ID database.

**References**

**Scotch Pine Blister Rust (Federal Quarantine Significant)**

Revised and restructured Feb. 1996

**Causal Organism**
*Cronartium flaccidum* (Alb. & Schw.) Wint.
Synonyms
Cronartium asclepiadeum (Willd.) Fries, Peridermium cornui Rostr. & Kleb. P. pini var. carticola, Aecidium paeoniae Wallr., Uredo paeoniae Cast

Hosts
Aecial. Pinus sylvestris L., P. mugo Turra., P. pinaster Ait., P. tabuliformis var. Yunnanesis

Imported uredial and telial hosts of this rust are not considered as a likely means of introducing the disease since this particular species of Cronartium is not systemic on these hosts. Furthermore, these plants, when brought into this country, usually arrive as seeds or nonfoliated dormant plant parts, and for that reason, represent a negligible risk. However, those same plants, when growing in this country, could serve as indicators of the presence of the rust that might have been introduced on pines by accident. For that reason, it is suggested that inspectors look for rusts on the following genera on the chance that the genera might sometime collect C. flaccidum.

Uredial and Telial. Blumenbachia, Cynanchum, Impatiens, Loasa, Melampyrum, Nemesia, Paeonia, Pedicularis, Ruellia, Schizanthus, Scyphanthus, Tropaeolum, Verbena, Vincetoxicum (esp. V. officinale)

Distribution
Europe and Asia

Symptoms
The following quotation is from Massee (1910). “The aecidia appear on bark of Scots fir, Pinus sylvestris, late in the spring, bursting through the outer dead cortex as irregular, inflated, pale yellow sacs, which open by an irregular crack and liberate the powdery, orange spores.” These “sacs” are from 2 to 6 mm long by 2 to 3 mm wide and high and are usually loosely aggregated on the branch, but may be evenly scattered. Description of the pathogen, Cronartium flaccidum (Alb. & Schwein.) Wint. (after Sydow).

1 Klebahn (1938) maintains that the meager original description of C. flaccidum then becomes the valid binomial. Many European mycologists follow this reasoning. Approximately 25 names have been applied to this rust. Those not listed above can be found in Sydow’s Monographia Uredinearum 3:560-63.
Description
Pycnia irregular, yellow in color; aecia on branches, erumpent, large, 2 to 6 mm long by 2 to 3 mm wide and high, mostly loosely aggregated, but may be rather evenly scattered over a large part of a branch, peridium white of 2 or 3 layers of cells, the outer layer of small cells, the inner layers of large warty cells, mostly without rigid hairs; peridial cells rhomboid-ellipsoid up to 80 µm long by 18 to 38 µm wide, warty, membrane 4 to 6 µm thick; aeciospores globose-ellipsoid or polyhedral, verrucose, 22 to 36 x 16 to 24 µm; wall hyaline, 3 to 4 µm thick.

On uredial and telial hosts the uredial sori sparse or aggregated, punctiform .15 to .25 mm in diameter, at last opening by a round pore, wall thin composed of cells up to 25 µm long by 15 µm wide, membrane cellular of almost uniform thickness (2 to 3 µm); uredospores ovate or ellipsoidal, loosely short echinulate, 18 to 30 x 14 to 20 µm, wall hyaline, 1.5 to 2.5 µm thick. The telial sori hypophyllous, sparse or aggregated, cylindrical, straight or curved, 1 to 2 µm long by 50 to 120 µm wide, yellowish-brown or reddish-brown in color; teliospores ellipsoid to oblong, smooth yellowish or yellowish-brown 20 to 60 x 10 to 16 µm, wall hyaline to golden, 1 1/2 µm thick, at the apex, slightly thicker.

References
Circular 39: Diseases of *Populus* spp.

- *Cytospora tritici* (Sordariomycetes: Diaporthales) 10-107
- Poplar (*Populus*) bacterial canker (federal quarantine significant) 10-108

**Cytospora tritici** (Sordariomycetes: Diaporthales)

May 17, 2012

**Causal Organism**

Fungus *Cytospora tritici* (Sordariomycetes: Diaporthales)

**Synonyms**

Originally described from *Triticum aestivum* (wheat) in Australia

**Hosts**

*Populus* spp. (poplar) trees

**Distribution**

China

**Symptoms**

Bark cankers and discolored sapwood

**Notes**

Not known to occur in the United States. The genus *Cytospora* is listed as reportable in the PEST ID database.

**References**


**Poplar (Populus) Bacterial Canker (Federal Quarantine Significant)**

Revised and restructured Jan. 1996

**Causal Organisms**

*Xanthomonas populi* (Ride) comb. nov.

**Synonyms**


**Hosts**

*Populus balsamifera* L. (*P. Candicans*), *P. brabantica* Houtzagers, *P. trichocarpa* Torr. & Gray, and on some varieties of *P. monilifera* Ait., *P. nigra* L.

**Distribution**

Europe

**Symptoms**

(After Dowson 1957) This is a serious disease of poplar characterized by die-back and cankers accompanied by a slimy exudation containing bacteria and other organisms. Cankers varying from 1 to 15 cm long develop on the shoots, the branches, and sometimes, the trunk. In early summer many of the young shoots die back and, during wet weather, pearl-like drops of slime exude from the smaller cankers, from the base of dead buds, and from the internodes of the previous season's shoots.

As the buds open, some of the tender young leaves turn black, and later expanded leaves may exhibit blackened areas of varying extent. Small rents, cracks, and depressions develop in the epidermis in the vicinity of the exudate, the cortex beneath which is black. A red layer is always present in the wood of the affected shoots. Two types of cankers can be distinguished. The first, developing in the current year of infection, takes the form of rough, knotted excrescences, varying in size from a pea to a walnut or more, referred to as closed cankers. The other type is a larger, 1-15 cm, elongated, perennial lesion with raised rim and exposed wood, is designated an open canker. Both types exude slime during wet weather in the spring.
Notes
Many fungi have been reported to cause cankers in *Populus*. In Europe, the most important of these according to Konig (4) are those caused by *Nectria* spp. In the Netherlands, particularly, *Nectria* is very commonly associated with *X. populi* in the same cankers. In France, this association is said to be rare. A canker of purely *Nectria* origin is said to be distinguishable by concentric zonation of the affected bark, by darker color in the first stages, and by the absence of the slimy exudate. *Nectria* cankers develop at a rapid rate in the winter months, while bacterial cankers grow little until spring.

References

Circular 40: Diseases of *Prunus* spp.

- Apple proliferation phytoplasma (federal quarantine significant) 10-85
- European rusty mottle of cherry (federal quarantine significant) 10-109
- Plum pox virus (federal quarantine significant) 10-110

**European Rusty Mottle of Cherry (Federal Quarantine Significant)**

June 3, 1963; restructured Mar. 1996

**Synonyms**
None

**Hosts**
*Prunus* spp. (cherry only)
**Distribution**
England, and probably other European countries

**Symptoms**
Symptoms first appear in July in England when groups of fine veins, tertiary or smaller, of mature leaves become yellow. The leaves gradually assume a dull green color in contrast to the bright green of the healthy leaves, and by the end of August, they have a yellowish-green appearance. Rusty red pigment develops on the leaf surface during August, usually, but not invariably, associated with the yellow veinlets. The amount of red coloration varies with the strain of the virus. Neither ring pattern, premature autumn yellowing, nor leaf-fall occurs. The shedding of yellowish-green mottled leaves with green rings in early summer, so characteristic of rusty mottle and mild rusty mottle in North America, does not occur.

Some virus strains have induced conspicuous dark red spotting and vein banding similar to red mottle in pear, while others have induced mainly yellow or pale rust colored pigmentation.

**References**

**Plum Pox Virus (Federal Quarantine Significant)**
Feb. 2000

**Synonyms**
Sharka

**Hosts**
All species of *Prunus* (almond, apricot, cherry, nectarine, peach, and plum) are natural hosts. *P. spinosum* is an important natural source of infection in Europe. Almost all the known apricot, peach, and plum cultivars are susceptible, but some remain symptomless when infected. There are six known strains of plum pox virus (PPV).

Sixty additional host species in eight plant families were found to be possible hosts when experimentally inoculated.

**Distribution**
Most European countries, Chile, Egypt, India, Syria, and Turkey Recently reported in the United States (Pennsylvania, Michigan, and New York)
Symptoms—Leaves

*Apricot.* Chlorotic, pale green lines, rings or spots develop on the leaves during the spring and can be observed until summer (Figure 10-38 on page 10-113).

*Peach.* Some chlorotic lines and small areas can develop on the leaves along the secondary and tertiary veins. These symptoms may be difficult to observe in the field (Figure 10-37 on page 10-112, Figure 10-40 on page 10-114, and Figure 10-41 on page 10-114).

*Plum.* Diffuse, pale green rings, lines or areas develop on the leaves in spring in some cultivars, they disappear in summer (Figure 10-39 on page 10-113).

This virus infects some wild and ornamental *Prunus* without symptoms. Symptoms on cherry are not common. Some varieties may flower during the quarantine period. Fruit symptoms are variable and since postentry plants should be released before fruit is produced, will not be discussed in this circular.

**Transmission**

Transmission occurs by grafting with infected budwood, and by 10 aphid species in a nonpersistent manner. The most efficient vectors are *Myzus persicae*, *Brachycaudus helichrysi*, *B. cardui*, and *Phorodon humuli*. Seed transmission has been reported for some strains of PPV in some hosts.
Figure 10-37  Peach leaves with plum pox virus (PPV) showing vein clearing
Figure 10-38  Apricot Prunus spp. with plum pox virus (PPV)

Figure 10-39  Plum fruit with plum pox virus (PPV); schematic drawing of symptoms on leaves and fruit
Disease and Pathogenic Organism Circulars
Circular 40: Diseases of Prunus spp.

References

Figure 10-40 Example of plum pox virus (PPV)-induced color breaking (pink flecks) in certain peach cultivars

Figure 10-41 Example of plum pox virus (PPV)-induced color breaking (pink flecks) in certain peach cultivars
Circular 41: Diseases of *Pseudolarix* spp.

- European larch canker (federal quarantine significant) 10-76

Circular 42: Diseases of *Pseudostuga* spp.

- Douglas fir canker (federal quarantine significant) 10-22

Circular 43: Diseases of *Punica* spp.

- Bacterial blight on pomegranate 10-115
- *Xiphinema granatum* (Longidoridea) 10-116

**Bacterial Blight on Pomegranate**

**Synonyms**

None

**Causal organism**

*Xanthomonas axonopodis pv. punicae*

**Hosts**

*Punica granatum* (pomegranate)

**Distribution**

India, Pakistan, and South Africa

**Symptoms**

Disease characteristics include leaf spots, branch, stem, and nodal cankers, and fruit blemishes. Pomegranate trees can die back above the parts on a branch or trunk girdled by the canker. Pomegranate production can be severely affected by high incidences of bacterial blight disease.
References


Xiphinema granatum (Longidoridae)

June 2012

Species
Nematode

Synonym
None

Host
Punica granatum (pomegranate) trees; but little information is currently available regarding further host range

Distribution
Iran; but little information is currently known about further distribution

Notes
New dagger nematode species isolated from soil around the roots of Punica granatum (pomegranate) trees in Iran. Xiphinema spp. can also vector nepoviruses. The genus Xiphinema is listed as reportable in the PEST ID database.

References
Circular 44: Diseases of Quercus spp.

- White rot and an undescribed gall-forming rust (federal quarantine significant) 10-117

White Rot and an Undescribed Gall-Forming Rust (Federal Quarantine Significant)

Quercus was placed under postentry regulations because of white rot caused by Stereum hiugense, and an undescribed gall-forming rust. The lack of recent reports regarding S. hiugense might signify the name is synonymous with one of the other Stereum spp.

Circular 45: Diseases of Ribes spp. (Grossularia)

- Black-currant reversion agent (federal quarantine significant) 10-117

Black-Currant Reversion Agent (Federal Quarantine Significant)

Synonyms
Ribes virus 1, Acrogenus ribes Holmes

Hosts
Ribes nigrum (European black currant)

Distribution
Europe and New Zealand

Symptoms
Leaves abnormally narrow and flat, generally smaller in surface area, but thicker and darker after early stages, small veins few, serrations of the leaf fewer and coarser. Wilson (1950) states that the “blossom symptoms can be distinguished in April. The buds of the infected bush are more highly colored than those of a healthy one, due to the absence of a dense mass of hairs, while the flowers which are carried on elongated stalks, appear transparent and more cylindrical than normal. The stigma protrudes above the anthers making pollination virtually impossible and what fruit does set usually drops.” Flowers and small fruits fall. Stems are less woody than normal with a tendency to excessive gum production.

It has been found that many of the symptoms develop so late in the disease cycle that they are of little use in the detection of the disease in the field. For this reason English workers rely on the following leaf symptoms in rouging the
plantings. The description is slightly revised from that published by Lees (1935).

If any leaf be examined from the under surface it will be noticed that there are 5 main (primary) veins arising from one point at the extreme base of the leaf. Those veins run to the 5 main points (lobes) of the leaf. Now if the secondary veins arising from the midrib on one side and running to the points on the margin (not counting the secondary veins from the primary veins other than the midrib) be counted it will be found that they number at least 5 in a normal leaf. Sometimes there are 6 to 7 but never less than 5. In a definitely reverted leaf, however, they are less than 5, 3 being a common number in well-developed cases, and in extreme cases they may be reduced to zero.

The second character to observe is the margin. In normal leaves there are numerous fine serrations, many of which do not receive a secondary vein, but receive vein branches of a lower order. In reverted leaves the margin has comparatively few and coarse serrations and only a few fine serrations exist which receive veins of a lower order than secondary.

In applying the foregoing instructions Amos and Hatton (1) stipulate that all but the “one or more leafy vegetative shoots which have developed from buds formed in the previous year’s wood” should be ignored. Leaves resembling reverted leaves may be found more or less commonly on the older wood. These may result from injury or in some situations appear to arise normally.

There is also a condition called “false reversion” which simulates the disease. In false reversion the basal leaves show the symptoms, later leaves approach or reach normal. In true reversion all leaves of a shoot are about equally affected.

An English Ministry of Agriculture leaflet has summarized inspection instruction briefly: If less than 5 secondary veins are present on each side of the main vein (midrib) in the central lobe of the leaf, the leaf is reverted if 5 or more, the leaf is probably normal.

If the margins (on both sides of the central lobe) are finely toothed, and if 4 to 8 of these teeth are not reached by a secondary vein, the leaf is almost certainly normal. If, however, this portion of the margin is coarsely-toothed, and if less than 4 of the teeth do not each receive a secondary vein, the leaf is reverted to some degree.

**Transmission**
By grafting. Reversion is not transmitted by expressed juice, nor through the soil, or through the seeds of infected plants.
Vector
The mite, *Cecidophyopsis ribis* (*Eriophyes ribis*). This is the mite which causes the condition known as big-bud. Big-bud and reversion, but not invariably, occur on the same plants.

References

Circular 46: Diseases of *Rosa* spp.

- *Cytospora rosarum* (Sordariomycetes: Diaporthales) 10-119
- Rose wilt agent (federal quarantine significant) 10-120

*Cytospora rosarum* (Sordariomycetes: Diaporthales)
December 01, 2011

Causal Agent
*Cytospora rosarum* (Sordariomycetes: Diaporthales)
Host
*Rosa* spp.

**Symptoms**
Twig, branch, and bark necrosis

**Distribution**
Armenia; Greece; India; Iran; Pakistan; Poland; Turkey; Ukraine; and United Kingdom of Great Britain and Northern Ireland

**Notes**
*Cytospora rosarum* (Sordariomycetes: Diaporthales) is *not* known to occur in the United States. The genera *Cytospora* and *Valsa* are listed as reportable in the PEST ID database.

**Reference**

**Rose Wilt Agent (Federal Quarantine Significant)**

**Synonym**
*Marmor flaccumfaciens*

**Time of Year to Inspect**
Spring; up to 6 weeks after leaves are fully out

**Symptoms**

*Plant.* Is wilted. Dieback of young shoots can be seen. Young plants produce pinched, yellowish-green shoots. There may be proliferation of stems from a single bud producing a witches’ broom effect. The shoots usually die during the year.

*Leaf.* Young petioles curve downward (epinasty), leaves are brittle and easily detached by wind or brushing with the hand. They often turn pale green or yellow in color before falling.

*Stem.* Dieback occurs in the stem. Some mature, but still soft stems may develop purple blotches that are often ring shaped. Scions are broad at the base and rapidly taper toward the tip.

*Flowers.* None
Transmission
Transmission occurs by grafting, mechanical, and/or insect (*Macrosiphum rosae, Aphidae*, in Australia).

Discussion
The rootstock of *Rosa multiflora* symptomless carrier of rose wilt agent, consequently the varieties grafted on this rootstock should be inspected for rose wilt agent symptoms. A disease named rose leaf curl and similar to rose wilt agent has been found in California. The agent is latent in antique roses and, therefore, such plants are symptomless. However, it incites symptoms in tea rose hybrids. As of this writing, there is no conclusive evidence that these diseases are caused by the same agent. For quarantine purposes, we presently consider them as distinct.

Distribution

![Map showing distribution of rose wilt agent](image)

Figure 10-42 Distribution of rose wilt agent; Australia (including Tasmania), New Zealand, Republic of South Africa; a similar disease occurs in Italy; for quarantine purposes, we will prohibit roses from these countries

References
Circular 47: Diseases of *Rubus* spp.

- Raspberry leaf blotch Virus (RLBV) 10-122
- *Rubus* stunt phytoplasma (federal quarantine significant) 10-122

**Raspberry Leaf Blotch Virus (RLVB)**

May 2012

**Causal Agent**
Emaravirus raspberry leaf blotch virus (RLBV)

**Hosts**
*Rubus idaeus* cv. glen ample (red raspberry) plants

**Symptoms**
Yellow leaf blotches and reduced yield

**Vectors**

**Distribution**
Finland, United Kingdom of Great Britain and Northern Ireland, and Serbia

**References**

**Rubus Stunt Phytoplasma (Federal Quarantine Significant)**


**Synonyms**
Witches’ broom, Heksenbezem, Dwergziekt, *Rubus Stauche*, Verzwergungskrankheit, ved “miny,” dvergsjuke, Sheaf

**Hosts**
*Rubus* spp. This agent has been found in all the principal European raspberry varieties, and in many wild blackberry species. It can be experimentally transmitted to *Fragaria vesca* L. and several commercial strawberry varieties.

**Distribution**
Bulgaria, Czechia, Denmark, England, Germany, Netherlands, Norway, Poland, Slovakia, and Russia
Symptoms

The disease is of great economic importance because of the severe crop losses that may occur when the disease becomes epidemic.

According to F.A. van der Meer and H.J. de Fluiter (1970) who studied the diseases in the Netherlands, the symptoms are basically alike in all species and varieties. Prentice (1950) states, however, that in raspberry, the symptoms depend to some extent on the variety infected.

Generally there are numerous small, thin, weak canes and excessive lateral branching of the whole plant, together with phyllody and proliferation of the flowers.

Prentice (1950) reports that in the season following the observance of weak canes, they generally fail to flower or produce very few flowers. Some varieties of raspberry have a tendency to produce a proportion of abnormal flowers. Sometimes the sepals are slightly longer than normal or the tips more leafy. According to Prentice (1950) and Putz (1969), in extreme cases, the sepals and carpels develop into leaves.

Prentice (1950) states that fruiting canes tend to have shortened internodes and often more than one bud develops at each node. Sometimes the development of axillary buds near the base of the cane help accentuate the bushy appearance of the plant. In early summer, leaves on infected canes are usually paler in color than normal.

In France, Putz (1969) reported symptoms of virescence on floral parts of “Malling Promise” similar to those of Rubus stunt phytoplasma, however, the virus has not yet been determined.

According to van der Meer and de Fluiter (1970), the variety “Malling Promise” is tolerant to some extent and on which phyllody is very rare. Other raspberry and blackberry varieties may regenerate to a high degree, consequently such regenerated plants generally do not show flower deformation.

Raspberry plants that are already badly affected by other viruses, such as mosaic diseases, are more sensitive to Rubus stunt phytoplasma, and often die within a few years of infection.

Among the great number of shoots formed, some become larger than others and bear normal but small fruits that are difficult to harvest. Fruiting laterals of infected plants are always shorter than those of healthy plants.
In cultivated plantations, many diseased plants die in the shock stage of infection, because they are overgrown by healthy ones. However, raspberry plants grown from diseased root cuttings and planted distant from each other seldom die and may show a certain degree of regeneration.

On *Fragaria* vesca and commercial strawberry varieties, the virus causes witches’ broom, phyllody of flowers, and severe growth reduction. Infected strawberry plants usually die within 2 or 3 years.

**Transmission**
The virus is transmitted by grafting. The incubation time for the virus to manifest itself is between 4 to 11 months depending on the season during which the plants are infected.

**Vector**
The vector is the leaf hopper, *Macropsis fuscula* Zett.

The vector has been reported from several European countries extending from Italy to Norway, Northern Russia, Canada (British Columbia), and United States (State of Washington, several counties).

There are two other probable vectors of the virus within the genus *Macropsis*: *M. brabantica* and *M. scotti*.

![First symptoms of Rubus stunt in red raspberry; numerous weak and erect shoots develop from the root buds](image-url)

**Figure 10-43** First symptoms of *Rubus* stunt in red raspberry; numerous weak and erect shoots develop from the root buds
Figure 10-44 Floricane of *Rubus* stunt-infected blackberry cv. “thornless evergreen,” showing witches’ broom growth and yellowing
Disease and Pathogenic Organism Circulars
Circular 47: Diseases of Rubus spp.

References


Figure 10-45 Phyllody of flowers of red raspberry cv. “Norfolk giant” sepals, petals, and pistils become leaflike structures; stamens usually remain normal
Circular 48: Diseases of *Salix* spp.

- Virus chlorosis 10-127
- Watermark disease (federal quarantine significant) 10-127

**Virus Chlorosis**

**Synonyms**
No synonyms are known.

**Hosts**

**Distribution**
Czechia, Slovakia, and Hungary

**Symptoms**
The chlorosis (yellowing) occurs between the veins in the blade of the leaf. The leaves may be much reduced in size and drop prematurely. The whole tree may show weak growth, sometimes accompanied by an excessive production of small secondary branches on the shoots, a witches’ broom effect.

**Transmission**
It has been transferred by grafting. The symptoms then appear in about 27 days. It can be transferred by sap inoculation but with difficulty. In this case, symptoms take much longer to become visible, about 61 days. An insect vector is believed to be involved in the natural spread of this disease because it may suddenly appear on previously healthy trees.

**References**

**Watermark Disease (Federal Quarantine Significant)**
Revised and restructured July 2005

**Causal Organism**
*Erwinia salicis* (Day) Chester
Synonyms

*Bacterium salicis* Day and *Brenneria salicis* (Day) Hauben et al.

In Holland, a disease of *Salix*, also called “watermark” is said to be caused by *Pseudomonass saliciperda* (Lindeijer 1932). Lindeijer (1932) states that the symptoms appear to be identical with those of the disease reported in England and holds that the diseases are probably identical. Impure cultures may have caused the discrepancy. Recent English papers continue to use Day's name revised by Chester. With these reservations as to the correct taxonomy we can proceed in postentry work handling watermark as if one disease is involved. If two, they are visually alike and equally harmful.

Hosts

*Salix alba calva* var. *calva* G.F. Mey., *S. alba* L., *S. purpurea* L., *S. X rubens* Shrank, *S. triandra* L. (*S. Amygdalina*), and *S. viminalis* L.

Distribution

Belgium, England, Germany, Japan, and The Netherlands

Symptoms

(After Dowson 1957) In England the first obvious sign of the disease is the sudden appearance of a bright red color of some of the leaves during hot weather in early summer. The foliage of whole branches may be affected in this way. Shortly afterwards, a bacteria-containing liquid drips in some quantity from the infected shoots. The reddened leaves soon turn brown and wither but do not fall. If infected shoots are cut across, a circular grayish discoloration is visible in the previous season's annual ring, but not in the current season's growth. This is the watermark that extends through the wood of the tree even into the roots. Adventitious shoots are produced numerously. These, being new wood, do not show the watermark when cut. Their presence is an indication of the disease. The “red leaf” branches are seldom killed and they die back, producing a “stag head” appearance of the trees.

In The Netherlands the first symptoms appear in May. The first leaves on a twig turn brown; subsequently the tip and the remaining leaves show signs of wilting. After one to several weeks, the neighboring twigs wither in their turn. Weather conditions largely influence the rapidity of this process.

As a rule, the sudden wilting may occur throughout the summer until September. Adventitious twigs may develop on the infected branches. In places on the infected twigs, exudations, consisting of a clear, sticky liquid that contains large masses of bacteria, may be found from May until the end of August. The color of infected twigs may fade.
The following internal symptoms are of even more importance to the plant quarantine worker who often sees only dormant plants or cuttings. On the freshly cut surface of a diseased twig a liquid mass soon gathers. A more or less large area of the wood has a water-soaked appearance. After having been exposed to the air, this wood turns brown. If a twig has been diseased for some time, the wood shows brown color directly when cut. When a twig is cut lengthwise the brown color appears as continuous streaks. Under the microscope, sections show the vessels swimming with bacteria. Tyloses and gum-like substances also occur in the vessels. Part of the medullary ray cells and the parenchyma cells are dead. No starch is found in the discolored wood. Infected trees are killed in 1 or 2 years.

**Transmission**

(The Netherlands) Observation and experiments indicate that the beetle *Cryptorrhynchus lapathi* L. is an important carrier of the disease.

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**Figure 10-46** Watermark disease of *Salix* spp.; typical die-back symptoms of this quarantine-significant disease caused by *Erwinia salicis*

**References**

2. Lindeijer, E.J. 1932. De Bacterie-Ziekte Van Den Wilg Veroorzaakt Door Pseudomonas saliciperda n. spp. 8 illus., 82. (English summ.).
Circular 49: Diseases of *Sorbus* spp.

- Leaf distortion 10-130
- Mountain ash variegation agent (federal quarantine significant) 10-130
- Ringspot mosaic of *Sorbus* 10-131

**Leaf Distortion**

**Causal Organism**
*Taphrina piri* Kusano

**Synonyms**
*Exoascus piri* (Kusano) Sacc. & Trott

**Hosts**
*Sorbus alnifolia* (Siebold & Zucc.) C. Koch (*Micromeles alnifolia*), and *Pyrus miyabei* Sarg.

**Distribution**
Australia, China, Japan, New Zealand, Oceania, and the Philippines

**Symptoms**
The infected leaves of *S. alnifolia* show yellowish-green, circular or irregularly shaped leaf spots. The spots bear a pruinose, hoary-white growth on the surface when the fungus matures. This growth is composed of the closely crowded ascus cells of the fungus.

**References**
2. CFR 319.37§2.

**Mountain Ash Variegation Agent (Federal Quarantine Significant)**

**Synonyms**
*Pyrus* virus I (Baur) Smith, Infectious chlorosis (Baur 1907), Infectious chlorosis Hertzsch 1930, and *Pyrus* variegation virus (Atanasoff 1935)

**Host**
*Sorbus aucuparia* L. and *Pyrus aucuparia* Gaertn
**Distribution**
Czechia, Denmark, Germany, and Slovakia

**Symptoms**
The leaves of infected trees have, at first, yellow tips that later become white. In cases of severe infection, the leaves do not show well-defined yellow cones, but become mottled with yellow spots. On some leaves the yellow tissues are limited to the tips. In other cases, there is a clearing of the veins, or alternatively, a yellow band about 2 mm wide may run along the main veins. Chlorotic tissues gradually become white and finally brown.

The above description is that given by Smith (1972) who seems to have used it almost verbatim as written by Atanasoff (1935). Atanasoff’s (1935) sources were Baur, Kranzlin, and Hertzsch (1907). Brierley (1944) has condensed the description to a sentence. “Yellow or white variegation, sometimes vein clearing and vein-banding (Smith 1972).”

**Transmission**
Transmission occurs by grafting. According to Baur (1907), a variegation not of virus origin also occurs on *Sorbus aucuparia Dirkenii aurea*. This variegated variety has rather evenly colored yellowish-green older leaves, and young leaves of a pronounced yellow. As it was not transmitted by grafting, Baur concluded that it is a noninfectious variegation.

**References**
3. Brierley, P. 1944. Viruses described primarily on ornamental or miscellaneous plants. P.D.R. Suppl. 150:145; 150; 184-85; 414; 436-37; 437; 448-49; 475.
5. CFR 319.37§2.

**Ringspot Mosaic of Sorbus**

**Synonyms**
None

**Hosts**
*Sorbus aucuparia* L.
**Distribution**
Germany and possibly Finland

**Symptoms**
The symptoms appear regularly in the years following infection. The incubation time is about 10 months. They appear a few days after the leaves open as spot-like, light-green flecks on the pinnules. Later, they form a number of light-green spots, bands, or rings, the diameter of which is only a few millimeters. In this way, the leaves attain a distinct mottling or streaking. Often, additional light-brown, dark-bordered necrotic spots appear that occasionally become shot holes. The disease may at first be confined to a branch, but in later years spreads to other parts of the crown. Injury is not discussed, but the yellowing and mottling would affect the tree’s value as an ornamental plant.

**References**
**Distribution**
Chile; South Africa; and Australia

**Notes**
*Diaporthe australafricana* (Sordariomycetes: Diaporthales) has been observed in Chile since 2006. It is not known to occur in the United States. The genus *Diaporthe* is listed as reportable in the PEST ID database.

**References**
Latorre, BA, E Elfar, JG Espinoza, R Torres, & GA Diaz. First report of *Diaporthe australafricana* associated with stem canker on blueberry symptoms in Chile. Plant Disease DOI: 10.1094/PDIS-12-11-1025-PDN.

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**Circular 53: Diseases of Watsonia spp.**

- Gladiolus rust (federal quarantine significant) **10-36**
- *Puccinia mccleanii* [Doidge] (federal quarantine significant) **10-61**
- *Uredo gladioli-buettneri* (federal quarantine significant) **10-42**
- *Uromyces gladioli* [Henn.] (federal quarantine significant) **10-62**

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**Circular 54: Diseases of Ziziphus spp.**

- *Longidorus pisi* (Longidoridae) **10-133**

**Longidorus pisi** (Longidoridae)

November 02, 2011

**Species**
Needle nematode

**Hosts**
*Ziziphus jujuba* (Chinese date); *Z. jujuba* var. *spinosa* (wild jujube); *Glycine max* (soybean); *Vitis vinifera* (grape); *Zea mays* (corn); *Oryza sativa* (rice); and *Pisum sativum* (pea)

**Distribution**
China; Cyprus; Africa; Pakistan; and India

**Notes**
*Longidorus pisi* (Longidoridae) was found in soil surrounding *Ziziphus jujuba* (Chinese date). It is not known to occur in the United States, and is listed as reportable in the PEST ID database.
Reference
# Directory of PPQ Postentry Quarantine Liaison Officers

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**Introduction**

The following list includes contact information for the PPQ Postentry Quarantine Liaison Officers (PEQLO) in both the Eastern and Western regions. Plant Inspection Stations (PIS) should use this list when determining who to contact and to whom PEQ forms and correspondence should be sent, i.e., PPQ Form 236 for the PPQ Liaison Officers. A list of State Plant Regulatory Officials and State PEQ Contacts can be found in Directory of SPROs and State PEQ Contacts on page C-1.

**Listings**

Table A-1 Directory of PEQ Liaison Officers (page 1 of 5)

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<tr>
<th>State:</th>
<th>Contact:</th>
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<td>Jeffrey Lasiter (<a href="mailto:jeffrey.t.lasiter@usda.gov">jeffrey.t.lasiter@usda.gov</a>)</td>
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<td>Tirzah Harris (<a href="mailto:tirzah.harris@usda.gov">tirzah.harris@usda.gov</a>)</td>
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### Table A-1 Directory of PEQ Liaison Officers (page 3 of 5)

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<td>Idaho</td>
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</tr>
<tr>
<td>Iowa</td>
<td>VACANT—contact PEQ Coordinator</td>
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<td>Kentucky</td>
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<td>Maine</td>
<td>Rachel S. Nyce, SPHD (<a href="mailto:rachel.s.nyce@usda.gov">rachel.s.nyce@usda.gov</a>)</td>
<td>USDA–APHIS–PPQ 15 Iron Rd., Suite 1 Hermon, ME 04401</td>
<td>P: 207-848-0008 C: 207-409-3325</td>
</tr>
<tr>
<td>Maryland</td>
<td>Darryl Moore, Acting SPHD (<a href="mailto:darryl.c.moore@usda.gov">darryl.c.moore@usda.gov</a>)</td>
<td>USDA–APHIS–PPQ 2400 Broening Highway, Suite 102 Baltimore, MD 21224</td>
<td>P: 302-287-5542 F: 410-228-5542</td>
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<tr>
<td>Massachusetts</td>
<td>See Connecticut on page A-3</td>
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<td>David Burt (<a href="mailto:david.m.burt@usda.gov">david.m.burt@usda.gov</a>)</td>
<td>USDA–APHIS–PPQ 3260 Eagle Park Drive Suite 103 Grand Rapids, MI 49525</td>
<td>P: 616-942-6225 C: 734-732-2947 F: 616-942-6235</td>
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## Table A-1 Directory of PEQ Liaison Officers (page 4 of 5)

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<tr>
<td>Mississippi</td>
<td>Miriam L. Allred (<a href="mailto:miriam.l.allred@usda.gov">miriam.l.allred@usda.gov</a>)</td>
<td>USDA–APHIS–PPQ 2159 Henry Hill Dr., Suite 100B Jackson, MS 39204</td>
<td>P: 601-922-1417</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>F: 601-922-7648</td>
</tr>
<tr>
<td>Missouri</td>
<td>Brian R. Deschu (<a href="mailto:brian.r.deschu@usda.gov">brian.r.deschu@usda.gov</a>)</td>
<td>USDA–APHIS–PPQ 1715 Southridge Dr. Jefferson City, MO 65109</td>
<td>P: 573-893-6833</td>
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<tr>
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<td></td>
<td>F: 573-216-0657</td>
</tr>
<tr>
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<td>Joey Esilva (<a href="mailto:joey.esilva@usda.gov">joey.esilva@usda.gov</a>)</td>
<td>USDA–APHIS–PPQ 1220 Cole Ave. Helena, MT 59601</td>
<td>P: 406-449-5210</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>F: 406-449-5212</td>
</tr>
<tr>
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<td>Craig A. Webb, Ph.D., SPHD (<a href="mailto:craig.a.webb@usda.gov">craig.a.webb@usda.gov</a>)</td>
<td>USDA–APHIS–PPQ 1131 SW Winding Rd., Suite A Topeka, KS 66615</td>
<td>P: 785-228-6551</td>
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<tr>
<td></td>
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<tr>
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<tr>
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<td>Shawn Carson (<a href="mailto:shawn.r.carson@usda.gov">shawn.r.carson@usda.gov</a>)</td>
<td>USDA–APHIS–PPQ 270 South 17th St. Las Cruces, NM 88005</td>
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<td>Thomas DeSisto (<a href="mailto:thomas.m.desisto@usda.gov">thomas.m.desisto@usda.gov</a>)</td>
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<td>Sheena Stanley (<a href="mailto:sheena.stanley@usda.gov">sheena.stanley@usda.gov</a>)</td>
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<td>Amy Mesman, SPHD (<a href="mailto:amy.mesman@usda.gov">amy.mesman@usda.gov</a>)</td>
<td>USDA–APHIS–PPQ 3509 Miriam Ave., Suite A Bismarck, ND 58501</td>
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<td>John Michael Burch (<a href="mailto:john.m.burch@usda.gov">john.m.burch@usda.gov</a>)</td>
<td>USDA–APHIS–PPQ 8995 East Main St. Reynoldsburg, OH 43068</td>
<td>P: 614-322-4700</td>
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<td>F: 614-322-4704</td>
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<tr>
<td>Oklahoma</td>
<td>Jonathan Motloch (<a href="mailto:jonathan.motloch@usda.gov">jonathan.motloch@usda.gov</a>)</td>
<td>USDA–APHIS–PPQ 301 N.W. 6th St., Suite 101 Oklahoma City, OK 73102</td>
<td>P: 405-609-8842</td>
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<td></td>
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<td></td>
<td>F: 405-609-8841</td>
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<tr>
<td>Oregon</td>
<td>Kara Mills, Lead Horticulturist (<a href="mailto:kara.mills@oda.oregon.gov">kara.mills@oda.oregon.gov</a>)</td>
<td>Oregon Department of Agriculture 635 Capitol St. NE Salem, OR 97301-2532</td>
<td>P: 503-983-6521</td>
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<tr>
<td>Pennsylvania</td>
<td>Michele McDonald, PHSS (<a href="mailto:michele.l.mcdonald@usda.gov">michele.l.mcdonald@usda.gov</a>)</td>
<td>USDA–APHIS–PPQ 121 Locust St. Wrightsville, PA 17368</td>
<td>P: 717-574-2882</td>
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<tr>
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<td>F: 215-768-4841</td>
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## Table A-1 Directory of PEQ Liaison Officers (page 5 of 5)

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<th>State</th>
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<tr>
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<td>See Connecticut on page A-3</td>
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<tr>
<td>South Carolina</td>
<td>Heather Russell (<a href="mailto:heather.n.russell@usda.gov">heather.n.russell@usda.gov</a>)</td>
<td>USDA–APHIS–PPQ 4600 Goer Drive, Suite 104 Charleston, SC 29406</td>
<td>P: 864-346-4410</td>
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<tr>
<td>South Dakota</td>
<td>Amy Mesman, SPHD (<a href="mailto:amy.mesman@usda.gov">amy.mesman@usda.gov</a>)</td>
<td>USDA–APHIS–PPQ 314 South Henry, Suite 200 P.O. Box 250 Pierre, SD 57501-0250</td>
<td>P: 605-224-1713</td>
</tr>
<tr>
<td>Texas</td>
<td>Mathias Marcos (<a href="mailto:mathias.marcos@usda.gov">mathias.marcos@usda.gov</a>)</td>
<td>USDA–APHIS–PPQ 903 San Jacinto Blvd., Suite 270 Austin, TX 78701</td>
<td>P: 512-916-5241</td>
</tr>
<tr>
<td>U.S. Virgin Islands</td>
<td>Diana Collingwood (<a href="mailto:diana.collingwood@doa.vi.gov">diana.collingwood@doa.vi.gov</a>)</td>
<td>RR1 Box 10345 Kingshill, VI 00850</td>
<td>P: 340-642-9027</td>
</tr>
<tr>
<td>Utah</td>
<td>Gregory Abbott (<a href="mailto:gregory.c.abbott@usda.gov">gregory.c.abbott@usda.gov</a>)</td>
<td>USDA–APHIS–PPQ 65 South 100 East Richfield, UT 84701</td>
<td>P: 435-896-4772</td>
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<tr>
<td>Vermont</td>
<td>Lindsay Modesto (<a href="mailto:lindsay.modesto@usda.gov">lindsay.modesto@usda.gov</a>)</td>
<td>USDA–APHIS–PPQ 222 Holiday Drive Building 2, Suite 1 White River Junction, VT 05001</td>
<td>P: 802-369-3207</td>
</tr>
<tr>
<td>Virginia</td>
<td>Karen Williams (<a href="mailto:karen.a.williams@usda.gov">karen.a.williams@usda.gov</a>)</td>
<td>USDA–APHIS–PPQ 200 Granby Mall Federal Bldg., Rm. 331 Norfolk, VA 23510</td>
<td>P: 757-441-3211</td>
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<tr>
<td>Wisconsin</td>
<td>Monica Little (<a href="mailto:monica.m.little@usda.gov">monica.m.little@usda.gov</a>)</td>
<td>USDA–APHIS–PPQ 835 S.192nd St., Suite 1600 Seatac, WA 98148</td>
<td>P: 206-878-6602</td>
</tr>
<tr>
<td>West Virginia</td>
<td>Justin Thaxton (<a href="mailto:justin.b.thaxton@usda.gov">justin.b.thaxton@usda.gov</a>)</td>
<td>USDA–APHIS–PPQ 1900 Kanawha Blvd., East Charleston, WV 25305</td>
<td>P: 304-343-8585</td>
</tr>
<tr>
<td></td>
<td>Ellen M. Natzke (<a href="mailto:ellen.m.natzke@usda.gov">ellen.m.natzke@usda.gov</a>)</td>
<td>USDA–APHIS–PPQ 1 Gifford Pinchot Dr. Building 1, Room 229 Madison, WI 53726</td>
<td>P: 608-286-3610</td>
</tr>
<tr>
<td>Wyoming</td>
<td>Jeremy Newland (<a href="mailto:jeremy.j.newland@usda.gov">jeremy.j.newland@usda.gov</a>)</td>
<td>USDA–APHIS–PPQ 5252 Yellowstone Road Suite 208 Cheyenne, WY 82009</td>
<td>P: 307-432-7979</td>
</tr>
<tr>
<td></td>
<td>Bruce Shambaugh, SPHD (<a href="mailto:bruce.a.shambaugh@usda.gov">bruce.a.shambaugh@usda.gov</a>)</td>
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## Plant Inspection Stations

### Listings

Table B-1  Directory of Plant Inspection Stations (page 1 of 2)

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<th>Region</th>
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<tr>
<td>Eastern</td>
<td>USDA–APHIS–PPQ&lt;br&gt;Plant Inspection Station&lt;br&gt;P.O. Box 660520&lt;br&gt;Miami, FL 33266</td>
<td>Phone: 305-526-3900&lt;br&gt;FAX: 305-871-4205</td>
</tr>
<tr>
<td></td>
<td>USDA–APHIS–PPQ&lt;br&gt;Plant Inspection Station&lt;br&gt;3951 Centerport St.&lt;br&gt;Orlando, FL 33122</td>
<td>Phone: 407-825-4237&lt;br&gt;FAX: 407-825-4235</td>
</tr>
<tr>
<td></td>
<td>USDA–APHIS–PPQ&lt;br&gt;Atlanta Plant Inspection Station&lt;br&gt;1220 Toffie Terrace&lt;br&gt;Atlanta, GA 30354</td>
<td>Phone: 404-260-7830&lt;br&gt;FAX: 404-260-7832</td>
</tr>
<tr>
<td></td>
<td>USDA–APHIS–PPQ&lt;br&gt;Memorial Inspection Station&lt;br&gt;2500 Brunswick Ave., Bldg. G&lt;br&gt;Linden, NJ 07036</td>
<td>Phone: 908-862-2012&lt;br&gt;FAX: 908-862-2095</td>
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<td></td>
<td>USDA–APHIS–PPQ&lt;br&gt;Plant Inspection Station&lt;br&gt;230-59 International Airport Centers Blvd.&lt;br&gt;Building C-Suite 100-Room 109&lt;br&gt;Jamaica, NY 11413</td>
<td>Phone: 718-553-3500&lt;br&gt;FAX: 718-553-3510</td>
</tr>
<tr>
<td></td>
<td>USDA–APHIS–PPQ&lt;br&gt;Plant Inspection Station&lt;br&gt;150 Central Sector, Bldg. C2, Warehouse #3&lt;br&gt;Carolina, PR 00979</td>
<td>Phone: 787-253-7850&lt;br&gt;FAX: 787-253-4514</td>
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<tr>
<td>Western</td>
<td>USDA–APHIS–PPQ&lt;br&gt;Plant Inspection Station&lt;br&gt;9 North Grand Ave., Room 120&lt;br&gt;Nogales, AZ 85621</td>
<td>Phone: 520-287-6463&lt;br&gt;FAX: 520-397-0138</td>
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<tr>
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<td>USDA–APHIS–PPQ&lt;br&gt;Plant Inspection Station&lt;br&gt;9777 Via de la Amistad, Rm. 140&lt;br&gt;San Diego, CA 92154</td>
<td>Phone: 619-661-3316&lt;br&gt;FAX: 619-661-3047</td>
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## Table B-1 Directory of Plant Inspection Stations (page 2 of 2)

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<td>Western</td>
<td>USDA–APHIS–PPQ Plant Inspection Station 560 Eccles Avenue South San Francisco, CA 94080</td>
<td>Phone: 650-876-9093 FAX: 650-876-9008</td>
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<tr>
<td></td>
<td>USDA–APHIS–PPQ Plant Inspection Station 222 Kansas St. El Segundo, CA 90245</td>
<td>Phone: 310-955-3258 FAX: 310-321-0035</td>
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<tr>
<td></td>
<td>USDA–APHIS–PPQ Plant Inspection Station 17-3306 Neptune Avenue Barrigada, GU 96913</td>
<td>Phone: 671-475-1427 FAX: 671-477-9487</td>
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<tr>
<td></td>
<td>USDA–APHIS–PPQ Plant Inspection Station 300 Rodgers Blvd., #58 Honolulu, HI 96819</td>
<td>Phone: 808-834-3240 FAX: 808-861-8501</td>
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<tr>
<td></td>
<td>USDA–APHIS–PPQ Plant Inspection Station 19581 Lee Rd. Humble, TX 77338</td>
<td>Phone: 281-233-7100 FAX: 281-230-7223</td>
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<tr>
<td></td>
<td>USDA–APHIS–PPQ Plant Inspection Station (Brownsville) P.O. Drawer 993 100 Los Indios Blvd. Los Indios, TX 78567</td>
<td>Phone: 956-399-2085 FAX: 956-399-4001</td>
</tr>
<tr>
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<td>USDA–APHIS–PPQ Plant Inspection Station 835 S. 192nd St., Suite 1600 SeaTac, WA 98148</td>
<td>Phone: 206-878-6600 FAX: 206-870-8043</td>
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## Directory of SPROs and State PEQ Contacts

### Contents

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Introduction

The following list includes contact information for State and Territory Plant Regulatory Officials (SPRO) and State PEQ Contacts. Plant Inspection Stations (PIS) should use this list when determining who to contact and to whom PEQ forms and correspondence should be sent, i.e., PPQ Form 236 for the State Contacts (copies number 3, 4, 5, and 6). A list of PPQ Liaison Officers for each State can be found in the Directory of PPQ Postentry Quarantine Liaison Officers on page A-1.

National Plant Board

What is the National Plant Board?¹

The National Plant Board is a nonprofit organization of the plant pest regulatory agencies of each of the states and Commonwealth of Puerto Rico. Member agencies must be members in good standing of the regional plant board in which their state or commonwealth is located.

Purpose²

Purposes of the National Plant Board as stated in its Articles of Incorporation include:

1. To provide national representation for the Eastern Plant Board, the Southern Plant Board, the Central Plant Board, and the Western Plant Board, and to receive, consider and implement to the extent possible, all regional plant board recommendations.

2. To foster effective and harmonized plant health programs; to act as an information clearinghouse on plant pest prevention and regulatory matters; to provide for a discussion of principles, policies and methods; and to make recommendations to the regional boards for the promotion of efficiency, harmony and uniformity in and among the states in the field of plant pest prevention and regulation.

3. To collaborate and communicate effectively with public and private agencies and organizations on plant health and plant pest regulatory issues which affect the states.

4. To protect agriculture, horticulture, forestry, and the environment on state, national and international levels.

¹ This information was retrieved from the National Plant Board Web site [https://nationalplantboard.org/].

² Id.
The National Plant Board Members

Membership of the National Plant Board [https://nationalplantboard.org/membership/] is made up of the principal plant pest regulatory officials of each member Commonwealth and State. This person is usually the administrator of the section of his or her state's Department of Agriculture that deals with pest prevention. Such units usually carry titles such as Plant Industry, Plant Health, Entomologist, State Plant Pathologist, etc. In some States the function is in an agency other than the department of agriculture.

Listings

Table C-1 Directory of State Plant Regulatory Officials and State PEQ Contacts (page 1 of 6)

<table>
<thead>
<tr>
<th>State:</th>
<th>Contact:</th>
<th>Address:</th>
<th>Phone/FAX:</th>
</tr>
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<tbody>
<tr>
<td>Alabama</td>
<td>Christel F. Harden, SPRO Plant Pest Administrator (<a href="mailto:christel.harden@agi.alabama.gov">christel.harden@agi.alabama.gov</a>)</td>
<td>Alabama Department of Agriculture and Industries 1445 Federal Drive Montgomery, AL 36107</td>
<td>P: 334-240-7226 F: 334-240-7168</td>
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<td>Tim Johnson Plant Protection Inspector (<a href="mailto:ptimjohn@aol.com">ptimjohn@aol.com</a>)</td>
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<td>State:</td>
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<tr>
<td>Connecticut</td>
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<td></td>
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<td>P.O. Box 147100</td>
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<td>1911 Southwest 34th Street</td>
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<td>Gainesville, FL 32614-7100</td>
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<td>1109 Experiment Street</td>
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<td>Redding Building, Room 213</td>
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<td>Griffin, GA 30223</td>
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<td></td>
<td></td>
<td>Indianapolis, IN 46204</td>
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<td>State</td>
<td>Contact</td>
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<td>Montana</td>
<td>Elizabeth (Beth) Eiring (<a href="mailto:eeiring@mt.gov">eeiring@mt.gov</a>)</td>
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</tbody>
</table>
## Table C-1 Directory of State Plant Regulatory Officials and State PEQ Contacts (page 5 of 6)

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<th>Contact</th>
<th>Address</th>
<th>Phone/FAX:</th>
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</thead>
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<td>Washington State Dept. of Agriculture Plant Protection Division P.O. Box 447</td>
<td>P: 360-410-1260</td>
</tr>
<tr>
<td></td>
<td>(<a href="mailto:bmatheson@agr.wa.gov">bmatheson@agr.wa.gov</a>)</td>
<td>Ephrata, WA 98823</td>
<td></td>
</tr>
<tr>
<td>West Virginia</td>
<td>Tim Brown</td>
<td>WVDA—Plant Industries Division 1900 Kanawha Boulevard East Charleston, WV</td>
<td>P: 304-558-2212</td>
</tr>
<tr>
<td></td>
<td>(<a href="mailto:tlbrown@wvda.us">tlbrown@wvda.us</a>)</td>
<td>25305-0191</td>
<td>F: 304-558-2435</td>
</tr>
<tr>
<td>State</td>
<td>Contact</td>
<td>Address</td>
<td>Phone/FAX</td>
</tr>
<tr>
<td>------------</td>
<td>------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>Shanon Hankin</td>
<td>Wisconsin Dept. of Agriculture, Trade, &amp; Consumer Protection</td>
<td>P: 608-224-4576 F: 608-224-4656</td>
</tr>
<tr>
<td></td>
<td>(<a href="mailto:shanon.hankin@wisconsin.gov">shanon.hankin@wisconsin.gov</a>)</td>
<td>P.O. Box 8911 Madison, WI 53708-8911</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(<a href="mailto:kent.drake@wyo.gov">kent.drake@wyo.gov</a>)</td>
<td>2219 Carey Avenue Cheyenne, WY 82002</td>
<td></td>
</tr>
</tbody>
</table>
Roles in Handling and Documenting Violations

This appendix details what the State Cooperator, Postentry Quarantine Liaison Officer, Representative of the Postentry Quarantine Program (PEQP), local Investigative and Enforcement Services (IES) Investigator, and State Plant Health Director (SPHD) do when a State Cooperator detects a violation of the Postentry Growing Agreement (PPQ Form 546).

⚠️ CAUTION

The SPHD and/or the PEQP decides whether to request that the permit unit revoke a company’s or individual’s postentry permit. Moreover, the SPHD decides, with input from the Liaison Officer, IES Enforcement Operations, and State Cooperator, whether it is more appropriate to issue a warning letter or pursue prosecution.

1. The State Cooperator detects the violation. The following are violations of the Postentry Growing Agreement (PPQ Form 546):

   A. The cooperator finds plants growing on premises **not** controlled by the person or company who signed the Agreement. If there was approval from the State and the National Coordinator for Postentry Quarantine in Beltsville, MD, or, for Hawaii, Guam, and CNMI, the Postentry Coordinator in Honolulu, HI to move the plants, no violation occurred.

   B. The person who signed the Postentry Growing Agreement, or a representative of the company signing the Agreement, refuses to allow a cooperator on the premises during the cooperator’s normal business hours.

   C. The cooperator finds quarantined plant(s) or any material propagated from these plants unlabeled or with inappropriate labeling. The label
must show the plant name, the port accession number, and the importation date.

D. The cooperator finds other postentry genera or domestic plants of the same genus planted within 3 meters (approximately 10 feet) of the postentry plants.

E. The cooperator learns that postentry plants have been propagated by seed or other propagules (e.g., air layers, cuttings, flowers, plants, or suckers) taken from the quarantined plants when there was no prior written approval by the State and the National Coordinator for Postentry Quarantine or, for Hawaii, Guam, and CNMI, the Postentry Coordinator.

F. The person who signed the Postentry Growing Agreement, or a representative of the company signing the Agreement, refuses to apply a treatment prescribed by the cooperator to eliminate pests on the quarantined plant material. Treatment may include destruction of the quarantined plant material when prescribed by the cooperator as the only way to eliminate pests.

G. The cooperator, using his or her best professional judgment, believes the person who signed the Postentry Growing Agreement, or a representative of the company signing the Agreement, failed to notify the State or Liaison Officer when that person had an opportunity to report a conspicuous abnormality in the plant material. The importer must also report the death of a plant or plants to the cooperator.

H. The cooperator learns that the person who signed the Postentry Growing Agreement, or a representative of the company signing the Agreement, failed to report an address change to the PEQP.

I. The cooperator finds plants of Rubus spp. from Europe growing outside or growing in an indoor facility with mesh larger than 16 mesh per inch, or finds Chrysanthemum or Dianthus growing outside an enclosed building.

J. The cooperator finds some or all of the plants are unaccounted for before release at 6 months for Chrysanthemum, 1 year for Dianthus, or 2 years for the remaining postentry genera.

K. The cooperator detects any violations of restrictions listed in the permit.

2. If the State Cooperator detects an apparent pest risk, he or she eliminates the risk immediately. Such actions may include prescribing a treatment or supervising the destruction of the infested or infected plants.

3. The State Cooperator reports the violation and any action taken to eliminate pest risk to the Liaison Officer within 1 work day or the discovery of the violation.
4. The Liaison Officer informs the SPHD and either one will then issue an EAN (PPQ Form 523).

**CAUTION**

For first-time offenders a Letter of Information (LOI) can be used before issuing a PPQ Form 518, Report of Violation on page F-9. The LOI may be issued instead of referring the matter to Investigative and Enforcement Services (IES) for investigation and possible issuance of civil or criminal penalties. The intent of the letter is to educate alleged noncompliant entities about APHIS regulations and their obligation to comply with them. The LOI may be used as the first step toward achieving compliance. In the event the violation continues and IES conducts a subsequent investigation, the LOI may be used as evidence to show the alleged violator had notice of regulatory requirements and may be considered aggravating factors to increase civil penalties. Details on preparing, issuing, communicating, and documenting a LOI can be found at [http://sp.we.aphis.gov/PPQ.fieldops/pgmops/excop/CandE/default.aspx](http://sp.we.aphis.gov/PPQ.fieldops/pgmops/excop/CandE/default.aspx).

5. The Liaison Officer and the IES Investigator meet with the State Cooperator to review the details of the violation. It would be favorable for the Liaison Officer, the State Cooperator, and the IES Investigator to visit the premises where the violation occurred.

6. Having the details of the violation, the Liaison Officer contacts the PEQP to give details of the incident.

7. The IES Investigator assembles a case file that includes affidavits from the State Cooperator, witnesses, and violator.

8. Once the case file is completed, the IES investigator writes a cover letter to transmit a copy of that file to the SPHD. The original investigative case file will be sent to the IES headquarters office in Riverdale, Maryland for review.

9. Following the guidelines of the Civil Penalty Action Team, the reviewer at the IES headquarters staff will submit an e-mail to the Coordinator, Postentry Quarantine Program and SPHD with a projected recommendation. The following are actions that may be appropriate forms of action:
   A. Official Warning Letter (APHIS Form 7060)
   B. Civil penalty
   C. Revocation of the Controlled Import Permit for Postentry Quarantine (CIP)
   D. Innovative terms (suspend a portion of the civil penalty provided training is provided by the violator)
Instructions for Completing a Report of Violation (PPQ Form 518)

While completing the form, the Liaison Officer will interview the State Cooperator to obtain a statement of the facts surrounding the alleged violation. The IES Investigator will interview all other parties including the violator and witnesses.

Table D-1 Instructions for completing a Report of Violation (PPQ Form 518) (page 1 of 2)

<table>
<thead>
<tr>
<th>Block:</th>
<th>Instructions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Date Violation Discovered</td>
<td>Enter the date the State Cooperator discovered the violation</td>
</tr>
<tr>
<td>2. Reg/Compl. Agreement Violated</td>
<td>Enter the regulation violated. If it is a violation of the Postentry Growing Agreement, enter 7 CFR 319.37-23</td>
</tr>
<tr>
<td>3. Where Intercepted</td>
<td>Enter the city and State where the violation was detected</td>
</tr>
<tr>
<td>4. Origin of Article</td>
<td>Fill in the name of the country where the postentry material was originally grown</td>
</tr>
<tr>
<td>5. Article Moved in Violation of Regulations</td>
<td>Enter “Material grown under postentry quarantine”</td>
</tr>
<tr>
<td>6. Identity of Article</td>
<td>Enter the number and identity of the plants associated with the violation. If available, fill in both common and scientific name. Always enter the scientific name</td>
</tr>
<tr>
<td>7. Name and Business Address of Violator</td>
<td>Fill in the violator’s name—usually this will be the name of the person who signed the Postentry Growing Agreement (in parentheses after the name, give the person’s position (e.g., owner, nurseryman, grower, salesperson)) and if appropriate, enter the violator’s business address</td>
</tr>
<tr>
<td>8. Violator Had/If No, Violator was Aware of Regulation</td>
<td>Check and fill in as appropriate</td>
</tr>
<tr>
<td>9. Violator Had/If No, Violator was Aware of Regulation</td>
<td>If the name of the violator and the name of the person signing the Postentry Growing Agreement are the same, check “Yes”</td>
</tr>
<tr>
<td>10. Violator Had/If No, Violator was Aware of Regulation</td>
<td>Write, “(name of violator) signed a Postentry Growing Agreement on (date signed) a copy of which is on file”</td>
</tr>
<tr>
<td>11. Carrier Information</td>
<td>Draw a diagonal line through</td>
</tr>
<tr>
<td>12. Carrier Information</td>
<td>Draw a diagonal line through</td>
</tr>
<tr>
<td>13. Name and Business Address of Consignee</td>
<td>Cross out “NAME AND BUSINESS ADDRESS OF CONSIGNEE” and write, “ADDRESS OR LOCATION WHERE MATERIAL IS BEING GROWN”—fill in the complete address or, as accurate, a description of the property as practicable</td>
</tr>
<tr>
<td>14. Disposition of Pest Risk</td>
<td>Fill in the action(s) taken to eliminate the pest risk, e.g., “the plants were rouged and incinerated,” or, “the plants were sprayed with (description of pesticide and how applied)—if applicable, include the Emergency Action Notice as an attachment and reference in the Officer’s Statement</td>
</tr>
<tr>
<td>15. Remarks</td>
<td>Fill in any pertinent remarks or the information from the continuation of another Block</td>
</tr>
<tr>
<td>16. Violator or Carrier’s Statement of Violation</td>
<td>The IES Investigator will obtain an affidavit or statement from the violator and all other subjects once the investigation is underway</td>
</tr>
<tr>
<td>Block:</td>
<td>Instructions:</td>
</tr>
<tr>
<td>--------</td>
<td>---------------</td>
</tr>
<tr>
<td>17. Liaison Officer’s Statement</td>
<td>Together with your State Cooperator, describe the violation on a separate sheet of paper; give this statement an exhibit number. A State Cooperator and/or a Liaison Officer’s Statement <strong>must</strong> be written and accompany each PPQ Form 518 submitted. Describe all the facts associated with the violation of the Postentry Growing Agreement. Write down all the facts including who, what, when, where, and how. Include the information in Figure D-1 on page D-6 when appropriate—Sign and date the Liaison Officer’s Statement (<strong>only</strong> this person signs). If more than one officer was involved in the violation, each officer <strong>must</strong> write a separate statement.</td>
</tr>
<tr>
<td>18. Signatures and Dates</td>
<td>Fill in as appropriate</td>
</tr>
<tr>
<td>19. Signatures and Dates</td>
<td>Fill in as appropriate</td>
</tr>
<tr>
<td>20. Signatures and Dates</td>
<td>Fill in as appropriate</td>
</tr>
<tr>
<td>21. Officer in Charge Comments</td>
<td>SPHD should fill in any additional information that may help to substantiate the case: e.g., specify any previous warning letters and the dates sent; list any known previous civil penalties, case numbers, dates, and amounts of penalties assessed—word this information as follows: “Case #RSS-CP-45-95 fined $1,000 on 03/07/06.” Recommend the appropriate action. Limit your recommendations to the following actions:  ◆ No action  ◆ Letter of warning  ◆ Civil penalty  ◆ Innovative terms  ◆ Revocation of the Controlled Import Permit for Postentry Quarantine (CIP)</td>
</tr>
</tbody>
</table>
**LIAISON OFFICER’S STATEMENT PREPARATION**

Officer’s Statement Should Contain the following:

<table>
<thead>
<tr>
<th>Your identity</th>
<th>The violator’s identity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full name</td>
<td>Full name(s)</td>
</tr>
<tr>
<td>Work address</td>
<td>Address</td>
</tr>
<tr>
<td>Phone number</td>
<td>Phone Number</td>
</tr>
<tr>
<td>Badge number</td>
<td></td>
</tr>
</tbody>
</table>

Capture information on everyone involved i.e. State inspector.

**WHAT HAPPENED?**

Provide a full explanation of what happened. It is easiest to prepare the statement in chronological order, providing a step-by-step account of events. Consider the following questions:

- What commodity or organisms was involved
- What was the nature of the alleged violation?
- Are there records that show what happened?
- Are there any photographs to support your statement?

**WHEN DID THIS OCCUR?**

It is important to record the time/date of each event.

**WHERE DID THIS OCCUR?**

Give location details
- Physical addresses
- Mailing addresses

**WHY DID THIS HAPPEN?**

If able to determine, describe why. Examples:
- Not knowing the regulations
- Oversight
- Record what you know and what was said, not what you suspect

**HOW?**

- How did you discover the alleged violation(s)?
- How did the alleged violation(s) occur based upon observation or evidence?
- Be specific
- Avoid assumptions unless circumstantial evidence supports them.

**IT’S CRUCIAL TO BE SPECIFIC ON ALL DETAILS:**

Can someone else reading your narrative fully understand and explain what happened?
Instructions for Conducting an Investigation and Assembling a Case File

The purpose of conducting an investigation is to substantiate that a violation took place. The Office of the General Counsel (OGC) will decide whether to prosecute a violation based on the results of the investigation and how well the case file was prepared. Only a sound investigation and well-prepared case file will result in a successful prosecution!

During the investigation, do not discuss any phase of the investigation with unauthorized persons (non-APHIS personnel) except for the State Cooperator(s) who initially detected the violation.

Once the PPQ Form 518 has been prepared, the officer’s statement and any associate evidence (invoices, sales receipts/records, packing lists, photographs, Emergency Action Notification, Compliance Agreement, and any other pertinent records) should be submitted to the local IES investigator. Also, provide Postentry Permit copies, Postentry growing agreements (PPQ Form 546) and Notices of Arrival (PPQ Form 236).

Once a violation has been noted, always document what transpired. Collect evidence to corroborate the violation. If germane to your case, take photographs. Photographs make forceful evidence. When submitting photographs, write the date, description, and photographer's name on the back of the photograph or on a piece of paper onto which the photograph is mounted. Physical evidence such as counterfeit or forged labels on postentry plants, samples of propagules collected from postentry plants without permission, etc. should be assembled. If the physical evidence presents a risk, submit it so as to prevent disease dissemination—put it in a tightly closed plastic bag.

The IES investigator can obtain a statement or prepare an affidavit to enter as evidence for the investigative case report. The investigator will also obtain written statements from all persons who have knowledge of the violation.

IES Distribution of the Case File
When the IES investigator sends the case file to the IES staff in Riverdale, MD, he or she will make a copy for the SPHD.
### Table D-2 Case File Responsibilities

<table>
<thead>
<tr>
<th>If you are a:</th>
<th>Then:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liaison Officer</td>
<td>REPORT serious violations to the PEQU in Beltsville, MD within 1 work day of notification by the State Cooperator</td>
</tr>
<tr>
<td></td>
<td>GIVE or SEND the originals of the evidence directly to the IES investigator or through your local SPHD</td>
</tr>
<tr>
<td>State Plant Health Director (SPHD)</td>
<td>If you have additional information on earlier violations or anything else germane to this case, give a statement to the IES investigator</td>
</tr>
<tr>
<td></td>
<td>SEND a copy of the case file to the National Coordinator at the PEQU in Beltsville, MD</td>
</tr>
<tr>
<td>The National Coordinator of the PEQP</td>
<td>REVIEW the case file</td>
</tr>
<tr>
<td></td>
<td>NOTIFY the Permit Unit in Riverdale, MD</td>
</tr>
<tr>
<td></td>
<td>SERVE as advisor on the case to the IES staff in Riverdale, MD</td>
</tr>
</tbody>
</table>
Introduction

Contents

APHIS Form 7060, Official Warning, Violation of Federal Regulations   F-2
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   Grown Under Postentry Quarantine   F-3
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PPQ Form 391, Specimens for Determination   F-7
PPQ Form 518, Report of Violation   F-9
PPQ Form 546, Agreement for Postentry Quarantine—State Screening Notice
   (7 CFR 319 Subpart—Plants for Planting)   F-10
Routing and Distribution of PPQ Form 546   F-12
PPQ Form 547, Postentry Quarantine Tag   F-13
PPQ Form 569 Release from Postentry Quarantine   F-13
PPQ Form 587, Application for Permit to Import Plants or Plant Products
   F-14
PPQ Controlled Import Permit for Postentry Quarantine   F-16
Witness Statements   F-20
Figure F-1  APHIS Form 7060, Official Warning, Violation of Federal Regulations
PPQ Form 236, Notice of Shipment and Report of Imported Plants to be Grown Under Postentry Quarantine

![PPQ Form 236, Notice of Shipment and Report of Imported Plants to be Grown Under Postentry Quarantine](image)

Figure F-2 Example of PPQ Form 236, Notice of Shipment and Report of Imported Plants to be Grown Under Postentry Quarantine (page 1 of 3)
**PPQ Form 236, Notice of Shipment and Report of Imported Plants to be Grown Under Postentry Quarantine**

**Figure F-2  Example of PPQ Form 236, Notice of Shipment and Report of Imported Plants to be Grown Under Postentry Quarantine (page 2 of 3)**
PPQ236 Copy Designation

| Pt.1  | PERMITTEE'S COPY |
| Pt.2  | POSTENTRY QUARANTINE UNIT COPY |
| Pt.3  | STATE OFFICE (File Copy) |
| Pt.4  | INSPECTION RECORD (To be returned to Postentry Quarantine Unit after form is reversed and completed.) |
| Pt.5  | INSPECTION RECORD (To be returned to Postentry Quarantine Unit after form is reversed and completed.) |
| Pt.6  | PPQ FIELD OFFICE COPY (To be returned with Pt. 4 and/or Pt. 5 to the Postentry Quarantine Unit.) |
| Pt.7  | INSPECTION STATION COPY |

Figure F-2 Example of PPQ Form 236, Notice of Shipment and Report of Imported Plants to be Grown Under Postentry Quarantine (page 3 of 3)
Routing and Distribution of PPQ Form 236

Figure F-3  Routing and Distribution of PPQ Form 236
**PPQ Form 391, Specimens for Determination**

![Form Image]

Figure F-4  Example of PPQ Form 391, Specimens for Determination (page 1 of 2)
**OMB Information**

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

**Instructions**

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

<table>
<thead>
<tr>
<th>BLOCK</th>
<th>INSTRUCTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1. Assign a number for each collection beginning the year, followed by the collector’s initials and collector’s number. <strong>EXAMPLE</strong> In 2001, Brian K. Long collected his first specimen for determination of the year. His first collection number is 01-SC-001. 2. Enter the collection number.</td>
</tr>
<tr>
<td>2</td>
<td>Enter date.</td>
</tr>
<tr>
<td>3</td>
<td>Check block to indicate Agency submitting specimens for identification.</td>
</tr>
<tr>
<td>4</td>
<td>Enter name of sender.</td>
</tr>
<tr>
<td>5</td>
<td>Enter type of property specimen obtained (e.g., nursery, seedmill, etc.).</td>
</tr>
<tr>
<td>6</td>
<td>Enter address.</td>
</tr>
<tr>
<td>7</td>
<td>Enter name and address of property owner.</td>
</tr>
<tr>
<td>8A-8L</td>
<td>Check all appropriate blocks.</td>
</tr>
<tr>
<td>9</td>
<td>Leave Blank.</td>
</tr>
<tr>
<td>10</td>
<td>Enter scientific name of weed if possible.</td>
</tr>
<tr>
<td>11</td>
<td>Enter quantity of plants and plants affected.</td>
</tr>
<tr>
<td>12</td>
<td>Check block to indicate distribution of plant.</td>
</tr>
<tr>
<td>13</td>
<td>Check appropriate block to indicate plant parts affected.</td>
</tr>
<tr>
<td>14</td>
<td>Check block to indicate pest distribution.</td>
</tr>
<tr>
<td>15</td>
<td>Check appropriate block to indicate type of specimen.</td>
</tr>
<tr>
<td>16</td>
<td>Enter number specimens submitted under appropriate column.</td>
</tr>
<tr>
<td>17</td>
<td>Enter sampling method.</td>
</tr>
<tr>
<td>18</td>
<td>Enter type of trap and lure.</td>
</tr>
<tr>
<td>19</td>
<td>Enter X in block to indicate isolated or general plant symptoms.</td>
</tr>
<tr>
<td>20</td>
<td>Enter X in appropriate block for weed density.</td>
</tr>
<tr>
<td>21</td>
<td>Enter X in appropriate block for weed growth stage.</td>
</tr>
<tr>
<td>22</td>
<td>Provide a brief explanation if Prompt or URGENT identification is requested.</td>
</tr>
<tr>
<td>23</td>
<td>Enter a tentative determination if you made one.</td>
</tr>
<tr>
<td>24</td>
<td>Leave blank.</td>
</tr>
</tbody>
</table>

**Distribution of PPQ Form 391**

Distribute PPQ Form 391 as follows:

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

---

**NOTICE**

The above form must accompany any disease specimen for identification sent to the Postentry Quarantine Unit by State Cooperators or local PPQ identifiers.
**PPQ Form 518, Report of Violation**

A fillable version of the PPQ Form 518, Report of Violation is available on the CBP.APHEIS internal Web site (for authorized users only). [https://cbp.aphis.usda.gov/ppq/php/manuals.shtml].

![PPQ Form 518, Report of Violation](image)

---

**Figure F-5 Example of PPQ Form 518, Report of Violation**
## PPQ Form 546, Agreement for Postentry Quarantine—State Screening Notice (7 CFR 319 Subpart—Plants for Planting)

![Image of PPQ Form 546](image-url)

Figure F-6 Example of PPQ Form 546, Agreement for Postentry Quarantine—State Screening Notice (7 CFR 319 Subpart—Plants for Planting) (page 1 of 2)
Instruction for Completing PPQ Form 546
Agreement for Postentry Quarantine—State Screening Notice

Note: Please TYPE or PRINT legibly to complete this form.

1. Enter the name of the company representative who is responsible for the shipment, the company name, and a street address. If you have a Post Office box for mail deliveries, add this to the street address in this box.

2. Enter the scientific (Latin) name of each plant you wish to import. If you do not know the scientific name(s), enter the English common name(s).

3. Enter the maximum number of plants/cuttings you and the State inspector consider appropriate for the growing you have selected during the quarantine period for the genus or genera you are importing.

4. Enter the country or countries from which the product is originally being shipped.

5. Enter the specific location – street address (if available), city, county, and State – where the plant material will be grown for the duration of the quarantine period. If no street address is available, you and the State inspector must determine how to describe the location in detail (GPS coordinates can be used).

STOP. Contact your State Plant Regulatory Official to set up an appointment for a site inspection. See the National Plant Board website at http://www.nationalplantboard.org/ for contact information for your State’s Regulatory Official.

6. After the site inspection and consultation, the person named in Block 1 must sign the application.

7. Enter the date the application was completed and signed.

The State Regulatory Official will complete the form and submit it to USDA,APHIS, Plant Protection and Quarantine (full address on bottom of form).

Figure F-6 Example of PPQ Form 546, Agreement for Postentry Quarantine—State Screening Notice (7 CFR 319 Subpart—Plants for Planting) (page 2 of 2)
Routing and Distribution of PPQ Form 546

Notice

Sets of PPQ 546 dated prior to January 1998 are obsolete and **MUST** be discarded. The State should contact the SPHD to order new forms, or download from the Web site.

Figure F-7  Routing and Distribution of PPQ Form 546
PPQ Form 547, Postentry Quarantine Tag

Figure F-8  Example of PPQ Form 547, Postentry Quarantine Tag

PPQ Form 569 Release from Postentry Quarantine

NOTICE

This form is only issued by the National Coordinator, PEQP and the PEQ Coordinator for Hawaii, Guam, and CNMI in Honolulu, HI.
PPQ Form 587, Application for Permit to Import Plants or Plant Products

<table>
<thead>
<tr>
<th>Country of Origin</th>
<th>Scientific Names of Plants or Plant Products</th>
<th>Plant Parts</th>
<th>U.S. Port or Ports of Arrival</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. INTENDED USE: ☐ Plant parts for planting (Nursery stock) ☐ Small lots of seed ☐ Fruit and vegetables ☐ Other

4. MEANS OF IMPORTATION: ☐ Mail or Express carriers ☐ Cargo shipment ☐ Personal baggage or car

5. SIGNATURE OF APPLICANT: ____________________________

6. PRINTED NAME OF APPLICANT: ____________________________

7. DATE: ____________________________

WARNING: Any alteration, forgery, or counterfeit use of this document is subject to civil penalties of up to $250,000 (18 U.S.C. 703) or imprisonment for not more than 5 years, or both (18 U.S.C. 1001).

Figure F-9  Example of PPQ Form 587, Application for Permit to Import Plants or Plant Products (page 1 of 2)
Instructions for completing PPQ Form 587
Application for Permit to Import Plants or Plant Products

Please TYPE or PRINT legibly to complete. You must complete all of the boxes.

1. Enter the name and street address of the person responsible for the importation. The applicant
   must be a United States resident. Enter the organization or company name, if applicable. A
   physical address of the facility or business is required. You may include a post office box address
   in addition to the street address for mailing purposes. Enter your daytime telephone number,
   including the Area Code. Enter your facsimile number, including the Area Code. Enter your e-mail
   address if applicable.

2. In the first column, enter a country or countries (if from Canada include Province, if from Mexico
   include State) from which you want to import the plants or plant products (the term "various" will
   not be accepted). In the second column, enter the scientific (Latin) name of each plant. If you do
   not know the scientific name(s), try to find out from the exporter. As a last resort, enter the English
   common name(s). In the third column, enter the type of plants or plant products you plan to import
   for each species. In the fourth column, enter the City and State of the port(s) of arrival. If you do
   not know the port, enter "N/A." (Check your permit when you receive it for the approved ports.)

3. Check the appropriate box. Select "Plants for planting" if the plants/seed you want to import
   will be planted or sold for planting. Select "Small lots of seed" if you want to import under the small
   lot of seed program (see below). Select "Fruits and Vegetables" if you are importing fruits and
   vegetables for consumption or resale. Select "Other" if the article you want to import does not fall
   into any of the other categories. List the category and additional information needed to describe the
   article (i.e., Cut flowers, broomcorn, etc.). See instructions for small lots of seed:

   Small lots of eligible seed may be imported without a permit. See the permit unit website
   (http://www.aphis.usda.gov/Import/ImportAppC/Import_Imports/smalllots_seed.shtml) for help in
   determining eligibility. In part #2 list the plant species and countries from which you want to ship
   each species. If the list of species and/or countries of origin is long, you may enter "eligible taxa." By
   using this option, you are accepting responsibility for determining the eligibility of the seeds.

   A permit is issued for taxa that arrive in the United States with no restrictions beyond port of entry inspection. If
   port of entry inspectors find non-eligible seeds in your shipment, they will remove the ineligible
   kinds.

4. Check the appropriate box or boxes that apply to the means of importation.

5. The applicant named in box #4 must sign the form.

6. Print the name of person who signed the form.

Enter the date the form is completed and signed.

If you attach additional sheets of paper, type or print PPQ Form 587, the applicant's name, and the
company name at the top of each page.

Send the completed application by facsimile to (301) 734-5786, or mail to:

USDA-APHIS-PPQ
Permit Unit
4700 River Road, Unit 133
Riverdale, MD 20737-1236

Call our automated phone number at 1-877-770-5990 if you have questions.

Figure F-9 Example of PPQ Form 587, Application for Permit to Import Plants or Plant Products (page 2
of 2)

NOTICE

This application is for all genera that are not prohibited or Postentry Quarantine.
Figure F-10  Example of a Controlled Import Permit for Postentry Quarantine (CIP) (page 1 of 4)
Figure F-10  Example of a Controlled Import Permit for Postentry Quarantine (CIP) (page 2 of 4)
12. Under the Plant Protection Act, individuals or companies who fail to comply with the following provisions are subject to civil penalties, or, if they knowingly submit false or misleading information, to criminal penalties and/or fines. If any permit requirements are not met, the permit shall be cancelled and the permit holder must remove all plant material from the quarantine area. The permit holder shall comply with all applicable requirements stated in Title 7 Code of Federal Regulations Part 309.

13. A phytosanitary certificate must accompany all propagative material imported under this permit.

14. Immediately upon arrival at the point of entry, the importer will notify the Plant Protection Officer and identify the consignee using a marked, numbered entry form, commercial invoice, label, or documentation, or PPO Form 398, which is available on the website http://www.plant.nrcs.usda.gov/Quarantine.htm.

15. A type of plant material must be specified on a phytosanitary certificate and must include the name of the consignee, the specific plant material, its species, and variety. Any item shall be labeled clearly, as well as the country of origin, and country of entry, for each shipment.

16. Permits must instruct the receiver to label each container with the species and variety of plant material. For quarantine purposes, more than one species, each species must be labeled separately.

17. The permit holder may request to label each container with the species and variety of plant material. For quarantine purposes, more than one species, each species must be labeled separately.

18. If the plant material shipped under the Quarantine Permit (PQ) program is delivered to the point of arrival for the purposes of inspection, and found to be noncompliant with the PPQ regulations, the permit holder may request to cancel the permit and receive a new permit at the cost of the permit. If the permit holder does not comply with the permit, the permit shall be cancelled.

19. To ensure that all plant material is properly identified, the permit holder must submit a copy of the permit to the plant material upon arrival at the point of entry. The permit holder must also submit a copy of the permit to the plant material upon arrival at the point of entry. The permit holder must also submit a copy of the permit to the point of entry. The permit holder must also submit a copy of the permit to the point of entry.

20. A phytosanitary certificate must accompany all propagative material imported under this permit. The permit holder must submit a copy of the permit to the point of entry. The permit holder must also submit a copy of the permit to the point of entry.

21. The permit holder must submit a copy of the permit to the point of entry. The permit holder must also submit a copy of the permit to the point of entry.
When shipments are to be inspected by mail, the permittee should request a green and yellow mailing label for each parcel. Instructions for this are on the reverse side of the label. If you are importing plants and seeds by mail (including express or parcel service), please contact your supplier to ensure, to your knowledge, that the green and yellow label is provided with each parcel. It is especially important that the permittee's name, address, telephone number, and permit number be included with each parcel. Failure to supply this information may result in delays or the parcel being returned to the sender. Green and yellow labels should be used only for small importations. You may request for PPQ Form 301 (Statement and Notice of Import or Export) at the following instructions or by calling the "My Permits" link on your respective authorized website. Otherwise, contact your state's Plant Health Inspector's Office or the USDA APHIS Plant Protection Office at the address provided below the "My Permits" link.

In addition to the green and yellow label, a separate multiple copy of the permit should be attached to each parcel. The permit must be included with the parcel and remain attached to the parcel until delivery. A copy of the permit should also be included with any correspondence concerning the shipment to the permittee or the supplier. If the permittee needs to make changes or corrections to the information provided on the permit (e.g., shipping or contact information), you must notify the sender immediately to make the changes.

END OF PERMIT CONDITIONS

Figure F-10 Example of a Controlled Import Permit for Postentry Quarantine (CIP) (page 4 of 4)
Witness Statements

Figure F-11 Example of a Witness Statement
(a) The following restricted articles, from the designated countries and localities, and any increase therefrom must be grown under postentry quarantine conditions specified in paragraphs (c) and (d) of this section, and may be imported or offered for importation into the United States only:

(1) If destined for a State that has completed a State postentry quarantine agreement in accordance with paragraph (c) of this section;

(2) If a postentry quarantine growing agreement has been completed and submitted to Plant Protection and Quarantine in accordance with paragraph (d) of this section. The agreement must be signed by the person (the importer) applying for a written permit for importation of the article in accordance with §319.37-3; and,

(3) If Plant Protection and Quarantine has determined that the completed postentry quarantine growing agreement fulfills the applicable requirements of this section and that services by State inspectors are available to monitor and enforce the postentry quarantine.

(c) State Postentry quarantine agreement. (1) Articles required to undergo postentry quarantine in accordance with this section may only be imported if destined for postentry quarantine growing in a State which has entered into a written agreement with the Animal and Plant Health Inspection Service, signed by the Administrator or his or her designee and by the State Plant Regulatory Official. In accordance with the laws of individual States, inspection and other postentry quarantine services provided by a State may be subject to charges imposed by the State.

(1) The following States have entered into a postentry quarantine agreement in accordance with this paragraph:

[Reserved]
(2) In any such written agreement, the State shall agree to:

(i) Establish State regulations and requirements prior to the effective date of the agreement and enforce such State and Postentry Quarantine Manual regulations and requirements necessary to inspect sites and plants growing in postentry quarantine and to monitor and enforce compliance with postentry quarantine growing in accordance with this section;

(ii) Review pending permit applications for articles to be grown under postentry quarantine conditions in the States, upon request of Plant Protection and Quarantine, and report to the Permit Unit of Plant Protection and Quarantine whether the State would be able to provide inspection and monitoring services for the proposed postentry quarantine;

(iii) Provide the services of State inspectors to: inspect sites to be used for postentry quarantine; report to the Permit Unit of Plant Protection and Quarantine whether the site is of adequate size to contain the number of plants proposed for importation, including potential increase if increase is allowed; inspect plants for evidence of exotic pests at least once during the first year and once during the second year for plants required to be grown in postentry quarantine for 2 years, and at least once for plants required to be grown in quarantine for less than 2 years and monitor and enforce compliance with the requirements of this section during the use of the sites for postentry quarantine;

(iv) Report to the Postentry Quarantine Unit of Plant Protection and Quarantine any evidence of plant pests that are not known to exist in the United States and that are found at a postentry quarantine site by State inspectors; recommend to Plant Protection and Quarantine safeguards or mitigation measures to control the pests; and supervise the application of safeguards or mitigation measures approved by Plant Protection and Quarantine; and

(v) Report to the Postentry Quarantine Unit of Plant Protection and Quarantine any propagation or increase in the number of plants that occurs during postentry quarantine.

(3) In any such written agreement, the Administrator shall agree to:

(i) Seek State review of permit applications for postentry quarantine material in that State, and issue permits only after determining that State services are available to monitor the postentry quarantine;

(ii) Upon request of the State, provide training, technical advice, and pest identification services to State officials involved in providing postentry quarantine services in accordance with this section;
(iii) Notify State officials, in writing and within 10 days of the arrival, when plant material destined for postentry quarantine in their State arrives in the United States, and notify State officials in writing when materials in postentry quarantine may be released from quarantine in their State.

(4) **Termination of State postentry quarantine agreement.** A State postentry quarantine agreement may be terminated by either the Administrator or the State Plant Regulatory Official by giving written notice of termination to the other party. The effective date of the termination will be 60 days after the date of actual receipt of notice, with regard to future importation to that State of articles requiring postentry quarantine in accordance with this section. When a postentry quarantine agreement is terminated by either the State Plant Regulatory Official or the Administrator, APHIS and the affected State shall continue to provide postentry quarantine services in accordance with the postentry quarantine agreement, until the time the plant material is eligible to be released from quarantine, for all postentry quarantine material already in the State, and for all postentry quarantine material that arrives in the State prior to the effective date of termination.

(d) **Postentry quarantine growing agreements.** Any restricted article required to be grown under postentry quarantine conditions, as well as any increase therefrom, shall be grown in accordance with a postentry quarantine growing agreement signed by the person (the importer) applying for a written permit in accordance with §319.37-3 for importation of the article and submitted to Plant Protection and Quarantine. On each postentry quarantine growing agreement, APHIS shall also obtain the signature of the State Plant Regulatory Official for the State in which regulated articles covered by the agreement will be grown. The postentry quarantine growing agreement shall specify the kind, number, and origin of plants to be imported, and shall certify to APHIS and to the State in which the articles are grown that the signed of the agreement will comply with the following conditions for the period of time specified below:

(1) To grow such article or increase therefrom only on specified premises owned, rented, or otherwise in possession of the importer, within a space of dimensions designated by an inspector, and to move, propagate, or allow propagation of the article or increase therefrom or parts thereof only with the written permission of the National Coordinator for postentry quarantine in Beltsville, MD or the Coordinator of postentry quarantine for Hawaii, Guam, and CNMI in Honolulu, HI after approval by the State Plant Regulatory Officer or representative:

(2) To permit an inspector to have access to the specified premises for inspection of such article during regular business hours;
(3) To keep the article and any increase therefrom identified with a label showing the name of the article, port accession number, and date of importation;

(4) To keep the article separated from any domestic plant or plant product of the same genus by no less than 3 meters (approximately 10 feet); and from any other imported plant or plant product by the same distance;

(5) To allow or apply remedial measures (including destruction) determined by an inspector to be necessary to prevent the spread of an injurious plant disease, injurious insect pest, or other plant pest;

(6) To notify an inspector, orally or in writing, within 30 days of the time the importer or the person in charge of the growing site finds any abnormality of the article, or the article dies or is killed by the importer, the person in charge of the growing site, or any other person; to retain the abnormal or dead article for at least 60 days following that date of notification; an to give the abnormal or dead article to an inspector upon request;

(7) To grow the article or increase therefrom, if an article or Rubus spp. (cloudberry, blackberry, boysenberry, dewberry, loganberry, raspberry) from Europe, only in a screenhouse with screening of a minimum of 16 mesh per inch;

(8) To grow the article or increase therefrom, if an article of Chrysanthemum spp. (chrysanthemum) or Dianthus spp. (carnation, sweet-william), only in a greenhouse or other enclosed building; and

(9) To comply with the above conditions for a period of 6 months after importation for an article of Chrysanthemum spp. (chrysanthemum), for a period of 1 year after importation for an article of Dianthus spp. (carnation, sweet-william), and for a period of 2 years after importation for any other such articles.

e) A completed postentry quarantine agreement (PPQ form 546) signed by both the applicant and the State Plant Regulatory Officer or representative must be forwarded to the Permits Unit in Riverdale, MD to obtain a written permit for an article required to be grown under postentry quarantine conditions.

(f) Inspector-ordered disposal, movement, or safeguarding of restricted articles; costs and charges, civil and criminal liabilities.

(1) Growing at unauthorized sites. If an inspector determines that any article subject to the postentry quarantine growing requirements of this section, or any
appropriately authorized increase therefrom, is being grown at an unauthorized site, the inspector may file an emergency action notification (PPQ Form 523) with the owner of the article or the person who owns or is in possession of the site on which the article is being grown. The person named in the form 523 must, within the time specified in form 523, sign a postentry quarantine growing agreement, destroy, ship to a point outside the United States, move to an authorized postentry quarantine site, and/or apply treatments or other safeguards to the article, the increase therefrom, or any portion of the article or the increase therefrom, as prescribed by an inspector to prevent the introduction of plant pests into the United States. In choosing which action to order and in setting the time limit for the action, the inspector shall consider the degree of pest risk presented by the plant pest(s) associated with the kind of article (including increase therefrom), the types of other host materials for the pest in or near the growing site, the climate and season at the site in relation to the pest's survival, and the availability of treatment facilities.

(2) Growing at authorized sites. If an inspector determines that any article, or any increase therefrom, grown at a site specified in an authorized postentry quarantine growing agreement is being grown contrary to the provisions of this section, including in numbers greater than the number approved by the postentry quarantine growing agreement, or in a manner that otherwise presents a risk of introducing plant pests into the United States, the inspector shall issue an emergency action notification (PPQ form 523) to the person who signed the postentry quarantine growing agreement. That person shall be responsible for carrying out all actions specified in the emergency action notification. The emergency action notification may extend the time for which the articles and the increase therefrom must be grown under the postentry quarantine conditions specified in the authorized postentry quarantine growing agreement, or may require that the person named in the notification must destroy, ship to a point outside the United States, or apply treatments or other safeguards to the article, the increase therefrom, or any portion of the article or the increase therefrom, within the time specified in the emergency action notification. In choosing which action to order and in setting the time limit for the action, the inspector shall consider the degree of pest risk presented by the plant pest(s) associated with the kind of article (including increase therefrom), the types of other host materials for the pest in or near the growing site, the climate and season at the site in relation to the pest's survival, and the availability of treatment facilities.

(3) Costs and charges. All costs pursuant to any action ordered by an inspector in accordance with this section shall be borne by the person who signed the postentry quarantine growing agreement (PPQ form 546) covering the site where the articles were grown, or if no such agreement was signed, by the owner of the articles at the growing site.
(4) **Civil and criminal liabilities.** Any person who moves an article subject to postentry quarantine growing requirements from the site specified for that article in an authorized postentry quarantine growing agreement, or who otherwise handles such an article contrary to the requirements of this section, shall be subject to such civil penalties and such criminal liabilities as are provided by 18 U.S.C. 1001, 7 U.S.C. 150gg and 163, or other applicable Federal statutes.

(g) **State.** As used in this section, “State” means each of the 50 States of the United States, the District of Columbia, Guam, Northern Mariana Islands, Puerto Rico, the Virgin Islands, of the United States, and all other territories and possessions of the United States.

(Approved by the Office of Management and Budget under control number 0579-0049)

Introduction

Use Table H-1 to determine when to look for symptoms of infections caused by bacteria, viruses, fungi, and cankers.

Table H-1  Causal Agent and Onset of Symptoms

<table>
<thead>
<tr>
<th>If the causal agent is likely:</th>
<th>Then look for symptoms at this time of year:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacteria</td>
<td>Spring and early summer</td>
</tr>
<tr>
<td>Viruses</td>
<td>Cool weather (when leaves are first expanding)</td>
</tr>
<tr>
<td>Cankers</td>
<td>Year long</td>
</tr>
<tr>
<td>Fungi including leaf spots</td>
<td>Mid-summer to fall</td>
</tr>
</tbody>
</table>

Inspection Aid for Plants Growing in Postentry Quarantine

Table H-2  Inspection Aid for Plants Growing in Postentry Quarantine (page 1 of 16)

<table>
<thead>
<tr>
<th>Host group:</th>
<th>Pathogen or disease:</th>
<th>Preferred inspection period:</th>
<th>Symptoms:</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Abelmoschus</em> spp. (okra)</td>
<td>Cotton leaf curl agent</td>
<td>After leaves are fully opened until 6 weeks after</td>
<td><strong>Leaves:</strong> Conspicuous net-veinenations; on severely affected plants, leaves are small, thick, and curled downwards; also, on severely affected plant, may have “bunchy-top” appearance</td>
</tr>
</tbody>
</table>
| *Acacia* spp.        | *Uromycladium tepperianum* (Sacc.) McAlp. (rust) | Throughout growing season | **Leaves:** Gall-like masses along entire length  
**Branches:** Large rounded galls or areas coated with brown, powdery spores |
### Table H-2 Inspection Aid for Plants Growing in Postentry Quarantine (page 2 of 16)

<table>
<thead>
<tr>
<th>Host group:</th>
<th>Pathogen or disease:</th>
<th>Preferred inspection period:</th>
<th>Symptoms:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Acer spp. (maple)</strong></td>
<td><em>Xanthomonas acernea</em> (Ogawa) Burk (leaf disease)</td>
<td>After leaves are fully opened until autumn</td>
<td><strong>Leaves:</strong> Irregular, water-soaked spotting; spots later turn pale gray to black; leaves turn black and shrivel</td>
</tr>
<tr>
<td></td>
<td>Maple-variegation agent</td>
<td>After leaves are fully opened until 6 weeks after</td>
<td><strong>Leaves:</strong> Yellow mottle mosaic peppered with very small, round, light-green spots; spots may coalesce to give chlorotic appearance</td>
</tr>
<tr>
<td><strong>Actinidia spp. (kiwi–fruit)</strong></td>
<td><em>Pucciniastrum actinidiae Hiratusuka</em> (rust)</td>
<td>After leaves are fully opened</td>
<td><strong>Leaves:</strong> Spots on lower surface, grouped or scattered on yellow or yellowish-brown discolored areas; mature pustules yellowish-brown to brown in color</td>
</tr>
<tr>
<td><strong>Aesculus spp. (horsechestnut)</strong></td>
<td>Horsechestnut-variegation agent</td>
<td>After leaves are fully opened until they color in autumn</td>
<td><strong>Leaves:</strong> Yellow variegation</td>
</tr>
<tr>
<td><strong>Althaea spp. (hollyhock)</strong></td>
<td>Hibiscus yellow vein mosaic agent</td>
<td>When leaves are developing until leaves are fully opened</td>
<td><strong>Leaves:</strong> Faint vein clearing (of young leaves) followed by swelling of the veins at several points on the underside of the leaves; swelling gradually extends to nearly all veins. As leaves grow, the swelling thickens and becomes twisted; thickened veins are deep green in color and appear opaque when seen against the light</td>
</tr>
<tr>
<td><strong>Anacardium occidentale</strong> (fruit and nut list)</td>
<td>Inspect for any potential exotic pathogen</td>
<td>Various times of the year</td>
<td>See Plant Genera Subject to Postentry Quarantine on page E-1</td>
</tr>
<tr>
<td><strong>Annona spp.</strong> (fruit and nut list)</td>
<td>Inspect for any potential exotic pathogens</td>
<td>Various times of the year</td>
<td>See Plant Genera Subject to Postentry Quarantine on page E-1</td>
</tr>
<tr>
<td><strong>Artocarpus spp.</strong></td>
<td>Inspect for any potential exotic pathogens</td>
<td>Various times of the year</td>
<td>See Plant Genera Subject to Postentry Quarantine on page E-1</td>
</tr>
<tr>
<td><strong>Averrhoa carambola</strong> (fruit and nut List)</td>
<td>Inspect for any potential exotic pathogens</td>
<td>Various times of the year</td>
<td>See Plant Genera Subject to Postentry Quarantine on page E-1</td>
</tr>
<tr>
<td><strong>Averrhoa spp.</strong></td>
<td>Inspect for any potential exotic pathogens</td>
<td>Various times of the year</td>
<td>See Plant Genera Subject to Postentry Quarantine on page E-1</td>
</tr>
<tr>
<td><strong>Berberis spp.</strong> (barberry)</td>
<td><em>Puccinia graminis</em> Pers. (black stem rust)</td>
<td>Between 5 and 9 weeks after leaves are fully opened</td>
<td><strong>Leaves:</strong> Small, circular, yellowish to orange spots (up to 2 to 5 mm) on upper side; usually on the lower side are groups of orange-yellow horn or cup-like projections</td>
</tr>
</tbody>
</table>
### Table H-2 Inspection Aid for Plants Growing in Postentry Quarantine (page 3 of 16)

<table>
<thead>
<tr>
<th>Host group:</th>
<th>Pathogen or disease:</th>
<th>Preferred inspection period:</th>
<th>Symptoms:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Blighia sapida</strong> (akee)</td>
<td>Okra mosaic virus</td>
<td>When leaves are developing until leaves are fully opened</td>
<td>Leaves: Chlorosis of the leaf veins and chlorosis of the lamina leaving thin, dark-green bands along the small leaf veins</td>
</tr>
<tr>
<td><em>Bromeliaceae</em> (pine-apple family) (Postentry in HI only)</td>
<td><em>Puccinia pitcairniae</em> Lagh.</td>
<td>All season</td>
<td>Leaves: Scattered or compact cinnamon-brown to blackish-brown lesions</td>
</tr>
<tr>
<td></td>
<td><em>Puccinia tillandsiae</em> Cummins and Pollack</td>
<td>All season</td>
<td>Leaves: Lesions in clusters yellow to golden-brown</td>
</tr>
<tr>
<td></td>
<td><em>Uredo nidularii</em> P. Henn.</td>
<td>All season</td>
<td>Leaves: Yellowish to cinnamon-brown lesions arranged in rows in groups</td>
</tr>
<tr>
<td></td>
<td><em>Ustilago tillandsiae</em> Patterson</td>
<td>During flowering period</td>
<td>Inflorescences: Powdery black sori destroying inflorescences</td>
</tr>
<tr>
<td><strong>Brugmansia spp.</strong></td>
<td>Datura Colombian virus</td>
<td>Spring and early summer</td>
<td>Leaves: 1) Veinbanding or chlorotic flecking followed by mottling; 2) may become rugose and slightly distorted</td>
</tr>
<tr>
<td><strong>Carica spp.</strong></td>
<td>Inspect for any potential exotic pathogen</td>
<td>Various times of year</td>
<td>See <em>Plant Genera Subject to Postentry Quarantine</em> on page E-1</td>
</tr>
<tr>
<td><strong>Cedrus spp.</strong> (cedar)</td>
<td><em>Phacidiopycnis pseudot-suga</em> (M. Wils.) Hahn (Douglas Fir Canker)</td>
<td>All season</td>
<td>Terminal buds and shoots: Die-back branches or trunk: Girdling up to 6 inches wide</td>
</tr>
<tr>
<td><strong>Ceratonia siliqua</strong></td>
<td>Inspect for any potential exotic pathogen</td>
<td>Various times of year</td>
<td>See <em>Plant Genera Subject to Postentry Quarantine</em> on page E-1</td>
</tr>
<tr>
<td><strong>Chaenomeles spp.</strong> (flowering quince)</td>
<td>Quince sooty ringspot agent</td>
<td>Up to 6 weeks after leaves are fully opened</td>
<td>Young leaves: 1) Show epinasty (curled sharply downwards); 2) Veinlets-necrosis and short lengths become blackened; black pigments develop in cuticle bordering veins or around pale yellow spots giving superficial appearance of “sooty mold”; 3) Vein clearing and yellowing</td>
</tr>
<tr>
<td></td>
<td>Quince yellow blotch agent</td>
<td>Up to 6 weeks after leaves are fully opened</td>
<td>Leaves: Large chlorotic blotches</td>
</tr>
<tr>
<td></td>
<td>Quince stunt agent</td>
<td>Up to 6 weeks after leaves are fully opened</td>
<td>Leaves: Reduced in size, puckered, and marked by translucent chlorotic spots; Plants: Show no growth; also, show various degree of die-back (Smith)</td>
</tr>
</tbody>
</table>
### Table H-2  Inspection Aid for Plants Growing in Postentry Quarantine (page 4 of 16)

<table>
<thead>
<tr>
<th>Host group:</th>
<th>Pathogen or disease:</th>
<th>Preferred inspection period:</th>
<th>Symptoms:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chaenomeles spp. (flowering quince) (cont.)</td>
<td>Gymnosporangium asiaticum Miyabe ex Yamada (rust)</td>
<td>After leaves are fully opened</td>
<td><strong>Leaves:</strong> Upper surface: orange–yellow spots; Lower surface: brown spots with yellowish-red margins; telia occur on juniperus needles</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Apple ring spot agent</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chrysanthemum spp. (Dendranthema spp.)</td>
<td>Puccinia horiana P. Henn. (white rust of Chrysanthemum)</td>
<td>When leaves are fully out. Spring: 3 to 6 weeks after planting and again later in the season; summer</td>
<td><strong>Leaves:</strong> Upper surface—greenish-yellow spots. Lower surface—raised, waxy, whitish-yellow to pink pustules. <strong>Young shoots:</strong> Wilt and die</td>
</tr>
<tr>
<td>Chrysobalanus icaco</td>
<td>Inspect for any potential exotic pathogen</td>
<td>Various times of year</td>
<td>See Plant Genera Subject to Postentry Quarantine on page E-1</td>
</tr>
<tr>
<td>Chrysophyllum spp.</td>
<td>Inspect for any potential exotic pathogen</td>
<td>Various times of year</td>
<td>See Plant Genera Subject to Postentry Quarantine on page E-1</td>
</tr>
<tr>
<td>Corylus spp. (except C. avellana)</td>
<td>Inspect for any potential exotic pathogen</td>
<td>Various times of year</td>
<td>See Plant Genera Subject to Postentry Quarantine on page E-1</td>
</tr>
<tr>
<td>Corylus Avellana (hazelnut)</td>
<td>Apple proliferation phytoplasma</td>
<td>Starting in the spring and throughout the season</td>
<td>General yellowing, weak growth, and dieback</td>
</tr>
<tr>
<td>Crataegus monogyna (English hawthorn)</td>
<td>Gymnosporangium spp. (rust)</td>
<td>After leaves are fully opened</td>
<td><strong>Leaves:</strong> Brownish spots</td>
</tr>
<tr>
<td>Crataegus spp. (fruit bearing)</td>
<td>Gymnosporangium spp. (rust) and Monilina fructigena (Aderh. &amp; Ruhl.) Honey (brown rot of fruit)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Host group:</td>
<td>Pathogen or disease:</td>
<td>Preferred inspection period:</td>
<td>Symptoms:</td>
</tr>
<tr>
<td>------------</td>
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</tr>
<tr>
<td><em>Crocosmia</em> spp.</td>
<td><em>Puccinia mccleanii</em></td>
<td>When leaves are out</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Uredo gladioli-buettneri</em> Bub. (rust)</td>
<td>When leaves are out</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Uromyces gladioli</em> P. Henn (rust)</td>
<td>When leaves are out</td>
<td><strong>Leaves:</strong> Telia in small, brown sori crowded together to form a crust</td>
</tr>
<tr>
<td></td>
<td><em>Uromyces nyikensis</em> Syd. (rust)</td>
<td>When leaves are out</td>
<td><strong>Leaves:</strong> Telia in small, cinnamon-brown sori along veins sometimes on chlorotic spots</td>
</tr>
<tr>
<td></td>
<td><em>Uromyces transversalis</em></td>
<td>When leaves are out</td>
<td><strong>Leaves:</strong> Uredinia appear as powdery bright-orange sori on both leaf surfaces in linear series transversely across the leaf; telia initially surround the uredinia and are dark brown</td>
</tr>
<tr>
<td><em>Cydonia</em> spp. (quince)</td>
<td><em>Guignardia piricola</em> (Nose) Yamamoto (leaf, branch, and fruit disease)</td>
<td>Spring to early summer for leaves; summer for fruit (if fruiting)</td>
<td><strong>Branches or trunk:</strong> Lesions are round to elliptical, separated from healthy tissue by a crack or crevice around margin, and brown to gray <strong>Fruit:</strong> Spots are brown and depressed and sometimes with brownish ring</td>
</tr>
<tr>
<td></td>
<td>Quince sooty ringspot agent</td>
<td>Up to 6 weeks after leaves are fully opened</td>
<td><strong>Young leaves:</strong> 1) Show epinasty (curled sharply downwards); 2) Veinlets-necrosis and short lengths become blackened; lack pigments develop in cuticle bordering veins or around pale yellow spots giving superficial appearance of “sooty mold”; 3) Vein clearing and yellowing</td>
</tr>
<tr>
<td></td>
<td>Quince yellow blotch agent</td>
<td>Up to 6 weeks after leaves are fully opened</td>
<td><strong>Leaves:</strong> Large chlorotic blotches</td>
</tr>
<tr>
<td></td>
<td>Quince stunt agent</td>
<td>Up to 6 weeks after leaves are fully opened</td>
<td><strong>Leaves:</strong> Reduced in size, puckered, and marked by translucent chlorotic spots; Plants: Show no growth; also, show various degree of dieback (Smith)</td>
</tr>
<tr>
<td></td>
<td><em>Gymnosporangium asiaticum</em> Miyabe ex Yamada (rust)</td>
<td>After leaves are fully opened</td>
<td><strong>Leaves:</strong> Upper surface: orange-yellow spots; lower surface: brown spots with yellowish-red margins; telia occur on juniperus needles</td>
</tr>
</tbody>
</table>
### Table H-2 Inspection Aid for Plants Growing in Postentry Quarantine (page 6 of 16)

<table>
<thead>
<tr>
<th>Host group:</th>
<th>Pathogen or disease:</th>
<th>Preferred inspection period:</th>
<th>Symptoms:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cydonia spp. (quince) (cont.)</td>
<td>Apple ring spot agent</td>
<td>When fruits are about 3 cm in diameter until harvest</td>
<td>Occurs only on fruits: Starts as small, brown areas. Develops into irregular patches of varying shades of brown (to reddish brown) with rough, russeted surface (sometimes intersected by little cracks) and scaly margin. As fruit ripens, a brown halo, or a series of concentric rings, forms around lesions. The skin around the halo (or rings) is light green or yellow even on red fruits</td>
</tr>
<tr>
<td>Datura spp. (thornapple)</td>
<td>Datura Colombian virus</td>
<td>Spring and early summer</td>
<td>Leaves: 1) Veinbanding or chlorotic flecking followed by mottling; 2) may become rugose and slightly distorted</td>
</tr>
<tr>
<td></td>
<td>Datura distortion or enation mosaic virus</td>
<td>Spring and early summer</td>
<td>Leaves: 1) First symptoms—pronounced vein clearing, curling or margins and upward folding of youngest leaf near its base followed by discoloration; 2) symptoms become more prominent and color gradually turns lighter green with few dark-green spots; 3) subsequent leaves show pronounced margin curling and almost double folding upwards; 4) severe malformation (distortion)—reduction of laminae to midrib only resulting in a shoestring (tendril-like) effect. <strong>Flowers and buds:</strong> Severe distortion and malformation, whorls imperfectly developed and corolla and calyx rupturing</td>
</tr>
<tr>
<td>Dendranthema spp. (see Chrysanthemum spp. on page H-4)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table H-2 Inspection Aid for Plants Growing in Postentry Quarantine (page 7 of 16)

<table>
<thead>
<tr>
<th>Host group</th>
<th>Pathogen or disease</th>
<th>Preferred inspection period</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Dianthus</em> spp. (pink)</td>
<td>Carnation etched ring virus</td>
<td>Spring and early summer</td>
<td>Leaves: Oval- to dumbbell-shaped whitish necrotic flecks and rings with dark brown–maroon edges</td>
</tr>
<tr>
<td></td>
<td>Carnation necrotic fleck virus</td>
<td>Spring and early summer</td>
<td>Leaves: Grayish white or reddish-purple flecks</td>
</tr>
<tr>
<td></td>
<td>Carnation streak agent</td>
<td>Spring and early summer</td>
<td>Leaves: Yellowish or reddish spots parallel to veins. Lower surface may be heavily spotted and turn yellow</td>
</tr>
<tr>
<td></td>
<td><em>Phialophora cinerecens</em> (Wr.) van Beyma (<em>Verticillium cinerecens</em> Wr.)</td>
<td>Any time</td>
<td>Leaves: Wilted, wrinkled, and chlorotic; vascular ring discoloration. Stems: May have “kinks” at nodes and internodes shortened</td>
</tr>
<tr>
<td><em>Eucalyptus</em> spp. (Australian gum)</td>
<td>Leaf chlorosis agent</td>
<td>After leaves are fully opened until 6 weeks later</td>
<td>Leaves: Chlorosis and size reduction. Plants: Die in full sunlight; less chlorotic plants may live for some years, but growth is retarded</td>
</tr>
<tr>
<td></td>
<td><em>Pestalotia disseminata</em> Thuem. (parasitic leaf fungus)</td>
<td>From full leaf maturity and thereafter</td>
<td>Leaves: Premature drop; blight</td>
</tr>
<tr>
<td><em>Euonymus</em> spp. (spindle tree)</td>
<td><em>Euonymus</em> mosaic agent</td>
<td>After leaves are fully opened until 6 weeks later</td>
<td>Leaves: Wide yellow border and center are mottled green or greenish-yellow; young leaves show yellow veination</td>
</tr>
<tr>
<td><em>Fraxinus</em> spp. (ash)</td>
<td><em>Pseudomonas savastanoi</em> var. fraxini (Brown) Dowson (canker and dwarfing disease)</td>
<td>All season</td>
<td>Young trees: Dwarfed. Branches and trunk: Cankers and discoloration of tissue beneath bark</td>
</tr>
<tr>
<td><em>Gladiolus</em> spp. (corn flag, sword lily)</td>
<td><em>Puccinia mccleanii</em> Doidge (rust)</td>
<td>When leaves are out</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Uredo gladioli-buettneri</em> Bub. (rust)</td>
<td>When leaves are out</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Uromyces gladioli</em> P. Henn. (rust)</td>
<td>When leaves are out</td>
<td>Leaves: Small, brown-black pustules crowded together to form a crust</td>
</tr>
<tr>
<td></td>
<td><em>Uromyces transversalis</em> (Thuem.) Wint. (rust)</td>
<td>When leaves are out</td>
<td>Leaves: Powdery, bright orange pustules on both surfaces in linear series perpendicular to veination</td>
</tr>
</tbody>
</table>
### Table H-2 Inspection Aid for Plants Growing in Postentry Quarantine (page 8 of 16)

<table>
<thead>
<tr>
<th>Host group:</th>
<th>Pathogen or disease:</th>
<th>Preferred inspection period:</th>
<th>Symptoms:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hibiscus</strong> (see <em>Abelmoschus</em> spp. (okra) on page H-1)</td>
<td>Cotton leaf curl agent</td>
<td>After leaves are fully opened until 6 weeks after</td>
<td>Leaves: Conspicuous net-vein enations; on severely affected plant, leaves are small, thick, and curled downwards; also, on severely affected plants, may have “bunchy-top” appearance</td>
</tr>
<tr>
<td></td>
<td><em>Hibiscus</em> yellow vein mosaic agent</td>
<td>When leaves are developing until leaves are fully opened</td>
<td>Leaves: Vein chlorosis; chlorotic areas yellowish green around leaf tissues to bright yellow near veins. Lower leaf surfaces: veins swollen (thickened), brittle and dark green; vein thickening causes leaf to curl downwards</td>
</tr>
<tr>
<td></td>
<td>Okra mosaic virus</td>
<td>Spring and early summer</td>
<td>Youngest leaves: 7 to 8 days after inoculation: light-green mosaic or regular chlorosis of veins. Next two to three leaves produced: one or more principal veins bordered by broad chlorotic bands. Later leaves: no symptoms</td>
</tr>
<tr>
<td><strong>Humulus</strong> spp. (hop)</td>
<td>Hop nettlehead strain of <em>Arabis</em> mosaic virus</td>
<td>After leaves are fully opened until 6 weeks after</td>
<td>Plant: Poor growth and degeneration of plant; reduction of both number and weight of cones</td>
</tr>
<tr>
<td><strong>Hydrangea</strong> spp.</td>
<td><em>Puccinia glyceriae</em> S. Ito (<em>Aecidium hydrangea</em>)</td>
<td>When leaves are out</td>
<td>Leaves: Orange-yellow lesions on the upper surface (spermogonia); aecia on the lower surface of the leaf are cup shaped and pale yellow in color</td>
</tr>
<tr>
<td><strong>Jasminum</strong> spp. (jasmine)</td>
<td>Jasmine variegation agent</td>
<td>After leaves are fully opened until 6 weeks later</td>
<td>Leaves and young branches: Yellowish variegation</td>
</tr>
<tr>
<td><strong>Juniperus</strong> spp. (juniper)</td>
<td><em>Stigmina deflectans</em> (Karst) Ellis (needlecast disease)</td>
<td>When needles are turning brown</td>
<td>Needles: Minute brownish fruiting bodies along the median veins of the upper side of needles</td>
</tr>
<tr>
<td></td>
<td><em>Phacidio pycnis pseudosuga</em> (M. Wils.) Hahn (Douglas fir canker)</td>
<td>Throughout growing season</td>
<td>Branches and trunk: cankers; often exude abundance of resin; fungus not perennial, therefore, isolated cankers may heal over</td>
</tr>
</tbody>
</table>
### Table H-2 Inspection Aid for Plants Growing in Postentry Quarantine (page 9 of 16)

<table>
<thead>
<tr>
<th>Host group</th>
<th>Pathogen or disease</th>
<th>Preferred inspection period</th>
<th>Symptoms:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Larix spp. (larch)</td>
<td><em>Phacidiopycnis pseudotsuga</em> (M. Wils.) Hahn (Douglas Fir Canker)</td>
<td>Throughout growing season</td>
<td>Branches and trunk: cankers; often exude abundance of resin; fungus not perennial, therefore, isolated cankers may heal over</td>
</tr>
<tr>
<td>Lachnellula wilkommii (Har-tig) Dennis (European larch canker)</td>
<td></td>
<td>Throughout growing season</td>
<td>Branches and trunk: cankers causing girdling dieback</td>
</tr>
<tr>
<td>Leucanthemella serotina</td>
<td><em>Puccinia horiana</em> P. Henn. (white rust of <em>Chrysanthemum</em>)</td>
<td>When leaves are fully out; spring: 3 to 6 weeks after planting and again later in the season; summer</td>
<td>Leaves: Upper surface—greenish-yellow spots. Lower surface—raised, waxy, whitish-yellow to pink pustules. Young shoots: Wilt and die</td>
</tr>
<tr>
<td>Ligustrum spp. (privet)</td>
<td>Ligustrum mosaic agent</td>
<td>After leaves are fully opened until 6 weeks after</td>
<td>Leaves: Clear yellow spots</td>
</tr>
<tr>
<td>Litchi chinensis (fruit and nut List)</td>
<td>Inspect for any potential exotic pathogen</td>
<td>Various times of year</td>
<td>See Plant Genera Subject to Postentry Quarantine on page E-1</td>
</tr>
<tr>
<td>Mahoberberis (Berberis x Mahonia hybrid)</td>
<td><em>Puccinia graminis</em> Pers. (black stem rust)</td>
<td>Between 5 to 9 weeks after leaves are fully opened</td>
<td>Leaves: Rust appears first on upper surface as yellowish round spots with brighter yellow or reddish-purple margins; later, discolored, slightly thickened spots appear on lower surface (this stage also appears on stem and fruit)</td>
</tr>
<tr>
<td>Mahonia spp. (Oregon grape, holly grape)</td>
<td><em>Puccinia graminis</em> Pers. (black stem rust)</td>
<td>Between 5 to 9 weeks after leaves are fully opened</td>
<td>Leaves: Rust appears first on upper surface as yellowish round spots with brighter yellow or reddish-purple margins; later, discolored, slightly thickened spots appear on lower surface (this stage also appears on stem and fruit)</td>
</tr>
<tr>
<td>Malus spp. (apple)</td>
<td>Apple proliferation phytoplasma</td>
<td>Late summer and fall—opening of blossoms on infected branches; fall—growth of axillary buds (Witches’ Broom); spring—early leafing out</td>
<td>Buds and leaves: 1) first symptoms—reddening of leaves and late growth of terminal buds; 2) second symptom—Witches’ Broom may appear in the same or later years; 3) infested plants may become symptomless after 2 to 3 years of acute reaction</td>
</tr>
<tr>
<td></td>
<td><em>Diaporthe mali</em> Bres. (leaf, branch, and fruit fungus)</td>
<td>Spring and early summer</td>
<td>Leaves: Pale, discolored spots; may curl and drop prematurely. Young shoots: Irregular, brownish canker about 6 inches below tip; twig surface gradually dries and cracks causing death of shoot</td>
</tr>
</tbody>
</table>
### Table H-2  Inspection Aid for Plants Growing in Postentry Quarantine (page 10 of 16)

<table>
<thead>
<tr>
<th>Host group:</th>
<th>Pathogen or disease:</th>
<th>Preferred inspection period:</th>
<th>Symptoms:</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Malus</em> spp. (apple) (cont.)</td>
<td>Apple branch canker (<em>Valsa ceratosperma</em>; Gvrtischvili)</td>
<td>Spring (more likely to see during a wet period)</td>
<td><strong>Bark</strong>: Swollen, water-soaked lesions; small black pycnidia appear in the lesions later and spore horns approximately 1 month after that; cankers (usually on older plants) on the upper side of limbs; a girdling type of injury may be observed on weakened branches and twigs. These signs will probably be found only during the second growing season inspection.</td>
</tr>
<tr>
<td><em>Guignardia piricola</em> (Nose) Yamamoto (leaf, branch, and fruit disease)</td>
<td>Spring and summer</td>
<td><strong>Leaves</strong>: Brown to dark brown spots surrounded by a ring. <strong>Branches and trunk</strong>: Round oval lesions; infected and healthy tissues separated by a crack or crevice; lesion surface depressed, brown in color with many fruiting bodies in center.</td>
<td></td>
</tr>
<tr>
<td><em>Valsa ceratosperma</em> (Tode ex Fr.) Maire (<em>V. mali</em>) (apple branch canker)</td>
<td>Throughout growing season</td>
<td><strong>Bark</strong>: On the upper side of limbs the bark appears swollen and water soaked especially when wet. The resultant canker becomes sunken, darker, and cracked on the surface. Black pycnidia appear in the canker in late spring and spore horns about 1 month later. These signs will probably be found only during the second growing season inspection.</td>
<td></td>
</tr>
<tr>
<td><em>Morus</em> spp. (mulberry)</td>
<td>Mulberry dwarf phytoplasma</td>
<td>Late spring to early summer</td>
<td><strong>Leaves</strong>: Normal leaves are produced at the beginning if winter temperatures were below 20°C; check leaves produced later after causal agent had moved from the roots and multiplied in newly growing shoots; chlorosis of leaves. <strong>Branches</strong>: Proliferation (Witches’ Broom).</td>
</tr>
<tr>
<td></td>
<td>Mulberry curly little leaf agent</td>
<td>Spring to early summer</td>
<td><strong>Leaves</strong>: Deformed; retards growth in general and development of root system.</td>
</tr>
</tbody>
</table>
### Table H-2 Inspection Aid for Plants Growing in Postentry Quarantine (page 11 of 16)

<table>
<thead>
<tr>
<th>Host group:</th>
<th>Pathogen or disease:</th>
<th>Preferred inspection period:</th>
<th>Symptoms:</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Morus</em> spp. (mulberry) (cont.)</td>
<td>Mulberry mosaic agent</td>
<td>Up to 6 weeks after leaves are fully opened</td>
<td>Leaves: Typical mosaic mottling, occasionally accompanied by slight curling and puckering; no noticeable reduction in leaf size</td>
</tr>
<tr>
<td></td>
<td><em>Aecidium mori</em> (Barclay Dietel) (mulberry rust)</td>
<td>Late spring to early summer for your geographical location</td>
<td>Aecia with spores on upper and lower surfaces of the leaf. They are solitary or in groups on leaves, buds, leaf veins, and petioles. Can be in elongated clusters up to 1 cm. long causing distortion and excessive host tissue growth</td>
</tr>
</tbody>
</table>
| *Nipponanthemum nipponicum* | *Puccinia horiana* P. Henn. (white rust of *Chrysanthemum*) | When leaves are fully out; spring: 3 to 6 weeks after planting and again later in the season; summer | Leaves: Upper surface—greenish-yellow spots. Lower surface—raised, waxy, whitish-yellow to pink pustules  
Young shoots: wilt and die |
| *Olea europaea* (olive) | Olive partial paralysis virus | After leaves are fully opened until 6 weeks later | Leaves: Chlorotic, curled leaves on secondary twigs or mosaic pattern with midrib darkening  
Twigs: The entire branch shrivels from the tip downward; a dark reddish-purple band appears on the bark; sections of twigs may have a strong fermentation odor  
Branches: May be stunted and may appear only in individual branches; diseased plants appear bushy |
| | Olive sickle leaf virus | After leaves are fully opened until 6 weeks later | Leaves: Chlorotic, blotched, streaked, are sickle-shaped, curved, puckered or otherwise deformed; they are light green with white markings  
Branches: May be stunted and may appear only in individual branches; diseased plants appear bushy |
| *Passiflora* spp. (passion fruit) | Passion fruit woodiness virus | During spring growth and early summer | Leaves: *P. edulis*: mosaic, distortion, and crinkles, with yellow spots on older leaves  
*P. edulis f. flavicarpa* and hybrids: Pale-green to yellowish ringspots and leaf mosaic on spring growth |
| *Philadelphus* spp. (mock orange) | Elm mottle virus | After leaves are fully opened until 6 weeks after | Leaves: Chlorotic ringspot, mottling, and line pattern |
Table H-2 Inspection Aid for Plants Growing in Postentry Quarantine (page 12 of 16)

<table>
<thead>
<tr>
<th>Host group</th>
<th>Pathogen or disease</th>
<th>Preferred inspection period</th>
<th>Symptoms:</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Picea</em> spp. (spruce)</td>
<td><em>Chrysomyxa ledi</em> (Alb. &amp; Schw.) d By var. <em>rhododendri</em> (DC) Savile (<em>rhododendron</em>—spruce needle rust)</td>
<td>Fall</td>
<td>Leaves: Premature defoliation of heavily infected needles</td>
</tr>
<tr>
<td></td>
<td><em>Phacidioptcys pseudotsuga</em> (M. Wils.) Hahn (<em>Douglas Fir Canker</em>)</td>
<td>Throughout growing season</td>
<td>Branches and trunk: girdling up to 6 inches wide</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Large branches and trunk: cankers; isolate cankers may heal over as fungus is not perennial on bark</td>
</tr>
<tr>
<td><em>Pinus</em> spp. (two- or three-leaved) (pine)</td>
<td><em>Cronartium flaccidium</em> (Alb. &amp; Schw.) Wint. (rust causing serious stunting of hard pines)</td>
<td>Late spring to early summer</td>
<td>Bark: Irregular, ballooned, pale, yellow sacs containing powdery, orange spores</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Gall forming rust</td>
</tr>
<tr>
<td><em>Populus</em> spp. (poplar, aspen, cottonwood)</td>
<td><em>Xanthomonas populi</em> Ride (<em>canker</em>)</td>
<td>Spring and early summer</td>
<td>Leaves: young leaves turn black</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Shoots: presence of canker and slime exude (especially during wet weather); slime exude also from base of dead buds and at internodes</td>
</tr>
<tr>
<td><em>Prunus</em> spp. (stone fruit)</td>
<td><em>Plum pox (=Sharka) virus</em></td>
<td>When leaves are fully opened, until six weeks after</td>
<td>Plum: Leaves: severe diffused olive-green rings or mottling</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fruit: skin with dark colored rings; flesh with brown or red discoloration</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Seed: brown spots</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Peach: Leaves: vein yellowing, chlorotic spotting, and distortion</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Flowers: some varieties will show color breaking symptoms</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Apricot: Leaves: diffused pale-green rings and lines</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Seed: yellow rings</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Apple proliferation phytoplasma in <em>P. armeniaca</em> (apricot); <em>P. avium</em> (cherry); and <em>P. domestica</em> (plum)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spring and summer</td>
<td>Leaves: wilting to leading to leaf death</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Branches and trunk: necrosis visible when cut across and longitudinally</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Flowers: become necrotic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Starting in the spring and throughout the season</td>
<td>Leaves: wilting</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Flowers: necrosis on cherry flowers</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Branches and trunks: necrosis in cross-section</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>Host group:</th>
<th>Pathogen or disease:</th>
<th>Preferred inspection period:</th>
<th>Symptoms:</th>
</tr>
</thead>
</table>
| *Prunus* spp. (stone fruit) (cont.) | Cherry leaf roll virus | Spring and summer | **Spring:** Delayed leafing and flowering  
**Summer:** 1) Margins of leaf roll upwards and, in some varieties, leaf turns purple; 2) infected tree declines in vigor and gum exudes from splits in bark |
| | Cherry rusty mottle (*European*) agent | Late summer | **Leaves:** Rust-colored pigmentation |
| | European stone fruit yellows phytoplasma | Spring and summer | **Early symptoms:** leaf rolling and yellowing  
**Later symptoms:** shoot proliferation and unseasonal growth (during winter) Characteristic disease symptoms: presence of weak shoot with small leaves among normal shoots and irregularly distributed dried twigs on branches |
| | Plum bark split strain of apple chlorotic leaf spot virus | Throughout growing season | **Bark:** formation of reddish-brown areas that become sunken, hard, and usually split; splits increase and are flanked by sunken areas of dead bark with wavy margin |
| | Arabis mosaic virus and its strains | For Chlorotic symptoms, not more than 6 weeks after leaves are fully opened | **Plants:** dwarving from slight stunting to extreme miniaturization (extreme miniaturization condition—leaves are twisted, cupped, crinkled, or deformed)  
**Leaves:** chlorosis between veins and in irregular blotches or yellowing of whole leaves or leaf edges |
| | Raspberry ringspot virus and its strains | Up to 6 weeks after leaf is fully opened | **Leaves:** "rasp-leaf" condition |
| | Tomato blackring virus and its strains | Spring and early summer | **Peach:** shoot stunting  
**Almond:** leaf enations |
| | Strawberry latent ringspot virus and its strains | Spring and early summer | **Peach:** causes dwarving  
**Cherry:** veinal chlorosis and reddening of leaves |
| *Pseudolarix* spp. (golden larch) | *Lachnellula wilkommii* (Hartig) Dennis (European larch canker) | Throughout growing season | **Branches and trunks:** cankers causing girding dieback |
### Table H-2 Inspection Aid for Plants Growing in Postentry Quarantine

<table>
<thead>
<tr>
<th>Host group:</th>
<th>Pathogen or disease:</th>
<th>Preferred inspection period:</th>
<th>Symptoms:</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Pseudotsuga</em> spp. (Douglas fir)</td>
<td><em>Phacidioptynis pseudotsuga</em> (M. Wils.) Hahn (Douglas fir canker)</td>
<td>Throughout growing season</td>
<td>Terminal buds and shoots: die-back  &lt;br&gt; Branches or trunk: girdling up to 6 inches wide  &lt;br&gt; Larger branches or trunk: cankers; isolated cankers may heal over as fungus is not perennial on bark</td>
</tr>
<tr>
<td><em>Pyrus</em> spp. (pear)</td>
<td><em>Guignardia piricola</em> (Nose) Yamamoto (leaf, branch, and fruit disease)</td>
<td>Spring and summer</td>
<td>Leaves: brown to dark-brown spots surrounded by a ring  &lt;br&gt; Branches or trunk: round oval lesions, infected and healthy tissues separated by a crack or crevice; lesion surface depressed, brown in color and with many fruiting bodies in center</td>
</tr>
<tr>
<td>Apple proliferation phytoplasma</td>
<td>First-year growth of scion wood and second-year growth of buds</td>
<td>Witches’ Broom</td>
<td></td>
</tr>
<tr>
<td>Pear blister canker viroid</td>
<td>Spring and early summer</td>
<td>Bud grafts: reddening of leaves and late growth of terminal buds the second year of growth</td>
<td></td>
</tr>
<tr>
<td>Pear bud drop agent</td>
<td>Early spring</td>
<td>Stems: Small blisters appear in early spring. Later, splits and cracks appear and coalesce to form cankers; may kill young trees</td>
<td></td>
</tr>
<tr>
<td><em>Gymnosporangium asiaticum</em> Miyabe ex. Yamada (rust)</td>
<td>After leaves are fully out</td>
<td>Leaves: upper surfaces: small, orange-yellow spots lower surfaces: brown spots with yellowish-red margins</td>
<td></td>
</tr>
<tr>
<td><em>Valsa ceratosperma</em> (Tode: Fr.) Mair (anamorph: <em>Cytospora sacculus</em> (Schwein.) Gvritischvili) (<em>Valsa</em> canker)</td>
<td>Spring (more likely to see during a wet period)</td>
<td>Bark: swollen, water-soaked lesions; small black pycnidia appear in the lesions later and spore horns approximately 1 month after that; cankers (usually on older plants) on the upper side of limbs; a girdling type of injury may be observed on weakened branches and twigs</td>
<td></td>
</tr>
</tbody>
</table>
Table H-2  Inspection Aid for Plants Growing in Postentry Quarantine (page 15 of 16)

<table>
<thead>
<tr>
<th>Host group:</th>
<th>Pathogen or disease:</th>
<th>Preferred inspection period:</th>
<th>Symptoms:</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Pyrus</em> spp. (pear)</td>
<td>Apple ring spot agent</td>
<td>Before and at fruit harvest</td>
<td><strong>Mature fruit</strong>: small, light-brown areas, varying in size and shape</td>
</tr>
<tr>
<td>(cont.)</td>
<td></td>
<td></td>
<td><strong>Ripened fruit</strong>: distinct, reddish spots intersected by little cracks; spots develop a broom halo or series of concentric rings</td>
</tr>
<tr>
<td>Quercus spp. (oak)</td>
<td><em>Stereum hiugense</em> Imazeki (white rot)</td>
<td>Throughout growing season</td>
<td><strong>Stems and branches</strong>: most likely a wound parasite causing decay of the wood; wood turn dark brown, some forming dark-brown streaks</td>
</tr>
<tr>
<td>Ribes spp.</td>
<td>Black currant reversion virus</td>
<td>During blossom period, late spring, and early summer</td>
<td><strong>Buds</strong>: smooth and brightly colored as compared with hairy and gray normal bud; flower may be malformed and “double”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Leaves</strong>: flatter than normal; number reduced and chlorotic during blossom period</td>
</tr>
<tr>
<td>Rosa spp. (rose)</td>
<td>Rose wilt agent</td>
<td>After leaves are fully opened until 6 weeks later</td>
<td><strong>Plants</strong>: wilted; pinched, yellowish-green shoots and eventually die-back and death; also, stems proliferation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Leaves</strong>: epinasty; turn pale green or yellow; brittle and easily detached</td>
</tr>
<tr>
<td>Rubus spp. (bramble)</td>
<td>Rubus stunt phytoplasma</td>
<td>Early summer</td>
<td><strong>Leaves</strong>: on infected cane, paler than normal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Canes</strong>: small, thin, and weak; also excessive lateral branching (bushy appearance)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Flowers</strong>: green, leaf-like petals; also excessive proliferation of flowers</td>
</tr>
<tr>
<td>Salix spp. (willow)</td>
<td><em>Erwinia salicis</em> (Day) Chester (<em>Brenneria salicis</em>) (watermark disease)</td>
<td>Throughout growing season</td>
<td><strong>Leaves</strong>: turn bright red in early summer during hot weather; remain on stem</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Shoots</strong>: show bacteria containing liquid drips; grayish discoloration inside shoot when cut</td>
</tr>
<tr>
<td>Sorbus spp. (mountain ash)</td>
<td>Mountain ash variegation agent</td>
<td>After leaves are fully opened until 6 weeks later</td>
<td><strong>Leaves</strong>: yellow or white variegation, sometimes vein-clearing and vein-banding</td>
</tr>
<tr>
<td></td>
<td><em>Taphrina piri</em> Kusano (leaf distortion fungus)</td>
<td>Throughout growing season</td>
<td><strong>Leaves</strong>: yellowish-green spots; later spots show pruinose, hairy–white growth on surface</td>
</tr>
</tbody>
</table>
### Table H-2 Inspection Aid for Plants Growing in Postentry Quarantine (page 16 of 16)

<table>
<thead>
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</tr>
</thead>
<tbody>
<tr>
<td><em>Syringa</em> spp. (lilac)</td>
<td>Elm mottle virus</td>
<td>After leaves are fully opened until 6 weeks later</td>
<td><strong>Leaves:</strong> chlorotic ringspots and line pattern</td>
</tr>
<tr>
<td><em>Ulmus</em> spp. (elm)</td>
<td>Elm mottle virus</td>
<td>After leaves are fully opened until 6 weeks later</td>
<td><strong>Leaves:</strong> chlorotic ringspots and line pattern</td>
</tr>
<tr>
<td><em>Watsonia</em> spp.</td>
<td><em>Puccinia mccleanii</em> Doidge (rust)</td>
<td>When leaves are out</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Uredo gladioli-buettneri</em> Bub. (rust)</td>
<td>When leaves are out</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Uromyces gladioli</em> gladioli P. Henn (rust)</td>
<td>When leaves are out</td>
<td><strong>Leaves:</strong> small, brown-black pustules crowded together to form a crust</td>
</tr>
<tr>
<td></td>
<td><em>Uromyces transversalis</em> (Thuem.) Wint. (rust)</td>
<td>When leaves are out</td>
<td><strong>Leaves:</strong> powdery, bright orange pustules on both surfaces in linear series perpendicular to veination</td>
</tr>
</tbody>
</table>
Pesticide Safety

Precautions

Practice the following safety precautions:

1. Check container markings, labels, and accompanying documents to learn if the seed was treated. If the accompanying documents indicate that the seed was treated, skip to Step 3. If the documents tell you nothing, go to Step 2.

2. If you didn't learn anything from the labels or accompanying documents, carefully examine the container and the seed for pesticide residue. If you detect a chemical odor, suspect the seed was treated. If pesticides are suspected, recheck the documentation and labeling to learn the name of the pesticide. By knowing what the pesticide is, you can take the most appropriate action if pesticide poisoning occurs.

3. Don't breathe the air around the open container or the treated seed. Work in a well-ventilated area.

4. If it is necessary for you to touch the seed, wear latex gloves. To increase your protection, handle the seed as little as possible.

5. Once you complete your inspection, appropriately discard the latex gloves. Wash your hands with soap and water.

6. If the seed showed evidence of having been treated but was not so marked, mark the documents and container. Mark them to alert other people who may have to handle the shipment.
Glossary

Use this glossary to find the meaning of specialized words, abbreviations, acronyms, and terms used in regulating postentry quarantine materials. To locate where in the manual a given definition, term, or abbreviation is mentioned, refer to the index.

Definitions, Terms, and Abbreviations

advisories. important information throughout the manual brought to the user’s attention

aecium. cuplike structure of some rust fungi that contains chains of aeciospores

APHIS. Animal and Plant Health Inspection Service

APHIS Form 7060. Official Warning Violation of Federal Regulations

blight. any of numerous plant diseases resulting in sudden conspicuous wilting and dying of affected parts, especially young, growing tissues

cancellate. to make in a crisscross pattern

cankers. (a) localized diseased or necrotic area on a plant part, especially on a trunk, branch, or twig of a woody plant, usually caused by fungi or bacteria; (b) any of several diseases of plants characterized by the presence of such lesions

character. a structure, function, or attribute determined by a gene or group of genes

chlorosis. yellowing or whitening of normally green plant tissue because of a decreased amount of chlorophyll, often as a result of disease or nutrient deficiency

clavate. having one end thickened; club-shaped

dieback. gradual dying of plant shoots, starting at the tips, as a result of various diseases or climatic conditions
eruptment. bursting through or as if through a surface or covering

girdle. to remove a band of bark and cambium from the circumference of (a tree) usually in order to kill it

graft. (a) to unite (a shoot or bud) with a growing plant by insertion or by placing in close contact; (b) to join (a plant or plants) by such union

host. animal or plant on which or in which another organism lives

hyaline. resembling glass, as in translucence or transparency; glassy

lacerate. having jagged, deeply cut edges

necrosis. death of cells or tissues through injury or disease, especially in a localized area of the body

pedicel. small stalk or stalk-like part bearing a single flower in an inflorescence

pedicellate. having or supported by a pedicel

PEQ. Postentry Quarantine

PEQLO. PPQ Postentry Quarantine Liaison Officer

PEQP. Postentry Quarantine Program

PEQU. Postentry Quarantine Unit

peridium. covering of the spore-bearing organ in many fungi

PIS. Plant Inspection Station

PPQ Form 236. Notice of Shipment and Report of Inspection of Imported Plants to be Grown Under Postentry Quarantine

PPQ Form 391. Specimens for Determination

PPQ Form 518. Report of Violation

PPQ Form 546. Agreement for Postentry Quarantine—State Screening Notice (7 CFR 319 Subpart—Plants for Planting)

PPQ Form 569. Release From Postentry Quarantine
PPQ Form 587. Application for Permit to Import Plants or Plant Products

pruinose. having a white, powdery covering or bloom

pulvinate. having a swelling at the base. Used of a leafstalk

pyriform. shaped like a pear

sori. reproductive structures in certain fungi and lichens

SPHD. State Plant Health Director

SPRO. State Plant Regulatory Official

striate. marked with atriae; striped, grooved, or ridged

telium. pustule-like sorus formed on the tissue of a plant infected by a rust fungus and producing teliospores

USDA. United States Department of Agriculture

vector. an organism that carries disease-causing microorganisms from one host to another

verrucose. covered with warts or wart-like projections

xylem. supporting and water-conducting tissue of vascular plants, consisting primarily of tracheids and vessels; woody tissue
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Postentry Quarantine

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