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# Guideline for Plant Pest Risk Analysis of Imported Commodities

*Commodity Pest Risk Analysis Branch (CPRA)*  
*Biological Assessment and Taxonomic Support*  
Version 1.3 - 17 May 1996

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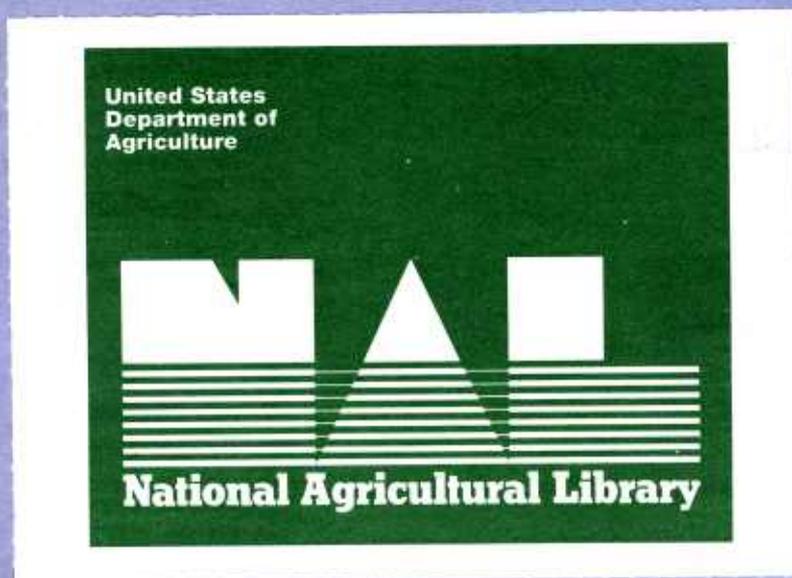
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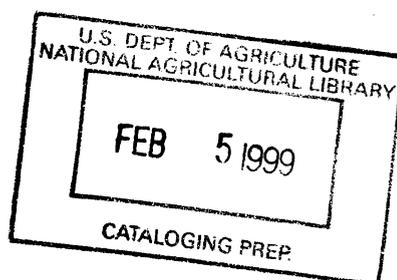
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Sections of the Guideline for Plant Pest Risk Analysis of Imported Commodities are available from the Permit Unit, BATS, PPQ fax vault by dialing 301-734-3560. Press "2" at the cue.

Request the Document Selection Menu. The sections are listed on pages 2 and 3 under the heading Pest Risk Analysis Guidelines.

Revised 16 May 1996



## **Guideline for Plant Pest Risk Analysis of Imported Commodities**

### **The PRA Process**

This section briefly describes guidelines for commodity-initiated, qualitative pest risk assessments conducted by Plant Protection and Quarantine (PPQ) within APHIS. Our goal is to harmonize PPQ risk assessment procedures with guidelines provided by the North American Plant Protection Organization (NAPPO) and the Food and Agriculture Organization (FAO). Our use of biological and phytosanitary terms (*e.g.*, introduction, quarantine pest) conforms with the *NAPPO Compendium of Phytosanitary Terms* (NAPPO 1995). Pest risk assessment is one component of an overall pest risk analysis. The FAO *Guidelines for Pest Risk Analysis* describe three stages in pest risk analysis:

- Stage 1:       Initiating the process for analyzing pest risk (identifying pests or pathways for which the pest risk analysis is needed)
  
- Stage 2:       Assessing pest risk (determining which pests are quarantine pests, characterized in terms of likelihood of entry, establishment, spread, and economic importance)
  
- Stage 3:       Managing pest risk (developing, evaluating, comparing and selecting options for dealing with the risk)

This outline provides a template for conducting FAO Stages 1 and 2.

FAO describes two general categories of initiating events for pest risk analyses. A pest risk analysis can be either "pest initiated" (*e.g.*, a quarantine pest is discovered in a new area, a pest is intercepted at a port of entry) or "pathway initiated" (*e.g.*, international trade is initiated in a new commodity). This outline describes procedures used by PPQ for pathway-initiated pest risk assessment. PPQ conducts two types of pathway-initiated pest risk assessments. The two types are qualitative only and qualitative and quantitative pest risk assessments. This guideline describes the PPQ process for qualitative pest risk assessments. Qualitative and quantitative assessments are similar in most respects, but in quantitative assessments we examine quarantine pests in greater detail and provide a quantitative estimates of the likelihood of introduction (see Step 8 below). PPQ completes nine basic steps in pathway-initiated plant pest risk assessments:

### **Stage 1 (FAO):   Initiating Pest Risk Analysis Process**

- Step 1.       Document the initiating event(s) for the PRA.**
  
- Step 2.       Assess Weediness Potential (of the species to be imported).**
  
- Step 3.       Identify Previous Risk Assessments, Current Status of Importations, and Pertinent Pest Interceptions.**

**Step 4. Pest List: Identify Potential Quarantine Pests.** Produce a list of pests reported to be associated with the host species in the exporting country/region.

**Stage 2 (FAO): Assessing pest risk**

**Step 5. Identify Quarantine Pests: Geographic and Regulatory Criteria.**

**Step 6. Identify Quarantine Pests Likely to Follow the Pathway (*i.e.*, those requiring further analysis).** Determine which quarantine pests may reasonably be expected to follow the pathway; only those are analyzed further.

**Step 7. Assess Economic Importance: Consequences of Introduction.** For each quarantine pest expected to follow the pathway, estimate the consequences of introduction. Issues to consider include "...the establishment, spread and economic importance potential in the PRA area". Environmental impacts are also a valid concern.

**Step 8. Assess Likelihood of Introduction.** For each quarantine pest expected to follow the pathway, estimate the likelihood of introduction via the pathway.

**Step 9. Conclusion / Phytosanitary Measures: Pest Risk Potential (PRP) of Quarantine Pests.** Produce a single rating which represents an overall estimate of the risk posed by each quarantine pest. Comment briefly on the meaning of the PRP's for each quarantine pest. Although this document focuses on risk assessment, the risk assessment (*i.e.*, FAO Stages 1 & 2) and risk management (FAO Stage 3) stages are interrelated. Accordingly, the risk assessor may occasionally make brief comments regarding risk management options associated with the requested commodity importations.

**Step 10. Document the PRA**

**Responsibilities of APHIS and Non-APHIS parties:**

1. **APHIS** is responsible for maintaining and providing to parties requesting a PRA:
  - A. A statement of purpose for the PRA, including the required breadth and depth of analysis, issues to be addressed, and desirable PRA completion date. APHIS agrees to notify the requestor of issues which may change the scope of the PRA while it is being conducted. See Appendix I.

- B. Up-to-date PRA standards. See Appendix II and III.
- C. PPQ's PRA quality control standards which should be used during the preparation of the PRA and during scientific review. See Appendix IV.
- D. A list of suggested literature references and computerized databases that should be searched to obtain information for the PRA. See Appendix V and VI.
- E. A sample PRA. See Appendix I.
- F. A copy of the scientific review process and anonymous comments from reviewers of the PRA. See Appendix VII.
- G. USDA does not intend to be legally bound to the guideline nor the PRA developed according to this document; therefore no specific disclaimers of USDA are required.

Furthermore, the USDA policy for Equal Employment Opportunity and Civil Rights requires that all persons be treated fairly and equitably. See Appendix VIII.

2. **Non-APHIS** parties conducting the PRA are responsible for:

- A. Contacting individuals qualified to conduct PRA's.
- B. Initiating and funding any effort to hire, contract, or procure that the requestor believes necessary to conduct the PRA.
- C. Assuring the PRA meets the following APHIS performance standards of quality:
  - (1.) The PRA should address the purpose, breadth and depth of analysis, and issues.
  - (2.) The PRA should follow the format standard specified in the preceding section entitled "The PRA Process" (for PRA's based on a commodity proposed to be imported, this commonly includes but is not limited to a list of pests which may gain entry on the commodity to be imported, assessment of each pest of quarantine significance according to the standard, and identification and comparison of risk mitigation options).
  - (3.) The PRA should meet quality control standards (which include scientific review).
  - (4.) The PRA should address sufficient literature references and sufficient computerized databases (including dates of coverage).

- D. Monitoring any effort, hire, contract, or procurement funded by the requestor for conformance to APHIS standards. This includes notifying APHIS of any issue associated with the PRA which may, in the opinion of the requestor, have a high media profile or may require a response from APHIS.
  - E. Paying for incidental expenses to conduct the PRA (photocopying, telephone calls, procurement of equipment or supplies, special meetings, travel, per diem, etc.).
  - F. Delivering the PRA to APHIS for preliminary review.
  - G. Modifying the PRA to address APHIS concerns raised in the preliminary review.
  - H. Modifying the PRA to address concerns raised by the scientific reviewers and APHIS.
3. **APHIS** evaluates the PRA and keeps the foreign government or requestor advised of its status. Any item not in conformance with APHIS standards is brought to the requestor's attention and the PRA is rejected. The requestor has the option to bring the PRA into conformance with these parts at any time and re-initiate an evaluation by APHIS.
4. **APHIS** chooses operationally feasible mitigation measures (some or all of which may be selected from the list of risk mitigation options identified, compared, and evaluated for efficacy in controlling particular pests within the PRA) and from the experiences of the Agency. Foreign site visits, consultation with foreign governments, and information-sharing sessions with industry and the public may be required to identify appropriate risk management measures.
- Appendix IX contains the index of treatment schedules from the Plant Protection and Quarantine Treatment Manual and examples of mitigation measures from the Code of Federal Regulations.
5. **APHIS** considers all the information provided to date from the non-APHIS parties supplying the PRA, scientific reviewers, and its own experiences to propose entry conditions for the given commodities and to publish a proposed rule in the Federal Register.

Revised 16 May 1996

**Appendix I. Statement of Purpose for the Plant Pest Risk Analysis.**

See paragraph *B. Risk Assessment, 1. Initiating Event: Proposed Action* in the example(s) of pest risk assessments included with the packet.

## **Glossary of Legal APHIS Terminology from 7 CFR, Chapter III.**

<b>Import</b>	To bring into the territorial limits of the United States.
<b>Move (moving, movement)</b>	To ship, offer for shipment, enter, offer for entry, import, offer for importation, receive for transportation, carry, mail, or otherwise transport or allow to be transported into, through, or within the United States.
<b>Person</b>	Any individual, partnership, corporation, company, society, association, or other legal entity or organized group.
<b>Plant</b>	Any stage of any member of the plant kingdom including, but not limited to, trees, plant tissue cultures, plantlet cultures, pollen, shrubs, vines, cuttings, grafts, scions, buds, roots, seeds, cells, tubers, and stems.
<b>Plant pest</b>	Any living stage of any insects, mites, nematodes, slugs, snails, protozoa, or other invertebrate animals, bacteria, fungi, other parasitic plants or reproductive parts of parasitic plants, viruses, or any organisms similar to or allied with any of the organisms previously identified in this definition, or any infectious substances which can directly or indirectly injure or cause disease or damage in any plants or plant parts, or any processed, manufactured, or other products of plants.
<b>Plant product</b>	Any processed or manufactured plant or plant part.

# **Importation of Purple Passion Fruit (*Passiflora edulis*) from Chile into the United States**

**Qualitative, Pathway-Initiated Pest Risk Assessment**

**March 1996**

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## A. Introduction

This pest risk assessment was prepared by the Animal and Plant Health Inspection Service (APHIS) of the U.S. Department of Agriculture to examine plant pest risks associated with the importation into the United States of fresh purple passion fruit (*Passiflora edulis*) from Chile. This is a qualitative pest risk assessment, that is, estimates of risk are expressed in qualitative terms such as high or low as opposed to numerical terms such as probabilities or frequencies.

International plant protection organizations (e.g., North American Plant Protection Organization (NAPPO), International Plant Protection Convention (IPPC) of the United Nations Food and Agriculture Organization (FAO)) provide guidance for conducting pest risk analyses. The methods we used to initiate, conduct, and report this plant pest risk assessment are consistent with guidelines provided by NAPPO, IPPC and FAO. Our use of biological and phytosanitary terms (e.g., introduction, quarantine pest) conforms with the *NAPPO Compendium of Phytosanitary Terms* (NAPPO 1995) and the *Definitions and Abbreviations* (Introduction Section) in *International Standards for Phytosanitary Measures, Section 1—Import Regulations: Guidelines for Pest Risk Analysis* (FAO 1995).

Pest risk assessment is one component of an overall pest risk analysis. The *Guidelines for Pest Risk Analysis* provided by FAO (1995) describe three stages in pest risk analysis. This document satisfies the requirements of FAO Stages 1 (initiation) and 2 (risk assessment).

The Food and Agriculture Organization (FAO, 1995) defines "pest risk assessment" as "Determination of whether a pest is a quarantine pest and evaluation of its introduction potential". "Quarantine pest" is defined as "A pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled" (FAO, 1995; NAPPO, 1995). Thus, pest risk assessments should consider both the likelihood and consequences of introduction of quarantine pests. Both issues are addressed in this qualitative pest risk assessment.

This document presents the findings of our qualitative plant pest risk assessment. We have not described in detail our assessment methods or the criteria we used to rate the various risk elements. Details of our methodology and rating criteria can be found in our "template" document: *Pathway-Initiated Pest Risk Assessment: Guidelines for Qualitative Assessments* (USDA, 1995); to obtain a copy of our template, contact the individual named on the front of this risk assessment.

## B. Risk Assessment

### 1. Initiating Event: Proposed Action

This pest risk assessment is commodity-based, and therefore "pathway-initiated"; we initiated the assessment in response to the request for USDA authorization to allow imports of a particular commodity presenting a potential plant pest risk. In this case, the importation of

fresh purple passion fruit from Chile into the U.S. is a potential pathway for introduction of plant pests. Quarantine 56 (7 CFR §319.56) provides a general regulatory authority for importation of fruits and vegetables.

## 2. Assessment of Weediness Potential of *Passiflora edulis*

Table 1 shows the results of our weediness screening for *Passiflora edulis*. These findings did not require us to initiate a pest-initiated pest risk assessment for *P. edulis*.

**Table 1: Process for Determining Weediness Potential of Commodity**

**Commodity:** *Passiflora edulis* (Purple Passion Fruit, Purple Granadilla)

**Phase 1:** *P. edulis* is grown in Hawaii and Florida (50-75 acres) commercially and as an ornamental. *P. edulis* also grows as a feral species in these states and is used as an ornamental. There is apparently no other commercial production of *P. edulis* in the continental United States. Various species of *Passiflora* are grown throughout the United States as ornamentals.

**Phase 2:** Is the species listed in:

- YES *Geographical Atlas of World Weeds* (Holm, 1979)
- NO *World's Worst Weeds* (Holm, 1977)
- NO *Report of the Technical Committee to Evaluate Noxious Weeds; Exotic Weeds for Federal Noxious Weed Act* (Gunn & Ritchie, 1982)
- NO *Economically Important Foreign Weeds* (Reed, 1977)
- NO Weed Science Society of America list (WSSA, 1989)
- NO Is there any literature reference indicating weediness (e.g., *AGRICOLA*, *CAB*, *Biological Abstracts*, *AGRIS*; search on "species name" combined with "weed").

**Phase 3:** Conclusion:

Holm (1979) listed *Passiflora edulis* as a weed in Brazil and Israel. However, its importance in Brazil is unknown and the author indicates that its weediness in Israel has not been confirmed. Because *P. edulis* already occurs in the United States, we proceeded with this pest risk assessment according to our guidelines (USDA, 1995).

## 3. Previous Risk Assessments, Current Status and Pest Interceptions

We reviewed a listing of recent (*i.e.*, since 1985) USDA pest interceptions on passion fruit from Chile. A single pest, the fungus *Ascochyta passiflorae*, was reported to have been intercepted on *Passiflora* fruit from Chile.

Several risk assessments for importation of fresh passion fruit have been conducted over the past few decades. Fresh passion fruit is currently enterable from Grenada, St. Vincent, Bermuda, and portions of Australia. Several risk assessments (*i.e.*, decision sheets) have been conducted for countries in South America and this commodity has not yet been allowed entry from any country in South America because of phytosanitary concerns. Two requests for importation from Chile were disapproved based on the results of the risk assessments. Requests in 1989 and 1993 were disapproved because there was no residue tolerance established by U.S. EPA for treatment for *Brevipalpus chilensis*.

#### 4. Pest List: Pests Associated with *Passiflora* in Chile

Table 2 shows our pest list for *Passiflora edulis* in Chile. We generated the list after review of the information sources listed in USDA (1995). The pest list includes potential pests associated with the plant species (as opposed to only the plant part to be shipped). The pest list includes limited information on the distribution of each pest, pest-commodity association, and regulatory history. Not all pests listed in Table 2 are known to occur in Chile. For those pests listed below whose listed distribution does not include Chile (CL), although we had no specific literature record for the presence of the pest in Chile, records exist for surrounding countries and we considered it reasonable that the pest may also occur in Chile. While preparing this list, we assumed that all Quarantine 56 conditions would be in effect: only the specified commodity (*i.e.*, fresh fruit) would be shipped and no other plant parts would accompany the fruit.

<b>Pest<sup>1</sup></b>	<b>Distribution<sup>2</sup></b>	<b>Comments<sup>3</sup></b>	<b>Reference(s)</b>
<b>Fungi</b>			
<i>Alternaria alternata</i> (Fr.:Fr.) Keissl.	CL US	c, f, m	Farr, <i>et al.</i> , 1989; Valdebenito & Pinto de Torres, 1972
<i>Alternaria tenuissima</i> (Kunze:Fr.) Wiltshire	CL US	c, f, m	Farr, <i>et al.</i> , 1989; Morales, <i>et al.</i> , 1974
<i>Armillaria mellea</i> (Vahl:Fr.) P. Kumm.	CL US	a, f, m	CMI, 1980; Farr, <i>et al.</i> , 1989
<i>Ascochyta passiflorae</i> Penz. Fruit spot	CL	x, z	ARS Fungal Database; Stevenson, 1926
<i>Asterina ildefonsiae</i> (Rehm.) Theiss. Synonym: <i>Seynesia balansae</i> Speg. var. <i>ildefonsiae</i> Rehm.	SX US(HI)	a, v	Wellman, 1977; Farr, <i>et al.</i> , 1989

<b>Table 2: Pest List: Purple Passion Fruit, <i>Passiflora edulis</i> from Chile</b>			
<b>Pest<sup>1</sup></b>	<b>Distribution<sup>2</sup></b>	<b>Comments<sup>3</sup></b>	<b>Reference(s)</b>
<i>Asterina megalospora</i> Berk. & Curt. Black mildew	BR CO EC PE	a, v	Wellman, 1977
<i>Botrytis cinerea</i> Pers. Fruit rot and branch tip disease	CL US	c, f, m	Farr, <i>et al.</i> , 1989; Valdebenito & Pinto del Torres, 1972
<i>Cladosporium herbarum</i> (Pers.) Link	CL US	c, f, m	Farr, <i>et al.</i> , 1989; Morales, <i>et al.</i> , 1974
<i>Fusarium solani</i> (Mart.) Sacc. Teleomorph: <i>Nectria</i> <i>haematococca</i> Berk. & Broome Crown and basal canker	CL US	a, c, f, m	Alfieri, <i>et al.</i> , 1994; Alvarez & Briner, 1987; Farr, <i>et al.</i> , 1989
<i>Leveillula taurica</i> (Lev.) Arn.	CL US	a, f, m	CMI, 1984
<i>Mycosphaerella passiflorae</i> Rehm	SX	a, v	Wellman, 1977
<i>Ovulariopsis passiflorae</i> Syd. White mildew	SX	a, v	Wellman, 1977
<i>Penicillium expansum</i> Link	CL US	f, m	Farr, <i>et al.</i> , 1989; Snowdon, 1990; Valdebenito & Pinto de Torres, 1972
<i>Phytophthora nicotianae</i> Breda de Haan	CL US	a, c, f, m	CMI, 1989
<i>Puccinia scleriae</i> (Paz.) Arth. Rust	SX	a, v	Wellman, 1977; Stevenson, 1975
<i>Rhizoctonia solani</i> Root rot, Thread blight	CL US	a, c, f, m	Farr, <i>et al.</i> , 1989; Kunstmann, <i>et al.</i> , 1986
<i>Rhizopus stolonifer</i> (Ehrenb.: Fr.) Vuill., Soft rot	CL US	c, f, m	Apablaza, <i>et al.</i> , 1974; Farr, <i>et al.</i> , 1989; Snowdon, 1990
<i>Schiffnerula pitteriana</i> Syd. Mildew	SX	a, v	Wellman, 1977

<b>Table 2: Pest List: Purple Passion Fruit, <i>Passiflora edulis</i> from Chile</b>			
<b>Pest<sup>1</sup></b>	<b>Distribution<sup>2</sup></b>	<b>Comments<sup>3</sup></b>	<b>Reference(s)</b>
<i>Sclerotium rolfsii</i> Sacc. Southern blight	CL US	c, f, m	Farr, <i>et al.</i> , 1989; Montealegre & Esterio, 1989
<i>Septoria passiflorae</i> Louw Leaf spot of passion fruit	BR CO EC PE VE US	a, f, v, x	Holliday, 1980; Hutton 1993; Kranz, <i>et al.</i> , 1978; Wellman, 1977
<i>Seynesia megalospora</i> (Berk. & Curt.) Rehm	SX	a, v	Wellman, 1977
<b>Nematodes</b>			
<i>Meloidogyne incognita</i> (Kofoid & White) Chitwood Root knot nematode	CL US	a, f, m	Jimenez, 1985; Wellman, 1977
<i>Meloidogyne javanica</i> (Treub) Chitwood, Root knot nematode	CL US	a, f, m	Jimenez, 1985
<b>Virus and viruslike agents</b>			
Bean yellow mosaic virus	CL US	a, f, m	Tay, <i>et al.</i> , 1988
Tobacco mosaic virus	CL US	f, m	Nome & Docampo, 1969
Tomato ringspot virus	CL US	f, m	Auger, 1989
<b>Arthropods</b>			
<i>Anastrepha fraterculus</i> (Wiedemann) (Diptera: Tephritidae)	CL <sup>4</sup>	n, z <sub>1</sub>	FAO, 1993; EPPO, 1994; PNKTO
<i>Atta sexdens</i> (Linnaeus) (Hymenoptera: Formicidae)	CL	e, n	PNKTO, CPPC
<i>Brevipalpus chilensis</i> Baker (Acari: Tenuipalpidae)	CL	n	Gonzalez, 1973
<i>Ceratitis capitata</i> (Wiedemann) (Diptera: Tephritidae)	CL <sup>5</sup> US <sup>5</sup>	h, x, z <sub>1</sub>	FAO, 1993; Liquido <i>et al.</i> , 1995; PNKTO
<i>Copitarsia consueta</i> (Walker) (Lepidoptera: Noctuidae)	CL	a, n	McGuire, 1967; Gonzalez, 1973

**Table 2: Pest List: Purple Passion Fruit, *Passiflora edulis* from Chile**

Pest <sup>1</sup>	Distribution <sup>2</sup>	Comments <sup>3</sup>	Reference(s)
<i>Liriomyza huidobrensis</i> Blanchard (Diptera: Agromyzidae)	CL US	a , g	FAO, 1993; Spencer, 1973 Spencer, 1990

**Table Footnotes**

<sup>1</sup> Pest names for pathogens and nematodes according to Farr, *et al.*, 1989 and Bradbury, 1986.

<sup>2</sup> Only distribution in South America and the United States is considered. Distribution codes: AR=Argentina, BO=Bolivia, BR=Brazil, CL=Chile, CO=Colombia, EC=Ecuador, PE=Peru, SX=South America, country unknown, VE=Venezuela, US=United States.

<sup>3</sup> Comments:

a = Pest mainly associated with plant part other than commodity.

c = Listed in U.S. Department of Agriculture (USDA) catalogue of pest interceptions as non-actionable.

e = Although pest attacks commodity, it would not be expected to remain with the commodity (plant part) during processing

f = Pest occurs in the U.S. and is not currently subject to official restrictions and regulations (*i.e.*, not listed as actionable or non-actionable, and no official control program)

g = Quarantine pest; pest has limited distribution in the United States and is under official control as follows: pest listed by name in USDA's pest dictionary, official quarantine action may be taken on this pest when intercepted on this commodity.

h = Quarantine pest; pest has limited distribution in the United States and is under official control as follows: (1) pest listed by name in USDA's pest dictionary, official quarantine action may be taken on this pest when intercepted on this commodity and, (2) pest is a "program pest" (there is an official Federal or recognized State program for control of this pest beyond its being listed in the pest dictionary as actionable).

m = Pest is reported to occur in the PRA area and has been reported to attack the commodity in other geographic areas; but the pest has not been reported to attack the commodity within the PRA area.

n = Listed in the USDA catalogue of intercepted pests as actionable.

v = No specific reports of the pest from the PRA area, but regional reports exist and the pest may be present in the PRA area

w = Program pest, occurs in the U.S. but not widely distributed and being officially controlled.

x = Multiple interception records exist

z = Pest is known to commonly attack or infect fruit and it would be reasonable to expect the pest may remain with the fruit during processing and shipping.

z<sub>i</sub> = Internal feeder: Pest is known to commonly attack or infect commodity and it would be reasonable to expect the pest may remain with the commodity during processing and shipping

<sup>4</sup> *A. fraterculus* is listed in the cited data bases. *A. fraterculus* was detected in Chile in the 1950's. However, eradication was declared and *A. fraterculus* has not been detected in Chile since 1956. *A. fraterculus* is not considered further in this risk assessment beyond its listing in this table.

<sup>5</sup> *Ceratitis capitata* has been detected in both Chile and the United States. Whenever *C. capitata* is detected in either country, a quarantine is established and an eradication program is implemented. *C. capitata* is a quarantine pest in both countries.

## 5. List of Quarantine Pests

Our list of quarantine pests for commercial shipments of *P. edulis* fruit from Chile is provided in Table 4. Should any of these pests be intercepted on commercial (or any other) shipments of *P. edulis*, quarantine action may be taken.

**Table 4: Quarantine Pests: Purple Passion Fruit from Chile**

<b>Fungi</b>	<i>Ascochyta passiflorae</i>
<b>Arthropods</b>	<i>Atta sexdens</i>
	<i>Brevipalpus chilensis</i>
	<i>Ceratitidis capitata</i>
	<i>Copitarsia consueta</i>
	<i>Liriomyza huidobrensis</i>

## 6. Quarantine Pests Likely to Follow Pathway (Quarantine Pests Selected for Further Analysis)

We analyzed in detail only those quarantine pests that can reasonably be expected to follow the pathway, *i.e.*, be included in commercial shipments of *P. edulis* (see USDA, 1995 for selection criteria). Only quarantine pests selected for further analysis are subjected to steps 7-9 below.

**Table 5: Quarantine Pest Selected for Further Analysis:  
*Passiflora edulis* from Chile**

<b>Fungi</b>	<i>Ascochyta passiflorae</i>
<b>Arthropods</b>	<i>Brevipalpus chilensis</i>
	<i>Ceratitidis capitata</i>

## 7. Consequences of Introduction: Economic/Environmental Importance

We rate each pest with respect to potential economic importance based on five biological features referred to here as Risk Elements (RE). Details of the five RE's and rating criteria are provided in USDA (1995). Our ratings for these five RE's are shown in Table 6. The cumulative (Total) score for Risk Elements 1-5 (*i.e.*, the "Consequences of Introduction Risk Rating") is considered to be a biological indicator of the potential destructiveness of the pest.

Pest	Climate /Host	Host Range	Dispersal	Eco-nomic	Environ-mental	Risk Rating
<i>Ascochyta passiflorae</i>	medium	low	medium	medium	medium	medium
<i>Brevipalpus chilensis</i>	high	high	medium	high	medium	high
<i>Ceratitidis capitata</i>	high	high	high	high	high	high

## 8. Likelihood of Introduction

We rate each pest with respect to introduction (*i.e.*, entry and establishment) potential. We consider two separate components. First, we estimate the amount of commodity likely to be imported. More imports lead to greater risk; the result is a risk rating (0-2) that applies to the commodity and country in question and is the same for all quarantine pests considered. Second, we consider five biological features (*i.e.*, risk elements) concerning the pest and its interactions with the commodity. The resulting risk ratings are specific to each pest. Details of elements and rating criteria are provided in USDA (1995). The cumulative risk rating for introduction is considered to be an indicator of the likelihood that a particular pest would be introduced.

Pest	Quantity of commodity imported annually	Likelihood survive post-harvest treatment	Likelihood survive shipment	Likelihood not detect at port of entry	Likelihood moved to suitable habitat	Likelihood find suitable host	Risk Rating
<i>Ascochyta passiflorae</i>	low	high	high	low	low	low	medium
<i>Brevipalpus chilensis</i>	low	high	high	medium	high	high	high
<i>Ceratitidis capitata</i>	low	high	high	high	high	high	high

## 9. Conclusion: Pest Risk Potential and Phytosanitary Measures

The overall risk posed by a particular pest depends on both the consequences and likelihood of introduction (see USDA, 1995). Our rating of the overall pest risk potential (PRP) for each quarantine pest selected for further analysis is shown in Table 8.

**Table 8: Pest Risk Potential, Quarantine Pests, *Passiflora edulis* from Chile**

<b>Pest</b>	<b>Pest risk potential</b>
<i>Ascochyta passiflorae</i>	<b>medium</b>
<i>Brevipalpus chilensis</i>	<b>high</b>
<i>Ceratitis capitata</i>	<b>high</b>

For pests receiving a PRP risk rating of high (*i.e.*, *Brevipalpus chilensis* and *Ceratitis capitata*), we strongly recommend specific phytosanitary measures, port-of-entry inspection is not considered sufficient to provide phytosanitary security. For the single pest receiving a medium PRP risk rating (*Ascochyta passiflorae*) specific phytosanitary measures may be required. Detailed examination and choice of appropriate sanitary and phytosanitary measures to mitigate pest risk for particular pests is undertaken as part of the pest risk management phase and is not discussed in this document. APHIS has not yet determined whether risks associated with importations of *P. edulis* from Chile can be managed adequately. Nor has it been determined what measures would be used to manage plant pest risk should APHIS proceed with a proposed rule for importations of *P. edulis* from Chile. APHIS' final decisions regarding importation of *P. edulis* will be based on the results of a complete pest risk analysis. This pest risk assessment is the first stage of the risk analysis and constitutes a primary tool for the rounds of risk management and risk communication to follow.

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**Appendix II. North American Plant Protection Organization (NAPPO) Standard for Plant Pest Risk Analysis.**

See enclosures.

## NAPPO STANDARD

for

### Plant Pest Risk Analysis

#### Introduction

The North American Plant Protection Organization (NAPPO) has the purpose to prevent the introduction and spread of quarantine pests of plants in North America. (NAPPO Co-operative Agreement, revised 1991).

To achieve this goal requires that each NAPPO country be able to justifiably determine, in advance, 1) those plant pests which, if introduced into their territories, or allowed to spread, would cause unacceptable damage to their agricultural economies, i.e. which are quarantine pests, 2) the means and likelihood of their entry and establishment, and 3) the phytosanitary measures that are available to prevent such introduction or spread.

The following constitutes the NAPPO guidelines for a standardized Plant Pest Risk Analysis process.

#### Purpose

The purpose of these guidelines is:

- to outline the basic requirements for a NAPPO Plant Pest Risk Analysis (PRA) which is consistent with that being developed by the Regional Plant Protection Organizations (RPPOs) under the aegis of the United Nations Food and Agriculture Organization (FAO).
- to ensure compliance with the "Risk Analysis" Principle agreed by the FAO Technical Consultations between RPPOs, that "to determine which pests are quarantine pests and the strength of the measures to be taken against them, countries shall use pest risk analysis methods based on biological and economic evidence and, wherever possible, follow procedures developed within the framework of the International Plant Protection Convention (IPPC)"; and,
- to contribute to the GATT initiative on sanitary and phytosanitary measures to achieve international agreement on guidelines for plant pest risk analysis.

The terminology in these guidelines follows that of the FAO Glossary of Phytosanitary Terms. Certain terms, however, are newly introduced or have been redefined. Their definitions are given in Appendix I.

### **The Pest Risk Analysis Process**

Plant Pest Risk Analysis (PRA) consists (Figures 1-3) of three stages: initiating the process for analyzing risk, assessing pest risk, and managing pest risk. Initiating the process involves identification of pests or pathways for which the PRA is needed. Pest risk assessment determines whether each pest identified as such, or associated with a pathway, is a quarantine pest, characterized in terms of likelihood of entry, establishment, spread and economic importance. Pest risk management involves developing, evaluating, comparing and selecting options for reducing the risk to an acceptable level.

PRA is only meaningful in relation to a defined "PRA area", considered to be at risk. This is usually a country, but can also be an area within a country, or an area covering all or parts of several countries (e.g. the area covered by an RPPO).

#### **Stage 1 - Initiating the PRA process**

There are generally two initiation points for a PRA (Fig. 1). The first is the identification of a pathway, usually an imported commodity, that may allow the introduction and/or spread of quarantine pests. The second is the identification of a pest that may qualify as a quarantine pest. Either can involve pests already present in the PRA area but of limited distribution and subject to official control, as well as pests absent from the PRA area, since both are covered by the quarantine pest definition.

##### *PRA initiated by a pathway*

A requirement for a PRA originating from a specific pathway will most frequently arise in the following situations:

- International trade is initiated in a new commodity (usually a plant or plant product) or a commodity from a new origin. The PRA may be triggered by a request for an import permit, or by the appearance in trade of consignments of a commodity. The pathway may concern a single area of origin or several.
- New plant species are imported for selection and scientific research purposes.
- An emergency arises on arrival of a consignment of a normally prohibited commodity
- A pathway other than commodity import is identified (natural spread, mail, garbage, passenger's baggage etc.).
- A policy decision is taken to establish or revise phytosanitary regulations or requirements concerning specific commodities
- A new treatment, system, process, or new information which impacts on an earlier decision

The pests which are likely to follow the pathway (e.g. be carried by the commodity) are then listed, and each is then subjected to stage 2 in the PRA process<sup>1</sup>. If no potential quarantine pests are identified as likely to follow the pathway, the PRA stops at this point.

### *PRA initiated by a pest*

A requirement for a PRA originating from a specific pest will most frequently arise in the following situations:

- An emergency arises on discovery of an established infestation of an exotic pest
- An emergency arises on interception and identification of a new pest at a port of entry
- A new pest risk is identified by scientific research
- A pest is introduced into a new area, other than the PRA area itself
- A pest is reported to be more damaging in a new area, other than the PRA area itself, than in its area of origin
- Audits reveal that a particular pest is repeatedly intercepted
- A request is made to import, as such, an organism, for example by researchers, educators, biological control practitioners, lobbyists, businesses (pet store owners), the food industry (snails for consumption) or hobbyists (aquatic plants for aquaria)
- A policy decision is taken to revise phytosanitary regulations or requirements concerning specific pests
- A proposal is made by another country or by an international organization (RPPO, FAO)
- Treatments or new data concerning host status

The specific pest identified is then subjected to stage 2 in the PRA process.

### *Review of earlier PRAs*

Before proceeding with the PRA, verify whether the pest or pathway concerned has already been subjected to the PRA process, either nationally or internationally. If so, note the time interval since the previous assessment and consider whether changes in circumstances make the earlier PRA outdated. Consider whether a PRA from another source (national or international) may partly or entirely replace the need for a new PRA, or else whether an earlier PRA on a very similar pest or pathway may do so.

### *Conclusion for stage 1*

At the end of stage 1, pests have been identified as potential quarantine pests, individually, or in association with a pathway.

1. The list of pests may be generated by any combination of databases, literature sources, or expert consultation. According to the results obtained, it may or may not be necessary to conduct a risk assessment on all pests on the list.

## Stage 2 - Pest Risk Assessment

Stage 1 has identified one pest, or a list of pests (in the case of initiation by a pathway), to be subjected to risk assessment. Stage 2 considers these pests individually (Fig. 2). It examines, for each, whether the criteria for quarantine pest status are satisfied:

"a pest of of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled".

In this definition, area should be understood to mean:

"an officially defined country, part of a country, or all or part of several countries".

In so doing, the PRA considers all aspects of each pest and in particular actual information about its geographical distribution, biology and economic importance. Expert judgement is then used to assess the establishment, spread and economic importance potential in the PRA area. Finally, the potential for introduction into the PRA area is characterized.

In characterizing the risk, the amount of information available will vary with each pest and the sophistication of the assessment will vary with available tools. For example, one country may have elaborate pest databases and geographical information systems, another may depend on books, printed soil maps, and climate maps. In some cases, virtually no information may be available, or research may be needed to obtain it. Assessments will be limited by the amount of information available on the biology of a particular pest.

### *Geographical and regulatory criteria*

For each pest subjected to the PRA process, consider the geographical and regulatory criteria in the quarantine pest definition:

- If the pest is present in the PRA area and has reached the limits of its ecological range (widespread), then the pest does not satisfy the definition of a quarantine pest and the PRA for the pest stops at this point.
- If the pest is present in the PRA area and has not reached the limits of its ecological range (limited distribution), and the pest is subject to official control in the PRA area, then the pest satisfies the definition of a quarantine pest.
- If the pest has limited distribution but is not subject to official control, or consideration of future official control in the PRA area, then the pest does not satisfy the definition of a quarantine pest and the PRA for the pest stops at this point<sup>2</sup>.
- If the pest is absent from the PRA area, then it satisfies the definition of a quarantine pest

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<sup>2</sup> Under certain circumstances, the PRA may lead to the decision that a pest of limited distribution should be put under official control.

### *Economic importance criteria*

For potential economic importance to be expressed, a pest must become established and spread. The risk of these steps must be characterized. The factors to be considered are set out below.

#### Establishment potential

The basic information to estimate the establishment potential in the PRA area will concern the biology (life cycle, host range, epidemiology, survival) of the pest in the areas where it currently occurs.

The situation in the PRA area can then be carefully compared with that in the areas where it currently occurs and expert judgement used to assess the establishment potential. Case histories concerning comparable pests can usefully be considered. Examples of the factors to consider are:

- The availability, quantity and distribution of susceptible hosts in the PRA area
- Environmental suitability in the PRA area
- The reproductive strategy of the pest
- The method of pest survival

If a pest has no potential for establishment in the PRA area, then it does not satisfy the definition of a quarantine pest and the PRA for the pest stops at this point.

#### Spread potential after establishment

The basic information to estimate spread potential in the PRA area will come from the areas where the pest currently occurs. Case histories concerning comparable pests can usefully be considered.

The situation in the PRA area can then be carefully compared with that in the areas where the pest currently occurs and expert judgement used to assess the spread potential. Examples of the factors to consider are:

- Suitability of the natural and/or managed environment for natural spread of the pest
- Movement with commodities or conveyances

The information on spread potential is used to estimate how rapidly a pest's potential economic importance may be expressed within the PRA area. This has significance if the pest is liable to enter and establish in an area of low potential economic importance and then spread to an area of high potential economic importance. It may also be important in the risk management stage (Fig. 3) when considering the ease with which an introduced pest could be contained and eradicated.

#### Potential economic importance

The next step in the PRA process is to determine whether the pest is of potential economic importance in the PRA area.

The basic information to make this assessment will come from the areas where the pest currently occurs. For each of these areas, note whether the pest causes major, minor or no damage. Note whether the pest causes damage frequently or infrequently. Relate this if possible to biotic and abiotic effects, particularly climate.

The situation in the PRA area can then be carefully compared with that in the areas where the pest currently occurs. Case histories concerning comparable pests can usefully be considered. Expert judgement is then used to assess the potential for economic importance. Examples of the factors to consider are:

- Type of damage
- Crop losses
- Loss of export markets
- Increases in control costs
- Effects on ongoing Integrated Pest Management (IPM) programs
- Environmental damage
- Capacity to act as a vector for other pests
- Perceived social costs such as unemployment.

If a pest has no potential economic importance in the PRA area, then it does not satisfy the definition of a quarantine pest and the PRA for the pest stops at this point.

#### *Introduction potential*

The final stage of assessment concerns introduction potential, which depends on the pathway from the exporting country to the destination and on the frequency and quantity of pests associated with that pathway. These contribute to entry and establishment potential. Documented pathways for the pest to enter new areas should be noted. Potential pathways which may not currently exist should be assessed, if known.

The following is a partial checklist that may be used to estimate entry and establishment potential:

#### Entry potential

- The opportunity for contamination of commodities or conveyances by the pest
- Whether the pest can survive under the environmental conditions of shipment
- The ease or difficulty of detecting the pest through visual inspection
- The frequency and quantity of pest movement into the PRA area by natural means

#### Establishment potential

- The number and frequency of shipments of the commodity
- The number of individuals of a given pest associated with the means of conveyance
- The intended use of the commodity

### *Conclusion for stage 2*

If the pest satisfies the definition of a quarantine pest, expert judgement should be used to review the information collected during Stage 2 to decide whether the pest has sufficient economic importance and introduction potential for phytosanitary measures to be justified. If so, proceed to Stage 3; if not, the PRA for the pest stops at this point<sup>3</sup>.

### **Stage 3: Pest risk management**

Pest risk management (Fig. 3) should be proportional to the risk identified in the pest risk assessment.

#### *Risk management options*

Assemble a list of options for reducing risks to an acceptable level. These options will primarily concern pathways and in particular the conditions for permitting entry of commodities. Examples of the options to consider are:

- Inclusion in list of prohibited pests
- Phytosanitary certification by exporting country
- Definition of requirements to be satisfied before export (e.g. treatment, origin from pest-free area, growing season inspection, certification scheme)
- Preclearance
- Inspection at entry
- Treatment or processing
- Detention in post-entry quarantine
- Post-entry measures (restrictions on use of commodity, control measures)
- Prohibition of entry of specific commodities from specific origins

They may also, however, concern ways of reducing the risk of damage, for example, introduction of a biological control agent, or ease of eradication or containment.

#### *Efficacy and impact of the options*

Evaluate the efficacy and impact of the various options in reducing risk to an acceptable level, in terms of the following factors:

- Biological effectiveness
- Cost/benefit of implementation
- Impact on existing regulations
- Commercial impact
- Social impact

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3. Decision-making schemes, or expert systems, may be useful at this stage to assist expert judgement.

- Policy considerations
- Time to implement a new regulation
- Efficacy of option against other quarantine pests
- Environmental impact

Specify positive and negative aspects of the options. Take particular note of the "Minimal impact" Principle: "Phytosanitary measures shall be consistent with the pest risk involved, and shall represent the least restrictive measures available which result in the minimum impediment to the international movement of people, commodities and conveyances".<sup>4</sup> Article VI.2(f) of the IPPC makes a similar but less comprehensive provision. Then recommend phytosanitary measures based on all of the above factors. Communication with interested and affected groups within the PRA area and outside it may be advisable to determine which options may be appropriate.

### *Conclusion for stage 3*

At the end of stage 3, the appropriate phytosanitary measures concerning the pest or pathway have been decided. Completion of stage 3 is essential for a proper PRA. It is in particular not justified to complete only stages 1-2, and then take phytosanitary measures without proper assessment of risk management options. After implementation of the phytosanitary measures, their effectiveness should be monitored and the risk management options should be reviewed if necessary.

### *Documenting the PRA process*

A PRA should be sufficiently documented, so that when a review or a dispute arises, the PRA will clearly state the sources of information and the rationale used in reaching a management decision regarding phytosanitary measures.

## PRA DEFINITIONS

**Area** - an officially defined country, part of a country, or all or parts of several countries

**Endangered area** - an area where ecological factors favor the establishment of a pest whose presence in the area will result in economically important loss.

**Entry** - movement of a pest into an area where it does not occur

**Entry potential** - the likelihood of entry of a pest

**Establishment** - the perpetuation of a pest within an area, after entry

**Establishment potential** - the likelihood of the establishment of a pest

**Introduction** - entry and establishment of a pest

**Introduction potential** - the likelihood of the introduction of a pest

**Pest Risk Analysis** - pest risk assessment and pest risk management

**PRA** - the abbreviation for Pest Risk Analysis

**PRA area** - the area in relation to which a Pest Risk Analysis is conducted

**Phytosanitary measure** - any legislation, standard, guideline, recommendation or procedure having the purpose to prevent the introduction and/or spread of quarantine pests

**Quarantine pest** - a pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled

**Pest Risk Assessment** - determination of whether a pest is a quarantine pest and evaluation of its introduction potential

**Pest Risk Management** - the decision-making process of dealing with the risk of introduction of a quarantine pest

**Spread** - expansion of the geographical distribution of a pest within an area.

**Spread potential** - the likelihood of the spread of a pest

# PEST RISK ANALYSIS

## STAGE 1: INITIATION

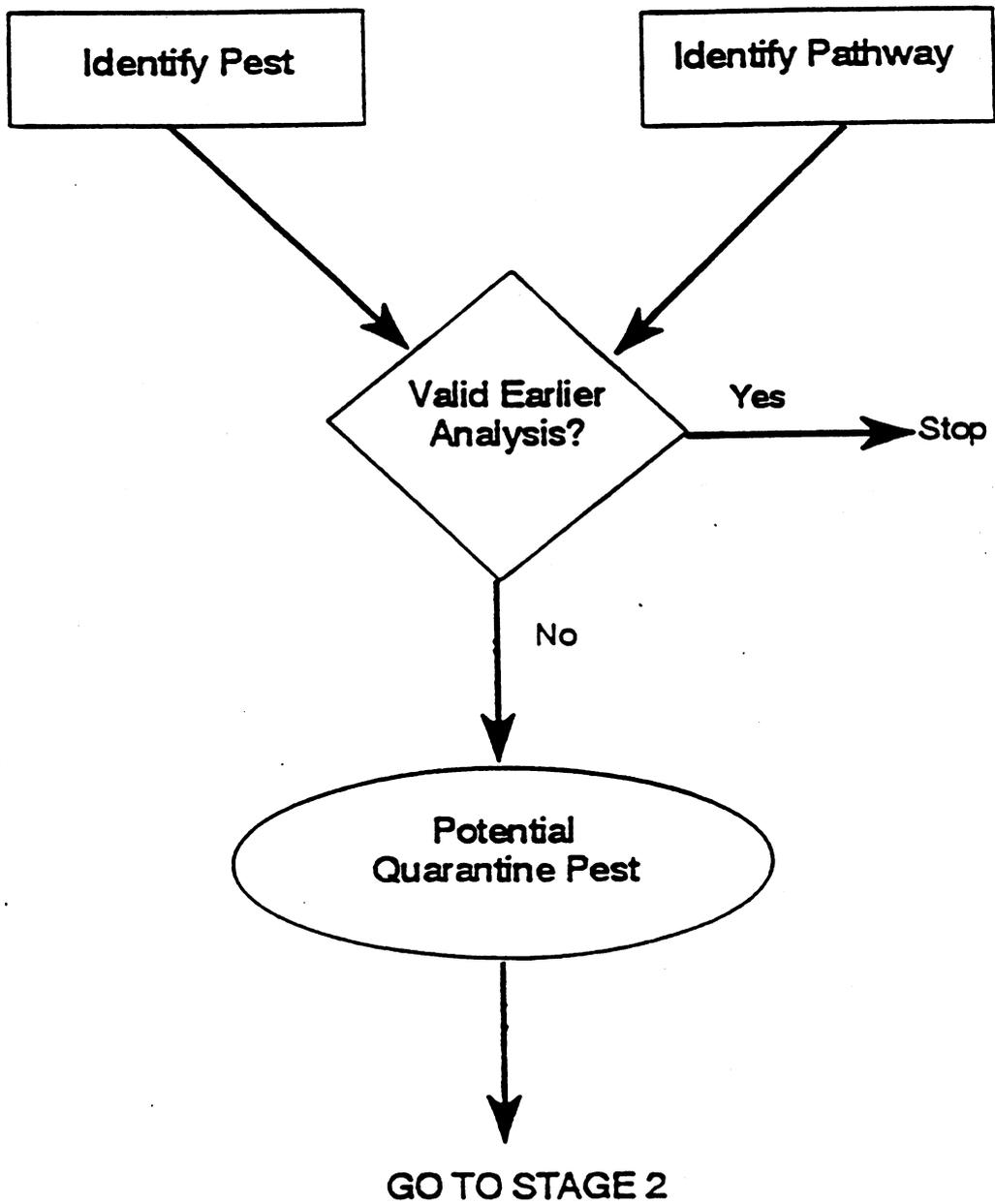


Figure 2

# PEST RISK ANALYSIS

## STAGE 2: ASSESSMENT

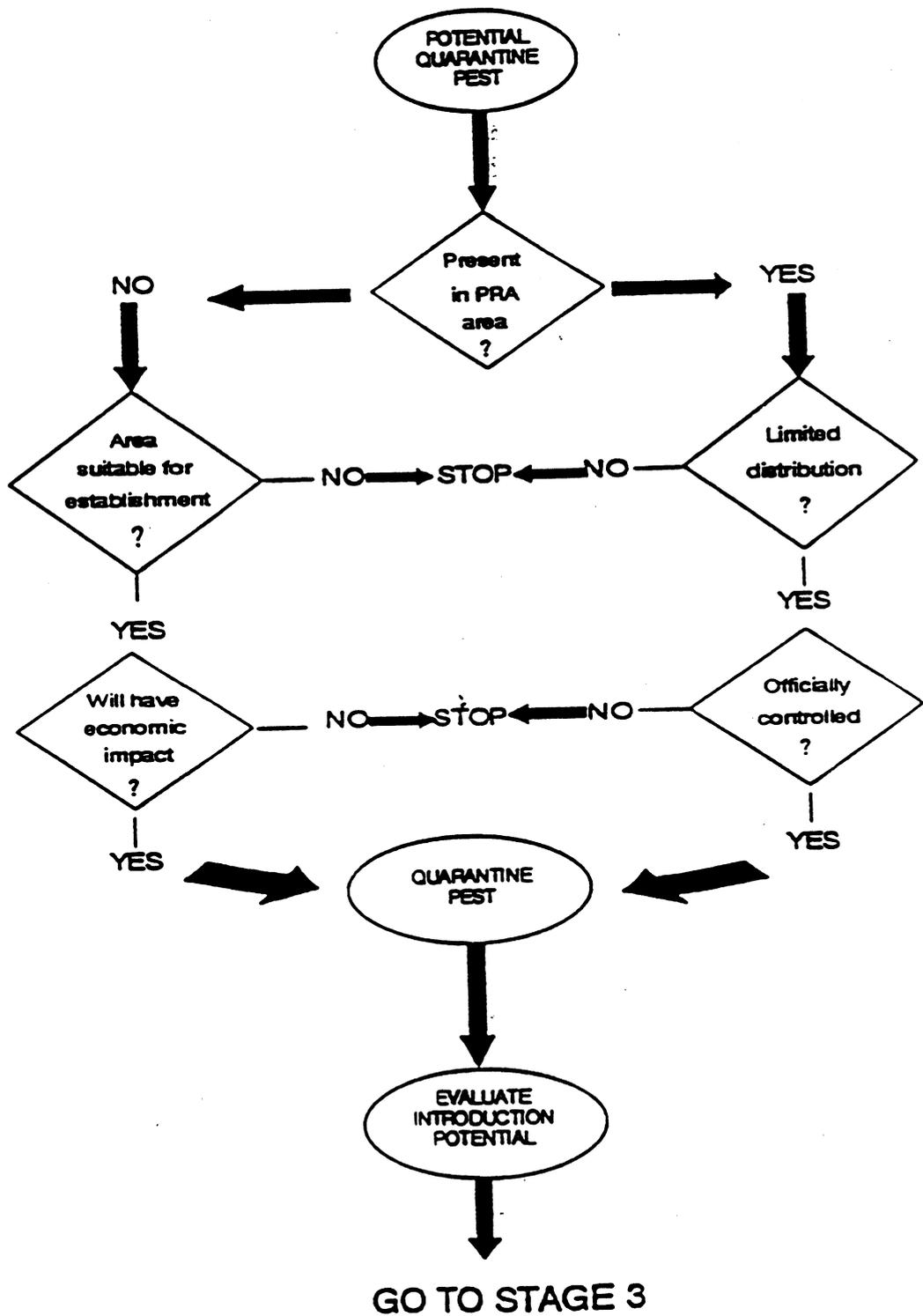
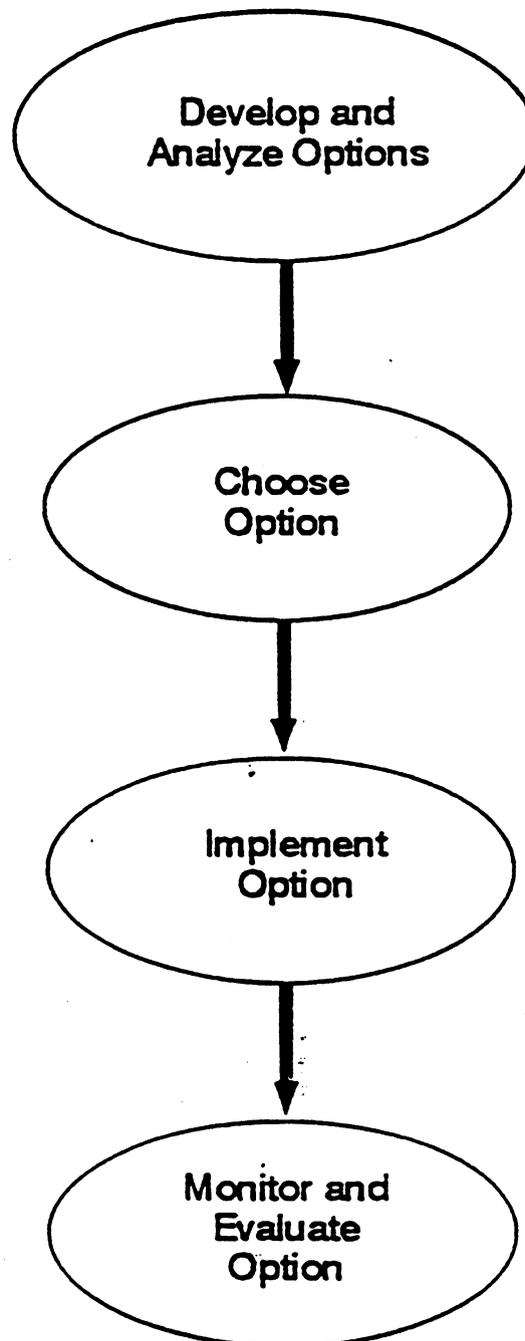


Figure 3

# PEST RISK ANALYSIS

## STAGE 3: RISK MANAGEMENT





ORGANISATION NORD-AMERICAINE POUR LA PROTECTION DES PLANTES  
NORTH AMERICAN PLANT PROTECTION ORGANIZATION  
ORGANIZACION NORTEAMERICANA DE PROTECCION A LAS PLANTAS  
CANADA — UNITED STATES — MEXICO

NAPPO Doc. No. 96-027

**NAPPO COMPENDIUM  
OF  
PHYTOSANITARY TERMS**

**Compiled and Edited**

**by**

**Bruce E. Hopper  
NAPPO Secretariat**

**Nepean, Ontario, Canada**

**February, 1996**

## Preface to the February, 1996 NAPPO Compendium of Phytosanitary Terms

This "NAPPO Compendium of Phytosanitary Terms" represents NAPPO's continuing efforts to foster uniformity in the use and interpretation of terminology among the National Plant Protection Organizations (NPPOs) of the NAPPO region. The terms and definitions included in the Compendium have been approved by a NAPPO Executive Committee, or by the NAPPO Working Group under the authority of a NAPPO Executive Committee, and are intended for use within the Organization in the development of NAPPO reports, position papers, policies and phytosanitary standards for application in North America.

The Compendium includes all terms and definitions adopted by NAPPO and by FAO, as well as some additional terms and definitions proposed by FAO's CEPM (Committee of Experts on Phytosanitary Measures) and/or Glossary Working Group. Also the Compendium includes a few terms and definitions selected from other sources which are judged to add to the document's usefulness. In all instances, the original source of all terms, and their present definitions, are identified, with complete references provided in the Bibliography.

The majority of the terms proposed by FAO working groups, i.e., FAO-CEPM, 1994 and FAO-WG, 1995, have been adopted by NAPPO. In a few cases, some of the FAO definitions required modification in order for them to be appropriate to conditions in North America. Terms that have been amended are identified by having their original reference enclosed in brackets, followed by the reference of the current definition. For example, "(FAO-WG, 1995) NAPPO, 1995c" indicates that the NAPPO Working Group, at their meeting in October, 1995, modified a definition as proposed by the FAO Glossary Working Group at a meeting held in September, 1995. Similarly, "(NAPPO, 1985) FAO, 1990" refers to an original NAPPO definition first published in 1985 NAPPO glossary which subsequently has been modified in the FAO glossary published in 1990.

A citation such as "(NAPPO, 1985; FAO, 1990) NAPPO, 1991; FAO-WG, 1994" would refer to an original NAPPO definition, first published in 1985, which had been accepted or modified by FAO in 1990 and which has been further modified by NAPPO in 1991 and accepted by the FAO-WG in 1994. (see, for example, the citation for "area").

Terms and definitions found in the FAO glossary have the first letter of both the term and the definition capitalized. Those terms that are unique to the NAPPO glossary, or new terms and definitions that have been proposed by an FAO working group which have yet to be adopted (published) by FAO, have the first letter of both the term and the definition in lower case.

In those situations where FAO has already published a term and definition and where a proposed amendment has not yet been published by FAO, the first letter of the term being defined remains capitalized, whereas the yet-to-be-published amended definition has the first letter in lower case.

In those few instances where a NAPPO definition deviates from an FAO definition, or an FAO working group proposed definition, both definitions are provided to highlight this difference of opinion.

The purpose of this rather complicated citation system is to provide a paper trail on the historical development of currently accepted definitions. While based on the system used in Zoological Nomenclature, the system adopted in this document goes further by attempting to identify all the intermediary steps between the original definition and the presently accepted definition.

It is the intention of the NAPPO Secretariat to update and revise the Compendium as circumstances warrant, i.e., when sufficient new material has been accumulated. Persons using the Compendium are encouraged to offer suggestions as to how the contents of the Compendium can be improved, either by the addition of new terms or the emendation of terms now included. And while the system of citation seems intelligible to its author, comments regarding its comprehension to readers might prove instructive in determining its continued, or modified use in future versions of the NAPPO Compendium.

Please direct all suggestions to the attention of the NAPPO Executive Secretary, c/o Agriculture and Agri-Food Canada, Plant Protection Division, 59 Camelot Drive, Nepean, Ontario, Canada K1A 0Y9

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## NAPPO COMPENDIUM OF PHYTOSANITARY TERMS

A-1 Pest (for an area)	a quarantine pest which is not present in that area. (FAO-WG, 1995) NAPPO, 1995c
A-2 Pest (for an area)	a quarantine pest present in that area but not widely distributed there and being officially controlled. FAO-WG, 1995
Additional declaration	A statement that is required by an importing country to be entered on a phytosanitary certificate and which provides specific additional information pertinent to the phytosanitary condition of a consignment. (NAPPO, 1985) FAO, 1990
aerial bait treatment	application of a bait spray by aircraft over a designated area. (NAPPO, 1985) NAPPO, 1987
aerial sterile release	release of sterile insects from aircraft, over an infested area. (NAPPO, 1985) NAPPO, 1987
aerial treatment	application of approved pesticides by aircraft over a designated area. (NAPPO, 1985) NAPPO, 1987
agent	see plant pest. NAPPO, 1985
Area	an officially defined country, part of a country, or all or parts of several countries. (NAPPO, 1985; FAO, 1990) NAPPO, 1991; FAO-WG, 1994
area endangered	see endangered area. FAO-CEPM, 1994
area of low prevalence	an area in which the prevalence of a specific pest is officially recognized to be at a level that can be managed to ensure the quarantine security of regulated articles being moved. (FAO-WG, 1995) NAPPO, 1996
audit inspection	an examination to determine the reliability of prescribed quarantine procedures. (NAPPO, 1985) NAPPO, 1991

B - Pest	a non-quarantine pest for that area. FAO-WG, 1995
B-1 pest	a pest of potential economic importance whose potential for economic loss can be satisfactorily managed by the application of specific measures in an officially accredited certification program. NAPPO, 1996
bait	an attractant into which a pesticide has been incorporated. (NAPPO, 1985) NAPPO, 1987
bark free	absence of bark and wane. NAPPO, 1985
biological control	management of a pest population of one organism by the use of another. (NAPPO, 1985) NAPPO, 1987
biotic agent	any organic matter which is capable of reproduction or replication. NAPPO, 1985
buffer zone	an area in which a specific pest does not occur, or is officially controlled, that either encloses, or is adjacent to an infested area or a pest-free area and in which phytosanitary measures are taken to prevent spread of the pest. FAO-WG, 1995
Bulbs and tubers	Dormant underground organs of plants intended for planting. FAO, 1990
carrier	any means of conveyance in or on which a plant pest can be moved from one place to another. (NAPPO, 1985) NAPPO, 1987
Certificate	An official document which attests to the phytosanitary status of any consignment affected by phytosanitary regulations. (NAPPO, 1985) FAO, 1990
certification	use of a single or any combination of quarantine procedures which will provide for the pest-free movement of commodities. (NAPPO, 1985) NAPPO, 1991
	see also "Phytosanitary certificate"

clearance	verification of compliance with phytosanitary regulations. (FAO-CEPM, 1994) NAPPO, 1996
cold treatment	use of prescribed time/cold temperatures to provide for pest-free commodity movement. (NAPPO, 1985) NAPPO, 1987
commercial fruit	fruit that is: (a) grown in a commercial orchard and commercially packed and labelled, or (b) purchased from a grocery store or commercial orchard and accompanied by a receipt or certificate bearing the letterhead or name of the store or grower, or (c) full fruit grown in a commercial orchard and destined to a commercial processing plant. NAPPO, 1985
commercial orchard	an orchard in which fruit is grown for commercial purposes. (NAPPO, 1985) NAPPO, 1987
commercial production area	a place of production where plants for commerce are grown. (NAPPO, 1985) NAPPO, 1991.
Commodity	a type of plant, plant product or other regulated article being moved for trade or other purpose. (NAPPO, 1987; FAO, 1990) FAO-CEPM, 1994
Commodity class	A category of similar commodities that can be considered together in phytosanitary regulations. FAO, 1990
commodity pest list	a list of pests occurring in an area which may be associated with a specific commodity. (FAO-WG, 1995) NAPPO, 1995c
compliance agreement	an official document which specifies the conditions to be followed as a basis for growing, handling or moving regulated articles. (NAPPO, 1985) NAPPO, 1991
confirmed identification	official verification by an authority of a previous identification. (NAPPO, 1985) NAPPO, 1991
Consignment	A quantity of plants, plant products and/or other regulated articles being moved from one country to another and covered by a single phytosanitary certificate. (A

	consignment may be composed of one or more lots.) FAO, 1990
	see also shipment NAPPO, 1994
containment	application of phytosanitary measures in and around an infested area to prevent spread of a pest. FAO-CEPM, 1994
contaminated article	an article made subject to phytosanitary regulations due to the presence of a pest. (NAPPO, 1985) NAPPO, 1991
contaminating pest	a pest carried by a commodity, but which does not infest the plant from which the commodity is derived; a hitch-hiker pest FAO-WG, 1995
contingency plan	see emergency planning. NAPPO, 1987
control (of a pest)	suppression, containment or eradication of a pest population. FAO-CEPM, 1994
controlled area	a regulated area which has been officially determined to be the minimum area necessary to prevent spread of a pest from a quarantine area. (FAO-WG, 1995) NAPPO, 1995
core area	that portion of an infested area which is believed to be the focal point of the pest introduction. (NAPPO, 1985) NAPPO, 1987
Country of origin (of a consignment of plants)	country where the plants were grown;
(of a consignment of plant products)	country where the plants from which the plant products are derived were grown;
(of other regulated articles)	country where the regulated articles were first exposed to contamination by pests. (FAO, 1990) FAO-WG, 1995
Country of re-export	country into which a consignment of plants, plant products or other regulated articles has been imported and was stored, split up or had its packaging changed prior to export to a third country. (FAO, 1990, 1995) NAPPO, 1995c

Country of transit	country through which a <b>consignment of plants, plant products or other regulated articles</b> passed without being stored, split up or having its packaging changed. (FAO, 1990) NAPPO, 1995c
Cut flowers and branches	Fresh parts of <b>plants</b> intended for decorative use and not for planting. FAO, 1990
Debarking	Removal of bark from <b>round wood</b> . (Debarking does not necessarily make the wood bark-free.) FAO, 1990
decontamination	application of an approved chemical or other treatment to contaminated implements, material, or buildings for killing or deactivating a <b>pest</b> . NAPPO, 1985
Delimiting survey	A <b>survey</b> conducted to establish the boundaries of an area considered to be infested by or free from a <b>pest</b> . (NAPPO, 1985) FAO, 1990
Detection survey	a <b>survey</b> conducted in an area to determine if <b>pests</b> are present. (NAPPO, 1985; FAO, 1990) FAO-CEPM, 1994
Detention	keeping a <b>consignment</b> in custody or confinement for <b>phytosanitary</b> reasons. (NAPPO, 1985; FAO, 1990) FAO-CEPM, 1994
devanning	removal of contents from a container or carrier to the extent necessary to make adequate inspections concerning the presence of <b>plant pests</b> . (NAPPO, 1985) NAPPO, 1991
Dunnage	<b>Wood</b> used to wedge or support cargo. (NAPPO, 1985) FAO, 1990
ecological distribution	distribution of a <b>pest</b> in relation to areas of potential <b>establishment</b> . FAO-WG, 1995
economic damage	the amount of injury which will justify the cost of artificial control measures. NAPPO, 1985 (from Stern <i>et al.</i> , 1959)
economic distribution	distribution of a <b>pest</b> in relation to <b>endangered areas</b> . FAO-WG, 1995 (see also Cook, 1929)

economic impact (expected)	the expenditures required to maintain agricultural production in the presence of the pest. NAPPO, 1985 (from Stern <i>et al.</i> , 1959)
economic injury level	the lowest population density that will cause economic damage. NAPPO, 1985 (from Stern <i>et al.</i> , 1959)
economic threshold	the density at which control measures should be determined to prevent an increasing pest population from reaching the economic injury level. (NAPPO, from Stern <i>et al.</i> , 1959)
emergency	detection of a quarantine pest under circumstances which require the immediate application of phytosanitary measures. NAPPO, 1996
emergency planning	development of strategies to be employed upon the detection of an incipient new plant pest infestation. NAPPO, 1985
endangered area	an area where ecological factors favor the establishment of a pest whose presence in the area will result in economically important loss. NAPPO, 1993; FAO-CEPM, 1994
endemic	prevalent in, or restricted to, a certain area. (NAPPO, 1985) NAPPO, 1987
entry	movement of a pest into an area where it does not occur. NAPPO, 1993
entry (of a consignment)	movement through a point of entry into an area. FAO-CEPM, 1994
entry (of a pest)	movement of a pest into an area where it is not yet present, or present but not widely distributed and being officially controlled. FAO-CEPM, 1994
entry potential	the likelihood of entry of a pest. NAPPO, 1993
epicenter (focal point)	the initial site of an infestation. NAPPO, 1985
equivalence	situation of phytosanitary measures which are not identical but have the same effect. FAO-CEPM, 1994

<b>Eradicate</b>	To eliminate a <b>pest</b> from a specific country or area. <b>FAO, 1990</b>
eradication	application of <b>phytosanitary measures</b> to eliminate a <b>pest</b> from an area. (NAPPO, 1985) <b>FAO-CEPM, 1994</b>
<b>Established</b>	Of an introduced <b>pest</b> , present in a country or area, multiplying and expected to continue. <b>FAO, 1990</b>
establishment	<b>perpetuation</b> , for the foreseeable future, of a <b>pest</b> within an area after entry. <b>FAO-CEPM, 1994</b>
establishment potential	<b>likelihood</b> of the <b>establishment</b> of a <b>pest</b> . <b>NAPPO, 1993</b>
evaluation (monitoring) survey	a <b>survey</b> to determine <b>pest</b> population levels. <b>NAPPO, 1985</b>
exotic	from another country; not native to the place where found; <b>foreign</b> . <b>NAPPO, 1985</b>
<b>Field</b>	A plot of land with defined boundaries within a <b>place of production</b> on which a <b>commodity</b> is grown. <b>FAO, 1990</b>
<b>Field inspection</b>	<b>inspection</b> of <b>plants</b> during the <b>growing season</b> . (FAO, 1990) <b>FAO-WG, 1995</b>
<b>Find free</b>	To inspect a <b>consignment</b> , <b>field</b> or <b>place of production</b> and consider it to be free from a specific <b>pest</b> . <b>FAO, 1990</b>
foreign site inspection	<b>verification</b> , at <b>origin</b> , of compliance with the conditons to be followed as a basis for growing, handling and/or moving <b>regulated articles</b> . <b>NAPPO, 1996</b>
<b>Free from</b>	of a <b>consignment</b> , <b>field</b> or <b>place of producton</b> , without <b>pests</b> (or a specific <b>pest</b> ) in numbers or quantities that can be detected by the application of <b>phytosanitary procedures</b> . (FAO, 1990) <b>FAO-CEPM, 1994</b>
<b>Fresh</b>	<b>Living</b> , not dried, deep-frozen or otherwise conserved. <b>FAO, 1990</b>

fruit collection survey	a survey conducted by collecting and holding fruit for observation to determine if plant pests are present. (NAPPO, 1985) NAPPO, 1987
fruit cutting survey	a survey conducted by cutting and examining fruit to determine if plant pests are present. (NAPPO, 1985) NAPPO, 1987
Fruits and vegetables	Fresh parts of plants intended for consumption or processing. FAO, 1990
Fumigation	treatment with a chemical agent that reaches the commodity wholly or primarily in a gaseous state. (FAO, 1990) FAO-CEPM, 1994
generation (life cycle)	the period of time from any given stage in the life cycle of a plant pest to the same stage in its progeny. (NAPPO, 1985) NAPPO, 1987
geographical distribution	distribution of a pest in relation to geographical boundaries. FAO-WG, 1995
Germplasm	Plants intended for use in breeding or conservation programs. (NAPPO, 1985) FAO, 1990
Grain	Seeds intended for processing or consumption and not for planting. (see Seeds) FAO, 1990
ground bait treatment	application of bait by ground equipment to a designated area. (NAPPO, 1985) NAPPO, 1987
ground treatment	application of pesticides or biological control agents by ground equipment to a designated area. (NAPPO, 1985) NAPPO, 1987
Growing medium	Any material in which plant roots are growing or intended for that purpose. FAO, 1990
Growing season	Period of the year when plants will actively grow in an area. (NAPPO, 1985) NAPPO, 1987

Growing season inspection	See <b>Field inspection</b> .
harmonization	establishment, recognition and application by different countries of <b>phytosanitary measures</b> based on common standards. (WTO Agreement on Application of Sanitary and Phytosanitary Measures) FAO-WG, 1995
hitch-hiker pest	see: <b>contaminating pest</b> .
host pest list	a list of <b>pests occurring</b> in an area which infest a <b>plant species</b> . FAO-WG, 1995
Host range	The species of <b>plants</b> capable, under natural conditions, of sustaining a <b>specific pest</b> (NAPPO, 1985) FAO, 1990
house plant	for regulatory purposes. a <b>plant</b> grown inside the house. NAPPO, 1985
Immediate vicinity	The <b>fields</b> adjacent to a <b>field</b> , or the <b>places of production</b> adjacent to a <b>place of production</b> . FAO, 1990
import	to bring ( <b>commodities</b> ) into one country from another in commerce. (NAPPO, 1985) NAPPO, 1987
Import permit	an <b>official</b> authorization for the importation of a <b>commodity</b> in compliance with specified <b>phytosanitary requirements</b> . (NAPPO, 1985; FAO, 1990) NAPPO, 1996
incineration	the act of burning to ash <b>infested/infected/contaminated regulated materials</b> to eliminate <b>plant pests</b> . (NAPPO, 1985) NAPPO, 1987
incipient	just beginning to exist or appear. NAPPO, 1985
indigenous	native of a particular area, not introduced. NAPPO, 1985
infested	contaminated with a <b>pest</b> or so exposed to a <b>pest</b> that contamination can reasonably be expected to exist. NAPPO, 1985

infested area	an area which has been determined to have an established pest population. (NAPPO, 1985) NAPPO, 1987
Inspect	Perform an official visual examination of plants, plant products or regulated articles to determine if pests are present and/or to determine compliance with phytosanitary regulations. FAO, 1990
Inspection	official visual examination of plants, plant products or other regulated articles to determine if pests are present and/or to determine compliance with phytosanitary regulations. (FAO, 1990) FAO-CEPM, 1994
inspection at origin	see "Precognance" NAPPO, 1991a
inspection on arrival	the physical examination of a consignment, carrier, or passenger baggage upon arrival at the first port-of-entry. (NAPPO, 1985) NAPPO, 1991a
inspection procedure	any prescribed method for the examination of an article, facility, carrier or passenger baggage. (NAPPO, 1985) NAPPO, 1987
inspection standard	predetermined rate of examination of a consignment based on percentages, profiling, or random sampling. (NAPPO, 1985) NAPPO, 1991a
Inspector	A person authorized by a National Plant Protection Organization to discharge its functions. (NAPPO, 1985) FAO, 1990
Interception (of a consignment)	refusal or controlled entry of an imported consignment due to failure to comply with phytosanitary regulations. (FAO, 1990) FAO-CEPM, 1994
Interception (of a pest)	detection of a pest during inspection or testing of an imported consignment. (FAO, 1990) FAO-WG, 1995
intermediate quarantine	quarantine in a country other than the country of origin or destination. FAO-WG, 1995

international standard for phytosanitary measures	an international <b>standard</b> developed under the auspices of the Secretariat of the IPPC in cooperation with the RPPOs, and endorsed by the procedures of FAO. FAO-WG, 1995
in transit	in the process of movement from the point of origin to final destination. (NAPPO, 1985) NAPPO, 1987
Introduction	<b>entry and establishment of a pest.</b> (FAO, 1990) NAPPO, 1993  <b>entry of a pest, resulting in establishment.</b> (FAO, 1990; NAPPO, 1993) FAO-CEPM, 1994
introduction potential	the likelihood of the introduction of a pest. NAPPO, 1993
IPPC	abbreviation of the International Plant Protection Convention, as deposited with FAO in Rome in 1951 and as subsequently amended. (FAO, 1990) FAO-CEPM, 1994
ISPM	abbreviation for <b>International Standard for Phytosanitary Measures.</b> FAO-WG, 1995
key pest	see <b>pest, key.</b> NAPPO, 1985
known infested property	see <b>infested area.</b> NAPPO, 1985
life cycle/generation	see <b>generation.</b> NAPPO, 1985
limited permit	<b>an official authorization for the movement of specific plants, plant products or other regulated articles to a specific location for treatment, particular handling, or utilization.</b> (NAPPO, 1985; NAPPO, 1991a) NAPPO, 1996
Lot	<b>A number of units of a single commodity, identifiable by its homogeneity of composition, origin, etc., forming part of a consignment.</b> (NAPPO, 1985) FAO, 1990
monitoring	<b>an official process to verify phytosanitary situations.</b> (FAO-WG, 1995) NAPPO, 1995c

monitoring inspection	an examination to determine if prescribed inspection procedures are being applied properly. NAPPO, 1985
monitoring survey	ongoing survey to verify the characteristics of a pest population. FAO-CEPM, 1994
monitoring (evaluation) survey	see evaluation survey. NAPPO, 1985
move	to ship, offer for shipment, receive for transportation, carry, or otherwise transport. (NAPPO, 1985) NAPPO, 1987
National Plant Protection Organization	official service established by a Government to discharge the functions specified by the IPPC. (FAO, 1990) FAO-CEPM, 1994
native	present in a certain area from other than man-made causes or influences (see indigenous). NAPPO, 1985
negligible pest risk	inspection, treatment and safeguard procedures which are carried out at a level where artificial introduction of plant pests is not likely to occur. NAPPO, 1985
new plant pest(s)	a plant pest recently introduced into an area where it previously did not occur; or an indigenous plant pest which has newly acquired an enhanced capacity to cause plant injury. (NAPPO, 1985) NAPPO, 1991
non-quarantine pest	a pest that is not a quarantine pest for an area. FAO-CEPM, 1994
NPPO	abbreviation for National Plant Protection Organization. FAO-CEPM, 1994
nursery stock	all field-grown florist's stock, trees, shrubs, vines, cuttings, grafts, scions, buds, fruit pits, and other seeds of fruit and ornamental trees or shrubs, and other plants and plant products for propagation, except field, vegetable, and flower seeds, bedding plants, and other herbaceous plants, bulbs, and roots. NAPPO, 1985
obscure pests	see "pest, obscure". NAPPO, 1985

occurrence	presence in an area of a pest, officially reported to be indigenous or introduced, and not officially reported to have been eradicated. (FAO, 1990) FAO-CEPM, 1994
Official	Established, authorized or performed by a National Plant Protection Organization. FAO, 1990
origin	see: Country of origin
outbreak	an isolated pest population, recently detected and expected to survive for the immediate future. FAO-CEPM, 1994
owner	the person or organization having legal right of, and responsibility for, possession of regulated articles. (NAPPO, 1985) NAPPO, 1987
package	a box, case, carton, wrapping, or other enclosure in which articles are covered, enclosed, or contained for movement. (NAPPO, 1985) NAPPO, 1987
packing material	any plants or plant products or other materials associated with or accompanying any commodity or shipment to serve for filling, wrapping, ties, lining, mats, moisture retention, protection, or for any other purpose. (NAPPO, 1985) NAPPO, 1987
Pathway	any means that allows the entry or spread of a pest. (FAO, 1990) FAO-CEPM, 1994
permit	see "Import permit". NAPPO, 1991a
person	an individual, corporation, company, society, organization, association or other business entity growing, handling or moving regulated articles. (NAPPO, 1985) NAPPO, 1987
Pest (i.e., plant pest)	any biotic agent capable of causing injury or damage to plants or plant products (NAPPO, revised, 1990) NAPPO, 1996

	<p>Any form of plant or animal life, or any pathogenic agent, injurious or potentially injurious to plants or plant products. FAO, 1992</p> <p>any species, strain or biotype of plant, animal or pathogenic agent, injurious to plants or plant products. (FAO, 1992) FAO-CEPM, 1994</p>
pest detection	a methodical procedure to determine the presence or absence of a plant pest. NAPPO, 1985
pest-free area	an area in which a specific pest does not occur as demonstrated by scientific evidence and in which, where appropriate, this condition is officially maintained. (NAPPO, 1994) FAO-CEPM, 1994
pest, key	in a pest complex a key pest is one that is a perennial, persistent threat dominating chemical control practices. In the absence of deliberate control by man, its population density often exceeds the economic threshold one or more times during the growing season. NAPPO, 1985 (from Stem, 1973)
pest management	the utilization of any procedure or combination of procedures designed to eradicate, suppress or contain pest populations at a level to protect agricultural and forestry resources. (NAPPO, 1985) NAPPO, 1995c
pest, obscure	<p>reported once and not reported thereafter. NAPPO, 1985</p> <p>a pest not readily detectable by visual inspection. (NAPPO, 1985) NAPPO, 1987</p> <p>[Note: In the opinion of this compiler, the concepts in the 1985 and 1987 definitions are not the same. BEH, 1994]</p>
pest risk analysis	pest risk assessment and pest risk management. NAPPO, 1993
pest risk assessment	determination of whether a pest is a quarantine pest and evaluation of its introduction potential. NAPPO, 1993

	determination of whether a pest is a quarantine pest and evaluation of its entry and establishment potential. (NAPPO, 1993) FAO-CEPM, 1994
pest risk management	the decision-making process of dealing with the risk of introduction of a quarantine pest. NAPPO, 1993
	the decision-making process of reducing the risk of entry and establishment of a quarantine pest. (NAPPO, 1993) FAO-CEPM, 1994
pest situation	population/damage on plant(s) during a specified period. NAPPO, 1985
pest survey	a methodical procedure to determine the characteristics of a pest population, such as geographical distribution, density, etc. (NAPPO, 1985) NAPPO, 1987
	see also "Survey"
PFA	abbreviation for Pest-Free Area. FAO-CEPM, 1994
Phytosanitary	Pertaining to plant quarantine. FAO, 1990
Phytosanitary certificate	A certificate patterned after the model certificates of the IPPC. (NAPPO, 1985) FAO, 1990
Phytosanitary certification	Use of phytosanitary procedures leading to the issue of a phytosanitary certificate. FAO, 1990
Phytosanitary legislation	basic laws granting legal authority to a national plant protection organization from which phytosanitary regulations may be drafted. (FAO, 1990) FAO-CEPM, 1994
phytosanitary measure	any legislation, regulation or phytosanitary procedure having the purpose to prevent the introduction and/or spread of quarantine pests. (NAPPO, 1991; FAO-CEPM, 1994) NAPPO, 1996

phytosanitary procedure	any officially prescribed method for performing inspections, tests, surveys or treatments in connection with plant quarantine. FAO-CEPM, 1994
Phytosanitary regulation	official rule to prevent the introduction and/or spread of quarantine pests, by regulating the production, movement or existence of, commodities or other articles, or the normal activity of persons, and by establishing schemes for phytosanitary certification. (FAO, 1990) FAO-CEPM, 1994
phytosanitary requirements	phytosanitary measures which are officially prescribed. NAPPO, 1996
Place of production	Any premises or collection of fields operated as a single production or farming unit. FAO, 1990
plant material	see "plant product "
plant pest	See "pest"
plant pest control	see "pest management"
Plant product	Unmanufactured material of plant origin (including grain) and those manufactured products that, by their nature or that of their processing, may create a risk for the spread of pests. (NAPPO, 1985) FAO, 1990
Plant Protection Organization (National)	See National Plant Protection Organization
Plant Protection Organization (Regional)	See Regional Plant Protection Organization
Plant quarantine	all activities designed to prevent the introduction and/or spread of quarantine pests or to ensure their official control. (FAO, 1990) FAO-CEPM, 1994
Planting (including replanting)	Any operations for the placing of plants in a growing medium to ensure their subsequent growth, reproduction or propagation. FAO, 1990

Plants	Living plants and parts thereof, including seeds. FAO, 1990
Plants for planting	Plants intended to remain planted, to be planted or replanted. FAO, 1990
Plants in tissue culture	Plants in a clear aseptic medium in a closed transparent container. FAO, 1990
point of entry	airport, seaport or land border point officially designated for the importation of consignments, and/or entrance of passengers. FAO-CEPM, 1994
port-of-entry	airport, seaport, or land border port officially designated for the importation of commodities, merchandise, and/or entrance and clearance of passengers and carriers. (NAPPO, 1985) NAPPO, 1991
post-entry quarantine	quarantine applied to a consignment after entry. FAO-CEPM, 1994  detention of plants under safeguard conditions and subject to phytosanitary procedures to determine compliance with phytosanitary requirements. NAPPO, 1996
potential quarantine pest	a pest whose status as a quarantine pest can not be, or has yet to be determined (NAPPO, 1993) NAPPO 1995c
Pot plant	A rooted plant, already planted, and not intended for replanting. FAO, 1990
PQIR	abbreviation for Plant Quarantine Importation Requirements. NAPPO, 1996
PRA	abbreviation for Pest Risk Analysis. NAPPO, 1993, FAO-WG, 1995
PRA area	the area in relation to which a Pest Risk Analysis is conducted. NAPPO, 1993; FAO-WG, 1995
Practically free	of a consignment, field or place of production, without pests (or a specific pest) in numbers or quantities in excess

	of those that can be expected to result from, and be consistent with good culturing and handling practices employed in the production and marketing of the commodity. (FAO, 1990) FAO-CEPM, 1994
preclearance	<b>phytosanitary certification and/or clearance in the country of origin, performed by or under the regular supervision of the National Plant Protection Organization of the country of destination. (FAO, 1990) FAO-CEPM, 1994</b>  <b>clearance in the country of origin performed by persons duly authorized by the plant protection organization of the country of destination. (FAO-CEPM, 1994) NAPPO, 1995b</b>
prevalence	number of occurrences of a specific pest in an area over a defined period of time. (OIE, 1992) FAO-WG, 1995
primary site	a property on which an initial detection of a plant pest occurs. NAPPO, 1985
probit 9 mortality	a death rate of 99.99683 percent in a population of live organisms, corresponding to a survival rate of 31.686 per million. NAPPO, 1985
production area	see commercial production area. NAPPO, 1985
prohibited article	any article specifically prohibited entry or movement. (NAPPO, 1985) NAPPO, 1987
Prohibition	<b>A phytosanitary regulation forbidding the importation of specific pests, commodities or other regulated articles. FAO, 1990</b>  <b>A phytosanitary measure forbidding the importation of specific pests, commodities or other regulated articles. (FAO, 1990) NAPPO, 1995c</b>
Propagative material	See "plants for planting"

property	a land unit under one owner or operator that is handled as a single farming or production operation. NAPPO, 1985  see also "Place of production"
Protected area	a <b>regulated area</b> which has been officially determined to be the minimum area necessary for the effective protection of the endangered area. (FAO-WG, 1995) NAPPO, 1995c
quality pest	a <b>non-quarantine pest</b> , for an importing country, whose presence in a <b>consignment of plants or plant products</b> has economic importance in so far as it affects the grade, marketability or ultimate use of the <b>consignment</b> , and which may be subject to regulatory control. FAO-WG, 1995
Quarantine	<b>Official confinement of plants</b> subject to phytosanitary regulations for observation and research or for further inspection and/or testing. FAO, 1990  See also "plant quarantine".
quarantine area	an area within which a <b>quarantine pest</b> occurs and is being <b>officially controlled</b> . (NAPPO, 1985) FAO-WG, 1995
quarantined articles	see "regulated article"
Quarantine pest	a <b>pest</b> of potential economic importance to the area <b>endangered</b> thereby and not present in that area, or present there but not widely distributed and being <b>officially controlled</b> . (FAO, 1992) FAO-WG, 1995
Quarantine procedure	see "Phytosanitary procedure"
quarantine security	see "negligible pest risk"
quarantine significant pest	see "quarantine pest"
Quarantine station	an <b>official station</b> for holding plants or plant products in quarantine. FAO-CEPM, 1994

Refusal	forbidding entry of a <b>consignment</b> or other regulated article when it fails to comply with <b>phytosanitary regulations</b> . (FAO, 1990) FAO-CEPM, 1994
Region	The combined territories of the member countries of a <b>regional plant protection organization</b> . FAO, 1990
Regional plant protection organization	An intergovernmental organization with the functions laid down by Article VIII of the <b>IPPC</b> . FAO, 1990
regulated area	<b>an area into which, within which, and/or from which plants, plant products and other regulated articles, are subjected to phytosanitary measures in order to prevent the introduction and/or spread of quarantine pests.</b> (NAPPO, 1994c) FAO-WG, 1995
Regulated article	Any storage place, conveyance, container or any other object or material capable of harbouring or spreading <b>plant pests</b> , particularly where international transportation is involved. (NAPPO, 1985) FAO, 1990
regulatory incident	detection of a <b>pest</b> under circumstances which indicate the absence of <b>establishment</b> . (NAPPO, 1985) NAPPO, 1996
regulatory trapping	trapping conducted around establishments where <b>regulated articles</b> are sold, handled, processed, or moved in order to ascertain the need for regulatory action. NAPPO, 1985
release (of a consignment)	authorization for entry after <b>clearance</b> . FAO-CEPM, 1994
Replanting	See " <b>Planting</b> "
restriction	a <b>phytosanitary measure</b> allowing an importation of <b>specified commodities</b> subject to certain requirements. FAO-WG, 1995
Round wood	<b>Wood</b> not sawn longitudinally, carrying its natural rounded surface, with or without bark. FAO, 1990
RPPO	Abbreviation for <b>Regional Plant Protection Organization</b> . FAO, 1990

safeguard	any action, procedure, equipment used to prevent any possible escape of a plant pest. NAPPO, 1985
sanitation	the prevention or diminution of pest outbreaks by the application of hygienic management practices. (NAPPO, 1985) NAPPO, 1987
Sawn wood	Wood sawn longitudinally, with or without its natural rounded surface, with or without bark. FAO, 1990
scientific permit	an official document which authorizes the movement of regulated articles, or the pest concerned, to a specified destination for scientific purposes. (NAPPO, 1985) NAPPO, 1991
seed potato certification	an officially adopted scheme for the production of potato propagative materials that meet prescribed requirements for potato pest freedom and varietal purity. NAPPO, 1995a
Seeds	Seeds for planting; not for consumption or processing (see Grain). FAO, 1990
shipment	a quantity of plants, plant products and/or other regulated articles being moved from one country to another and covered by a single phytosanitary certificate. (A shipment may be composed of one or more lots.) NAPPO, 1994d  see also "Consignment"
soil	the loose surface material of the earth in which plants grow, in most cases consisting of disintegrated rock with an admixture of organic material. NAPPO, 1994b
soil treatment	the application of an approved physical or chemical treatment to the soil. (NAPPO, 1985) NAPPO, 1987
spread	expansion of the geographical distribution of a pest within an area NAPPO, 1993; FAO-CEPM, 1994
spread potential	the likelihood of the spread of a pest. NAPPO, 1993

standard	document established by consensus and approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for activities and their results, aimed at the achievements of the optimum degree of order within a given context. (ISO Guide 2: 1991) FAO, 1994)
sterile media	a substrate in which all organisms have been destroyed. NAPPO, 1985
sterile insect technology	a technique used to suppress and/or eradicate insect populations through the release of sterilized insects. (NAPPO, 1985) NAPPO, 1987
Stored product	An unmanufactured plant product intended for consumption or processing, stored in a dried form. (This includes in particular grain and dried fruits and vegetables). FAO, 1990
suppression	application of phytosanitary measures in an infested area to reduce pest populations and thereby limit spread. FAO-CEPM, 1994
surface pesticide	a pesticide applied to the surface of a structure or to the soil surface. (NAPPO, 1985) NAPPO, 1987
surveillance	an official process which collects and records data on pest occurrence or absence by survey, monitoring or other procedures. FAO-WG, 1995
Survey	a methodical procedure, conducted over a defined period of time, to determine the characteristics of a pest population, or to determine which species occur in an area. (FAO, 1990) FAO-WG, 1995
system integrity	verifiable assurance that a defined set of phytosanitary procedures are efficacious and properly conducted. NAPPO, 1996
systems approach	a defined set of phytosanitary procedures, at least two of which have an independent effect in providing for the pest-free movement of commodities. NAPPO, 1996

target pest	a quarantine pest specified in an area, or potentially associated with a commodity. (NAPPO, 1994a) NAPPO, 1996
Test	Official examination, other than visual, to determine if pests are present or to identify pests. FAO, 1990
Tissue culture	See "Plants in tissue culture"
Transit	See "Country of transit"
transparency	the principle of making available, at the international level, phytosanitary measures and their rationale. FAO-CEPM, 1994
trap array	the spatial pattern of trap placement within an area. NAPPO, 1985
trap density	the number of traps per unit of area. NAPPO, 1985
Treatment	Officially authorized procedure for killing, removal or rendering infertile of plant pests. (NAPPO, 1985) FAO, 1990
Wood	Round wood, sawn wood, wood chips or dunnage, with or without bark. FAO, 1990

11/10/92

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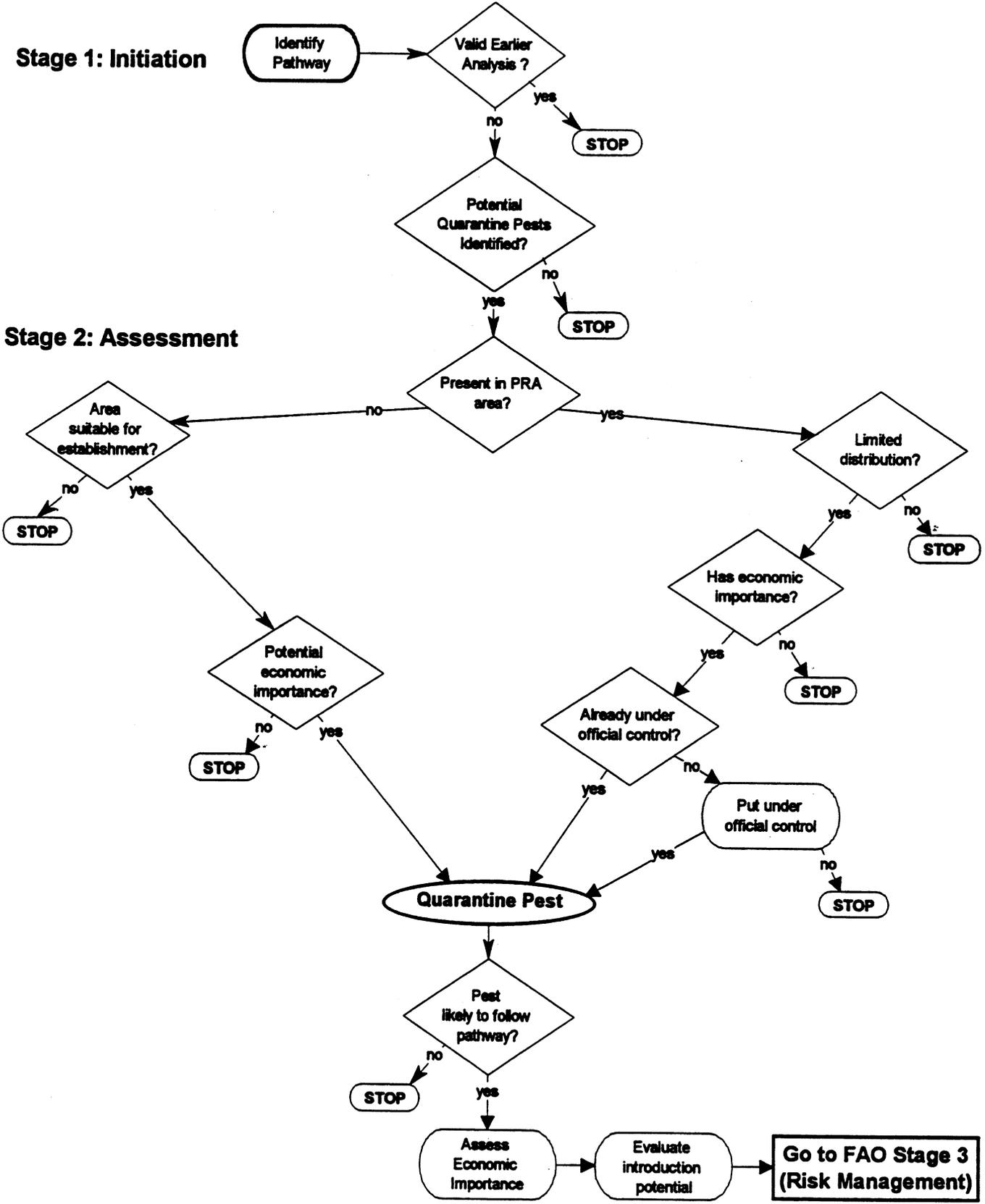
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## **Appendix III. BATS AND FAO-IPPC GUIDELINES AND FLOW CHARTS**

**See enclosures.**

# Pathway-Initiated Plant Pest Risk Assessment \*

(FAO PRA Stages 1 & 2): Flow Chart for APHIS-PPQ-BATS-CPRA



DRAFT

DRAFT

\* This chart illustrates key necessary steps in a PRA and does not necessarily represent a chronological course of events -- 3/28/96

# Checklist for: Pathway-Initiated Pest Risk Assessment

**Biological Assessment and Taxonomic Support  
Plant Protection and Quarantine  
Animal and Plant Health Inspection Service  
U.S. Department of Agriculture  
4700 River Road, Unit 133  
Riverdale, MD 20737-1236**

**INSTRUCTIONS:** Refer to *Pathway-Initiated Pest Risk Assessment: Guidelines for Qualitative Assessments*, ver. 4.0 (USDA, 1995) for more complete details on the risk analysis methods to be used. All numbered blocks must be checked. References in parentheses (e.g., *Ref. 1.0*) refer back to the *International Standards For Phytosanitary Measures, Section 1-Import Regulations, Guidelines For Pest Risk Analysis, Draft Standards, Annex 2* (FAO, 1995). Because this is a checklist for pathway-initiated PRA's, portions of FAO Stage 1 ("Initiating the PRA process", FAO, 1995) have already been completed.

## FAO Stage 1: Initiating the PRA process

### 1 Document the initiating event(s) for the pathway-initiated PRA

Document the reason(s) for initiating the risk assessment. The pathway may concern a single area of origin or several areas of origin. (*Ref. 1.1*). What was/were the identified pathway(s) (check all that apply, but check at least one item before checking block 1)?

- by initiation of trade in a new commodity
- by initiation of trade in a commodity from a new origin
- by a request for import
- by the appearance in trade of consignments of a commodity
- by new plant species imported for selection and scientific research purposes
- by identification of a pathway other than an imported commodity:
  - natural spread
  - mail
  - garbage
  - passengers' baggage
  - other \_\_\_\_\_
- a policy decision is taken to establish or revise phytosanitary regulations or requirements concerning specific commodities
- a new treatment, system, process, or information impacts on an earlier decision
- other \_\_\_\_\_

### 2 Assess weediness potential of commodity to be imported

The weediness potential of the plant species to be imported was evaluated. We found that the plant species did not pose a significant risk as a weed.

3  **Identify and cite pertinent PRA's completed previously.** (Ref. 1.3)

Identify previous pest risk assessments from same country or region and the same host/commodity/relative. If an existing risk assessment adequately assesses the risks in question, the risk assessment stops here. Describe appropriate current importations (e.g., same commodity from other countries, other commodities from the country in question). Report pertinent pest interceptions at United States ports of entry.

4  **Identify and list potential quarantine pests for the pathway.** (Ref. 1.4)

## FAO Stage 2: Pest Risk Assessment

5  **Identify quarantine pests: verify the quarantine status of pests.** (Ref. 2.1)

Provide evidence relative to (1) the geographic and regulatory criteria for quarantine pest status and (2) the potential for each pest to be important economically. Blocks 5a and 5b must both be completed and checked before checking block 5.

5a  The pest satisfies the importance portion of the quarantine pest definition (*i.e.*, "... the pest is of potential economic importance to the area endangered thereby."). For quarantine pests not analyzed in detail (*i.e.*, those quarantine pests not expected to follow the pathway and therefore do not warrant specific mitigation measures), this information can be provided as part of the pest list.

5b  The pest satisfies the geographical and regulatory criteria in the quarantine pest definition as evidenced by the assemblage of data addressing whether the pest (check only those that apply):

- "is present in the PRA area and has reached the limits of its ecological range (*i.e.* is widely distributed), then the pest does not satisfy the definition of a quarantine pest and the PRA for the pest stops at this point)"
- "is present in the PRA area and has not reached the limits of its ecological range (*i.e.* is not widely distributed), and the pest is subjected to official control in the PRA area, then the pest satisfies this aspect of the definition of a quarantine pest"
- "is not widely distributed but is under consideration of future official control in the PRA area, then the PRA will determine whether the pest should be placed under official control. If the conclusion is reached that the pest should be subject to official control, then the pest satisfies this aspect of the definition of the definition of a quarantine pest"
- "is not widely distributed but is not subject to official control or consideration of future official control in the PRA area, then the pest does not satisfy the definition of a quarantine pest and the PRA for the pest stops at this point"
- "is absent from the PRA area, then it satisfies this aspect of the definition of a quarantine pest"

6.  **Identify and list quarantine pests likely to follow the pathway.** (Ref. 1.1)

Quarantine pests considered likely to follow the pathway require detailed examination and are analyzed further (see below). Information should be provided for each quarantine pest regarding whether the pest can be expected to follow the pathway (the information may be provided as part of the pest list).

7.  **Assess economic importance: Consequences of Introduction.** Assess the potential economic importance of each quarantine pest expected to follow the pathway (*i.e.*, those quarantine pests being considered for further analysis. (Ref. 2.1) Blocks 7a, 7b and 7c must all be completed and checked before checking block 7.

7a  Pest has potential for establishment in the PRA area (if the pest has no potential for establishment in the PRA area the PRA stops at this point). (Ref. 2.2.1). Evidence exists to support the finding that (all of the following must be checked before checking block 7a):

7a1  suitable hosts are available (in terms of quantity and distribution of hosts) in PRA area

7a2  the environment in the PRA area is suitable for the pest

7a3  there is potential for adaptation of the pest

7a4  the pest's reproductive strategy is consistent with pest establishment

7a5  the pest's has potential to survive in the PRA area

7a6  other (if none, write none and this check block) \_\_\_\_\_

7b  Pest has potential to spread after establishment. (Ref. 2.2.2) Evidence exists to support the finding as indicated below. Consider each of the following and check all that apply but at least one must be checked before checking block 7b:

the natural and/or managed environment is suitable for natural spread of the pest

movement with commodities or conveyances

intended use of the commodity

potential vectors of the pest in the PRA area

potential natural enemies of the pest in the PRA area

other (if none, write none and check block) \_\_\_\_\_

7c  Pest is potentially of economic importance. (Ref 2.2.3). Evidence exists to support the finding with respect to (check all that apply, at least one must be checked before checking block 7c):

type of damage

crop losses

loss of export markets

increases in control costs

effects on ongoing IPM programmes

environmental damage

capacity to act as a vector for other pests

- perceived social costs such as unemployment
- other \_\_\_\_\_

8  **Assess Likelihood of Introduction.** Assess in detail the likelihood of introduction via the pathway of each quarantine pests expected to follow the pathway (*i.e.*, those quarantine pests being considered for specific risk mitigation measures). (*Ref.2.3*). Blocks 8a and 8b must both be completed and checked before checking block 8.

8a  **Entry:** Pest has potential to enter the PRA area (if the pest has no potential to enter the PRA area the PRA stops at this point). Blocks 8a1, 8a2 and 8a3 must all be checked before checking block 8a. Evidence exists to support the finding that:

- 8a1  Pest has the potential to contaminate the commodities or conveyances.
- 8a2  Pest has potential to survive the environmental conditions of transport.
- 8a3  Pest has potential to avoid being detected at entry inspection.

If appropriate, check the following:

8a4  Pest has potential to enter the PRA area by means other than the commodity currently under consideration.

8b  **Establishment:** Pest has potential to become established in the PRA area (if the pest has no potential to establish in the PRA area the PRA stops at this point). Evidence exists to support the finding that (all of the following must be checked before checking block 8b):

- 8b1  The number and frequency of consignments of the commodity, OR, the number of individuals of a given pest associated with the means of conveyance, are sufficient to support pest establishment.
- 8b2  The intended use of the commodity is consistent with pest establishment.
- 8b3  The environmental conditions and availability of hosts at the destination and during transport in the PRA area are appropriate to support pest establishment.

9  **Conclusion / Phytosanitary Measures.** Consider all of the essential elements (*i.e.*, Blocks 5-8): evidence exists to support the finding that sufficient risk is present to justify phytosanitary measures. (*Ref. 2,4*). If so proceed, otherwise stop at this point.

# **Pathway-Initiated Pest Risk Assessment: Guidelines for Qualitative Assessments**

**Commodity Pest Risk Analysis Branch  
Biological Assessment and Taxonomic Support  
Plant Protection and Quarantine  
Animal and Plant Health Inspection Service  
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## Introduction

This document presents guidelines for pathway-initiated, qualitative pest risk assessments conducted by Plant Protection and Quarantine (PPQ) within the Animal and Plant Health Inspection Service (APHIS) of the U.S. Department of Agriculture. Our goal is to harmonize PPQ risk assessment procedures with guidelines provided by the North American Plant Protection Organization (NAPPO) and the Food and Agriculture Organization (FAO). Our use of biological and phytosanitary terms (*e.g.*, introduction, quarantine pest) conforms with the *NAPPO Compendium of Phytosanitary Terms* (NAPPO 1995) and the *Definitions and Abbreviations* (Introduction Section) in *International Standards for Phytosanitary Measures, Section 1—Import Regulations: Guidelines for Pest Risk Analysis* (FAO 1995). Pest risk assessment is one component of an overall pest risk analysis. The FAO (1995) *Guidelines for Pest Risk Analysis* describe three stages in pest risk analysis:

- Stage 1: Initiating the process for analyzing pest risk (identifying pests or pathways for which the pest risk analysis is needed)
- Stage 2: Assessing pest risk (determining which pests are quarantine pests, characterized in terms of likelihood of entry, establishment, spread, and economic importance)
- Stage 3: Managing pest risk (developing, evaluating, comparing and selecting options for dealing with the risk)

This document provides a template for conducting FAO Stages 1 and 2.

FAO (1995) describes two general categories of initiating events for pest risk analyses. A pest risk analysis can be either "pest initiated" (*e.g.*, a quarantine pest is discovered in a new area, a pest is intercepted at a port of entry) or "pathway initiated" (*e.g.*, international trade is initiated in a new commodity). This document describes procedures used by USDA for pathway-initiated pest risk assessment. APHIS conducts pathway-initiated pest risk assessments at two levels: "Qualitative" and "Quantitative." This document describes APHIS' process for qualitative pest risk assessments. Qualitative and quantitative assessments are similar in most respects, but in quantitative assessments we examine quarantine pests in greater detail and provide a quantitative assessment of the likelihood of introduction (see Step 8 below). APHIS completes nine basic steps in pathway-initiated plant pest risk assessments:

### **Stage 1 (FAO): Initiating Pest Risk Analysis Process**

- Step 1. Document the initiating event(s) for the PRA.**
- Step 2. Assess Weediness Potential (of the species to be imported).**
- Step 3. Identify Previous Risk Assessments, Current Status of Importations, and Pertinent Pest Interceptions.**
- Step 4. Pest List: Identify Potential Quarantine Pests. Produce a list of pests reported to be associated with the host species in the exporting country/region.**

## **Stage 2 (FAO): Assessing pest risk**

- Step 5. Identify Quarantine Pests: Geographic and Regulatory Criteria.**
- Step 6. Identify Quarantine Pests Likely to Follow the Pathway (*i.e.*, those requiring further analysis).** Determine which quarantine pests may reasonably be expected to follow the pathway; only those are analyzed further.
- Step 7. Assess Economic Importance: Consequences of Introduction.** For each quarantine pest expected to follow the pathway, estimate the consequences of introduction. Issues to consider include "...the establishment, spread and economic importance potential in the PRA area" (FAO, 1995). Environmental impacts are also a valid concern.
- Step 8. Assess Likelihood of Introduction.** For each quarantine pest expected to follow the pathway, estimate the likelihood of introduction via the pathway.
- Step 9. Conclusion / Phytosanitary Measures: Pest Risk Potential (PRP) of Quarantine Pests.** Produce a single rating which represents an overall estimate of the risk posed by each quarantine pest. Comment briefly on the meaning of the PRP's for each quarantine pest. Although this document focuses on risk assessment, the risk assessment (*i.e.*, FAO Stages 1 & 2) and risk management (FAO Stage 3) stages are interrelated. Accordingly, the risk assessor may occasionally make brief comments regarding risk management options associated with the requested commodity importations.

## **Methods: Pest Risk Assessment Guidelines**

### **FAO Stage 1: Initiating Pest Risk Analysis Process**

#### **Step 1. Document the Initiating Event(s) for the PRA**

Document the reason(s) for initiating the pathway-initiated PRA (*e.g.*, importation of a new commodity or new importation from a new area provides a potential pathway for the introduction of plant pests).

#### **Step 2. Assess Weediness Potential**

Assess the weediness potential of the imported species. This step is important to the initiation process because if the assessment finds that the species being considered for import poses a risk as a pest (*i.e.*, as a weed), then a "pest-initiated" pest risk assessment may be initiated. If the species to be imported passes the weediness screening, the pathway-initiated pest risk assessment continues. Table 1 shows how we assess weediness potential and can be used to present findings and conclusions.

## Table 1: Process for Determining Weediness Potential of Commodity

**Commodity:** (Scientific and common names of commodity)

**Phase 1:** Consider whether the species is new to or not widely prevalent in the United States (exclude plants grown under USDA permit in approved containment facilities)?

**Phase 2:** Answer Yes or No to the following questions:

Is the species listed in:

YES / NO

*Geographical Atlas of World Weeds* (Holm et al., 1979)

YES / NO

*World's Worst Weeds* (Holm et al., 1977)

YES / NO

*Report of the Technical Committee to Evaluate Noxious Weeds; Exotic Weeds for Federal Noxious Weed Act* (Gunn & Ritchie, 1982)

YES / NO

*Economically Important Foreign Weeds* (Reed, 1977)

YES / NO

Weed Science Society of America list (WSSA, 1989)

YES / NO

Is there any literature reference indicating weediness (e.g., *AGRICOLA*, *CAB*, *Biological Abstracts*, *AGRIS*; search on "species name" combined with "weed").

**Phase 3:** Conclusion:

**IF:** 1. The species is widely prevalent in the United States and the answer to all of the questions is **no...**

Proceed with the pest risk assessment.

2. The species is widely prevalent in the United States and the answer to **one or more** of the questions is **yes...**

Proceed with the pest risk assessment, provide comments on findings in text, and incorporate findings regarding weediness into the Risk Elements described below.

3. The species is new to or not widely prevalent in the United States and the answer to all of the questions is **no...**

Proceed with the pest risk assessment.

4. The species is new to or not widely prevalent in the United States and the answer to **one or more** of the questions is **yes...**

Consult authority under the Federal Noxious Weed Act for listing plant species as a noxious weed and consider the advisability of performing a pest-initiated pest risk assessment on the plant species. Provide explanations of findings in text.

### **Step 3. Identify and Cite Previous Risk Assessments.**

Identify previous pest risk assessments from the same country/region and the same host/commodity/relative. If there is an existing risk assessment that adequately assesses the risks in question, the risk assessment stops here. Describe appropriate current importations (*e.g.*, same commodity from other countries, other commodities from the country in question). Report pertinent pest interceptions at United States ports of entry.

### **Step 4. Pest List: Identify Potential Quarantine Pests**

APHIS adheres to accepted international definitions of quarantine pest. FAO (1995) and NAPPO (1995) define quarantine pest as “a pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled”. Our first step in identifying quarantine pests is to present a comprehensive pest list of potential quarantine pests. The list includes all pests in the exporting country known to be associated with the plant species to be imported (regardless of what plant part is to be imported). The pest list should enumerate those potential quarantine pests known to occur in the country or region from which the commodity is to be exported. Because all pests on the list are associated with the plant species they are considered to be “of potential economic importance” (FAO, 1995). The listed pests may or may not also occur in the United States. For qualitative pest risk assessments, the minimum list of information sources that should be consulted includes:

- ▶ Literature reviews using electronic databases (*e.g.*, AGRICOLA, CAB database, University of California computer information system, MELVYL).
- ▶ Previous decision sheets covering importation of the commodity.
- ▶ The United States catalogue of intercepted pests and interception records.
- ▶ C.M.I. Distribution Maps/Descriptions of Plant Pests (Fungi, Bacteria, and Arthropods)
- ▶ Various texts and indices of plant diseases and pathogens.
- ▶ APHIS’ files on pests not known to occur in the U.S. (*e.g.*, PNKTO’s—Pests Not Known To Occur and INKTO’s—Insects Not Known To Occur).
- ▶ EPPO plant pest database
- ▶ FAO plant pest database

Pests can be included on the list for a variety of reasons:

- ▶ known pest of commodity (*i.e.*, plant part to be imported)
- ▶ known pest of species (*e.g.*, pest of apple leaves when fruits are the commodity)
- ▶ known pest of the group (*e.g.*, citrus pest when importing particular variety of citrus)

For each pest on the list, include:

- ▶ scientific name (when available)
- ▶ common name for pathogens (when available)
- ▶ selected references

- ▶ limited pertinent information (represented as defined code letters) regarding:
  - ▶ whether the pest is officially regulated by APHIS or other Federal or State agency
  - ▶ pest biology (*e.g.*, pest—commodity association, life history, climatic tolerance)
  - ▶ distribution (*i.e.*, with respect to the exporting country and the U.S.)
  - ▶ regulatory history
  - ▶ interception records at U.S. ports.
  - ▶ whether the pest can be expected to act as a plant pest

The list should include all pests that may be associated with the commodity or plant species in any way. If no potential quarantine pests are identified, the PRA stops at this point.

## **FAO Stage 2: Assessing Pest Risk**

### **Step 5. Identify Quarantine Pests: Geographic and Regulatory Criteria**

There are two primary components to the definition of quarantine pest. First, a pest must be “of potential economic importance” (FAO, 1995; NAPPO, 1995). To be included on the comprehensive list of potential quarantine pests, a pest is considered to be of potential economic importance because scientific evidence, as indicated in the references, demonstrates that a known pest has an association with the plant species being considered. Thus, all of the pests listed on the list of potential quarantine pests (see Step 3) satisfy this criterion unless stated otherwise on the pest list. Second, to be considered a quarantine pest, a pest must satisfy geographic and regulatory criteria, specifically, with respect to the PRA area (*i.e.*, the United States), the pest must be “not yet present there, or present but not widely distributed and being officially controlled (FAO, 1995; NAPPO, 1995). Information should be collected and provided in the risk assessment which documents whether each pest satisfies these criteria. Pertinent geographic and regulatory information (*i.e.*, with respect to the exporting country and the United States) should be provided on the comprehensive pest list. After making this determination for each pest, a separate list of quarantine pests is presented. The list should include all those pests on the comprehensive list (each of which has potential for economic importance) that satisfy the geographic and regulatory criteria.

### **Step 6. Identify Quarantine Pests Likely to Follow the Pathway.**

Identify those quarantine pests that require further analysis (*i.e.*, quarantine pests likely to follow the pathway and which therefore may be associated with the plant part to be imported). Only quarantine pests selected for further analysis are subjected to steps 7-9 below. If none of the potential quarantine pests satisfy the geographic and regulatory criteria as a quarantine pest, the PRA stops at this point. It may be reasonable to assume that certain quarantine pests will not follow the pathway. For example:

- ▶ a pest may be associated only with plant parts other than the commodity
- ▶ a pest may not reasonably be expected to remain with the commodity during harvest and packing
- ▶ it may be reasonable to assume that existing regulations (*e.g.*, Quarantine 56, 7 CFR §319.56) would prevent the pest from following the pathway

Pests not expected to follow the pathway are not considered further. Information supporting this finding should be documented either on the pest list or in the text. Because these pests will not be analyzed further but will still be considered quarantine pests, it is important that certain information be provided on these species. Whether a pest satisfies the geographic and regulatory criteria of a quarantine pest was already documented in the previous section. But for quarantine pests not analyzed further, it is important to document the other characteristics of the pest that justify its characterization as a quarantine pest. In particular, specific information or references should be cited (*e.g.*, on the pest list in the form of codes or citations) documenting that the pest has potential to become established and spread in the PRA area (*i.e.*, suitable climate and host material exists in the United States), and that the pest has potential for economic damage. The decision whether or not to further analyze a particular pest applies only to the current PRA. In other PRA's for the same commodity (*e.g.*, different exporting country), or for a different commodity from the same plant host species, the pest may be considered further because it poses a different level of risk. Should any of the pests not selected for further analysis later be detected on shipments of the commodity, quarantine action may be taken at the port of entry and additional risk analyses may be needed.

For pests analyzed further, the biology and pest potential of each quarantine pest is analyzed and documented more completely in steps 7-9. To be considered for further analysis, it must be reasonable to assume the quarantine pest will:

- ▶ be present in the production area (area of the exporting country where the commodity is grown and packed),
- ▶ be associated with the commodity at the time of harvest, and
- ▶ remain with the commodity in viable form during harvest and packing procedures.

A separate list should be presented showing the quarantine pests that can reasonably be expected to follow the pathway. If no quarantine pests can be expected to follow the pathway, the PRA stops at this point.

## **Step 7. Assess Economic Importance: Consequences of Introduction**

The undesirable outcome being considered is negative impacts resulting from the introduction of a quarantine pest. After identifying those quarantine pests that could reasonably be expected to follow the pathway, the assessment of risk continues by considering the consequences of introduction. For each quarantine pest being considered further, rate the potential consequences of introduction according to risk elements (RE) #1-5. These elements reflect the biology of the pest and its hosts. For each RE, assign each pest a rating of High (3 points), Medium (2 points), or Low (1 point) as indicated.

### **RE #1: Climate—Host Interaction**

When introduced to new areas, pests can be expected to behave as they do in their native area if host plants are available and the climate is similar. We consider ecological zonation and the interaction between the geographic distributions of the pest and host.

Estimates are based on availability of both host material and suitable climate conditions. To rate this RE, we use the U.S. "plant hardiness zones" as described by the U.S. Department of Agriculture (see Figure 1) (USDA, 1990). Assign ratings as follows:

Due to the availability of both suitable host plants and suitable climate, the pest has potential to establish a breeding colony:

- High (3): In four or more plant hardiness zones.
- Medium (2): In two or three plant hardiness zones.
- Low (1): In at most a single plant hardiness zone.

If none of the quarantine pests are capable of becoming established in the PRA because of the absence of both suitable climate and suitable hosts, the PRA stops at this point.

### **RE #2: Host range**

The risk posed by a plant pest depends on both its ability to establish a viable reproductive population and its potential for causing plant damage. For arthropods, risk is assumed to be correlated positively with host range. For pathogens, risk is more complex and is assumed to depend on host range, aggressiveness, virulence and pathogenicity; for simplicity, we rate risk as a function of host range.

- High (3): Pest attacks multiple species within multiple plant families.
- Medium (2): Pest attacks multiple species within a single plant family.
- Low (1): Pest attacks a single species or multiple species within a single genus.

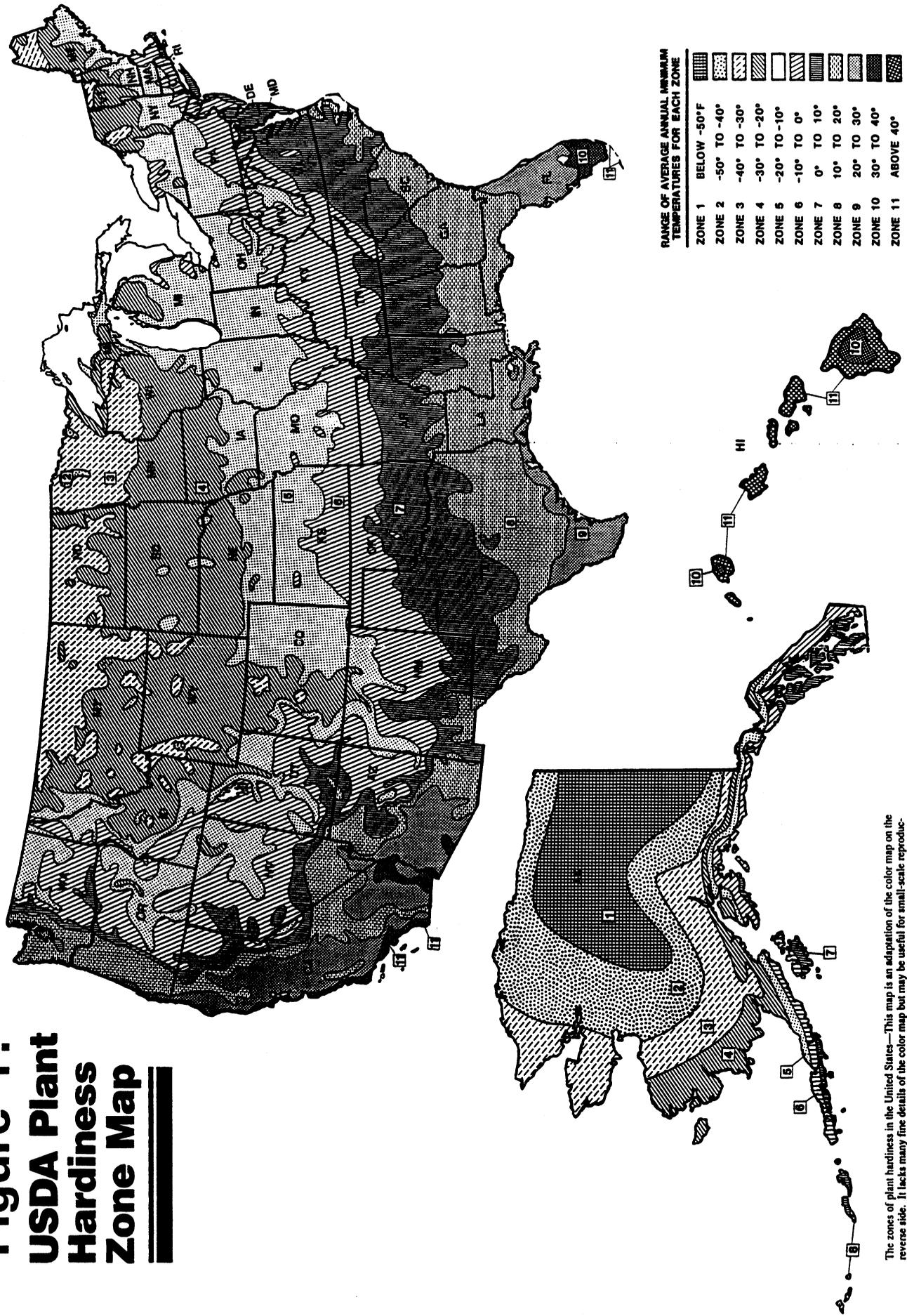
### **RE #3: Dispersal Potential**

A pest may disperse after introduction to a new area. The following items are considered:

- ▶ reproductive patterns of the pest (*e.g.*, voltinism, reproductive output)
- ▶ innate dispersal capability of the pest
- ▶ whether natural factors (*e.g.*, wind, water, presence of vectors) facilitate dispersal

- High (3): Pest has high reproductive potential (*e.g.*, many generations per year, many offspring per reproduction, high innate capacity for population increase (*i.e.*, "r-selected" species), *AND* evidence exists that the pest is capable of rapid movement (*e.g.*, over 10 km per year) either under its own power, human-assisted, or by natural forces such as wind, water or vectors.
- Medium (2): Pest has either high reproductive potential *OR* the species is motile.
- Low (1): Neither high reproductive potential nor highly mobile.

# Figure 1: USDA Plant Hardiness Zone Map



The zones of plant hardiness in the United States—This map is an adaptation of the color map on the reverse side. It lacks many fine details of the color map but may be useful for small-scale reproduction in books, magazines, and nursery catalogs.

#### **RE #4: Economic Impact**

Introduced pests are capable of causing a variety of economic impacts. We divide these impacts into three primary categories (other types of impacts may occur):

- ▶ Lower yield of the host crop (*e.g.*, by causing plant mortality, or by acting as a disease vector).
- ▶ Lower value of the commodity (*e.g.*, by increasing costs of production, lowering market price, or a combination).
- ▶ Loss of markets (foreign or domestic) due to presence of new quarantine pest.

High (3): Pest causes all three of the above impacts.

Medium (2): Pest causes any two of the above impacts.

Low (1): Pest causes any one or none of the above impacts.

#### **RE #5: Environmental Impact**

Our assessment of the potential of each pest to cause environmental damage (FAO, 1995) proceeds by considering the following factors:

- ▶ Introduction of the pest is expected to cause significant, direct environmental impacts (*e.g.*, ecological disruptions, reduced biodiversity). When used within the context of the National Environmental Policy Act (NEPA), "significant" has a special meaning different from its use in a scientific or statistical context (*e.g.*, different from its use in the term "statistically significant"). As used by NEPA, significance is qualitative and encompasses both the likelihood and severity of an environmental impact.
- ▶ Pest is expected to have direct impacts on species listed by Federal or State agencies as endangered, threatened, or candidate. An example of a direct impact would be feeding on a listed plant. If feeding trials have not been conducted with the listed organism and the pest, a pest will be expected to feed on the plant if it feeds on other species within the genus or other genera within the family.
- ▶ Pest expected to have indirect impacts on species listed by Federal or State agencies as endangered, threatened, or candidate (*e.g.*, by disrupting sensitive, critical habitat).
- ▶ Introduction of the pest would stimulate control programs including toxic chemical pesticides.
- ▶ Introduction of the pest would stimulate control programs including release of nonindigenous biological control agents.

High (3): Two or more of the above.

Medium (2): One of the above.

Low (1): None of the above. It is assumed that introduction of a nonindigenous pest will have some environmental impact (*e.g.*, by definition, introduction of a nonindigenous species affects biodiversity).

## Consequences of Introduction: Cumulative Risk Element Score

For each pest, add together the five numerical estimates (five RE's) to produce an overall estimate of the Consequences of Introduction Risk Rating for each pest. The overall risk rating is used to assign a Consequences of Introduction Risk Score as follows:

Cumulative Risk Element Score	Risk Rating	Risk Score
5 - 7	Low	1
8 - 11	Medium	2
12 - 15	High	3

The Consequences of Introduction Risk Rating is considered to be a biological indicator of the potential of the pest to become established and spread, and its potential to cause economic and environmental impacts.

## Step 8. Assess Likelihood of Introduction

For quarantine pests likely to follow the pathway (*i.e.*, those selected for further analysis), rate the potential likelihood of introduction according to RE #6 RE #7. RE #7 is based on five separate components. Note that all quarantine pests to be analyzed in this step were considered reasonably likely to follow the pathway. The cumulative score for the Likelihood of Introduction Risk Elements is referred to as the Likelihood of Introduction Risk Score (numerical) which leads to a Likelihood of Introduction Risk Rating of low, medium or high.

### RE #6: Quantity of Commodity Imported

The likelihood that an exotic pest will be introduced depends on the amount of the potentially-infested commodity that is imported. For qualitative pest risk assessments, the amount of commodity imported is estimated in units of standard 40 foot long shipping containers. Often, the quantity of a commodity imported is provided only in terms of kilograms, pounds, number of items, etc. In those cases, or when shipments do not completely fill a 40 foot shipping container, a conversion to 40 foot shipping containers is needed. Score the quantity of commodity imported as follows:

Number of 40' Containers Per Year	Score
< 10	1
10 - 100	2
> 100	3

## **RE #7: Pest Opportunity (Survival and Access to Suitable Habitat and Hosts)**

For each pest, consider five sub-elements. Consider the likelihood that the pest may:

- 1. Survive postharvest treatment:** For this sub-element, postharvest treatment refers to any manipulation, handling or specific phytosanitary treatment to which the commodity is subjected. Examples of postharvest treatments include culling, washing, fumigation with pesticides (regardless of whether the treatment has documented efficacy), cold storage, etc. If there is no postharvest treatment, estimate the likelihood of this sub-element as high.
- 2. Survive shipment:** Estimate survival during shipment assuming standard shipping conditions. If shipping conditions are specifically designed to provide phytosanitary conditions (*e.g.*, cold treatment *via* refrigerated shipping containers), consider the phytosanitary effects in this sub-element and not in the previous sub-element (*i.e.*, postharvest treatment).
- 3. Not be detected at the port of entry:** Unless specific protocols are in place for special inspection of the commodity in question, assume standard inspection protocols for like commodities. If no inspection is planned, estimate this likelihood of this sub-element as high.
- 4. Imported or moved subsequently to an area with an environment suitable for survival:** Even if infested commodities enter the country, not all final destinations will have suitable climatic conditions for pest survival. Consider the geographic location of likely markets and the proportion of the commodity that is likely to move to locations suitable for pest survival.
- 5. Come into contact with host material suitable for reproduction:** Even if the final destination of infested commodities are suitable for pest survival, suitable hosts must be available in order for the pest to survive. Consider the complete host range of the pest species.

The events described in these five elements should be considered as a series of independent events that must all take place before a pest outbreak can occur. Each of the five elements should be considered independently (*i.e.*, estimates for one element should not affect estimates for subsequent elements). Regardless of how unlikely a certain event may be, estimates of the likelihood of subsequent events must be based on the "nontrivial" (in the mathematical sense) situation. An example of a "trivial" situation would be that a particular event cannot occur because the previous event did not occur. For example, sub-element #1 asks for an estimate of the likelihood that a pest will survive shipment. This estimate only has meaning for pests that have survived any postharvest treatment (*i.e.*, the trivial case would lead to a likelihood estimate of 0% because there was no chance that the fruit were infested). Thus, Element #2 could be restated as... "For pests that survived to the shipping stage, what is the likelihood that the pest would survive shipment"? Note that the likelihood that fruit would be infested was considered already in Step 5.

Score each of the five Pest Opportunity elements on the following scale:

<b>Table 4. Likelihood Estimates for Risk Element #7.</b>		
<b>Likelihood</b>		<b>Score</b>
<b>Low</b>	= less than 0.1% = less than one in a thousand	1
<b>Medium</b>	= between 0.1% and 10% = between one in a thousand and one in ten	2
<b>High</b>	= greater than 10% = greater than one in ten	3

**Likelihood of Introduction: Cumulative Risk Element Score**

Rate the Likelihood of Introduction by adding together the score for RE #6 (Quantity of Commodity Imported, possible score of 1-3) and the cumulative score for the five sub-elements of RE #7 (Pest Opportunity, possible totals for RE #7 range from 5 to 15). Possible total scores for Likelihood of Introduction range from 6 to 18. The cumulative score for RE #6 and RE #7 (*i.e.*, the "Likelihood of Introduction Risk Score" and therefore also the "Risk Rating") is considered to be an indicator of the likelihood that a particular pest would be introduced. Rate the Likelihood of Introduction as shown in the Table below:

<b>Table 5. Risk: Likelihood of Introduction (Sum: RE #6 &amp; #7)</b>		
<b>Cumulative Risk Element Score</b>	<b>Risk Rating</b>	<b>Risk Score</b>
6 - 9	Low	1
10 - 13	Medium	2
14 - 18	High	3

**Step 9. Conclusion/Pest Risk Potential: Pests Requiring Phytosanitary Measures**

Produce estimates of the pest risk potential (PRP) for each quarantine pest selected for further analysis. The PRP for each pest is estimated by adding together the Consequences of Introduction Risk Score (1-3) and the Likelihood of Introduction Risk Score (1-3). Possible values and interpretation of the meaning of particular PRP values is as follows:

<b>Table 6. Pest Risk Potential</b>	
<b>Score (Consequences of Introduction Score + Likelihood of Introduction Score)</b>	<b>Rating</b>
2	Low
3 - 4	Medium
5 - 6	High

Following assignment of PRP's, the risk assessor may comment briefly on risk management options associated with the requested commodity importations. The following guidelines are offered as an interpretation of the low, medium and high PRP ratings:

**Low:** Pest will typically not require specific mitigations measures, the port-of-entry inspection to which all imported commodities are subjected can be expected to provide sufficient phytosanitary security.

**Medium:** Specific phytosanitary measure may be necessary.

**High:** Specific phytosanitary measures are strongly recommended. Port-of-entry inspection is not considered sufficient to provide phytosanitary security.

Detailed examination and choice of appropriate sanitary and phytosanitary measures to mitigate pest risk for pests with particular pest risk potential scores or ratings is undertaken as part of the pest risk management phase and is not discussed in this document. The appropriate risk management strategy for a particular pest depends on the risk posed by that pest. APHIS' risk management programs are risk based and their nature depends on the availability of appropriate methods. Details of APHIS' risk management programs are described primarily in the *Federal Register* in the form of quarantine notices.

## References

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- L. Redmond, Plant Pathologist
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- R. Stewart, Entomologist

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- R. Griffin, Planning and Risk Analysis Systems, Planning and Policy Development
- C. Miller, Planning and Risk Analysis Systems, Planning and Policy Development



Special Requirements  
Pest Risk Analysis  
7 CFR 319.37

Subpart - Nursery Stock, Plants, Roots, Bulbs, Seeds, and Other Plant Products

Sec. 319.37-8 -- Growing Media

\* \* \* \* \*

(g) Pest risk evaluation standards for plants established in growing media. When evaluating a request to allow importation of additional taxa of plants established in growing media, the Animal and Plant Health Inspection Service will conduct the following analysis in determining the pest risks associated with each requested plant article and in determining whether or not to propose allowing importation into the United States of the requested plant article.

(1) Collect commodity information.

(i) Determine the kind of growing medium, origin and taxon of the regulated article.

(ii) Collect information on the method of preparing the regulated article for importation.

(iii) Evaluate history of past plant pest interceptions or introductions (including data from plant protection services of foreign countries) associated with each regulated article.

(2) Catalog quarantine pests. For the regulated article specified in an application, determine what plant pests or potential plant pests are associated with the type of plant from which the regulated article was derived, in the country and locality of origin. A plant pest that meets one of the following criteria is a quarantine pest and will be further evaluated in accordance with paragraph (g)(3) of this section:

(i) Non-indigenous plant pest not present in the United States;

(ii) Non-indigenous plant pest, present in the United States and capable of further dissemination in the United States;

(iii) Non-indigenous plant pest that is present in the United States and has reached probable limits of its ecological range, but differs genetically from the plant pest in the United States in a way that demonstrates a potential for greater damage potential in the United States;

(iv) Native species of the United States that has reached probable limits of its ecological range, but differs genetically from the plant pest in the United States in a way that demonstrates a potential for greater damage potential in the United States; or

(v) Non-indigenous or native plant pest that may be able to vector another plant pest that meets one of the criteria in (g)(2)(i) through (iv) of this section.

(3) Conduct individual pest risk assessments. Each of the quarantine pests identified by application of the criteria in paragraph (g)(2) of this section will be evaluated based on the following estimates:

(i) Estimate the probability the quarantine pest will be on, with, or in the regulated article at the time of importation;

(ii) Estimate the probability the quarantine pest will survive in transit on the regulated article and enter the United States undetected;

(iii) Estimate the probability of the quarantine pest colonizing once entered into the United States;

(iv) Estimate the probability of the quarantine pest spreading beyond the colonized area; and

(v) Estimate the actual and perceived economic, environmental and social damage that would occur if the quarantine pest is introduced, colonizes, and spreads.

(4) Determine overall estimation of risk based on compilation of component estimates. This step will evaluate whether the pest risk of importing a regulated article established in growing media, as developed through the estimates of paragraph (g)(3) of this section, is greater than the pest risk of importing the regulated article with bare roots as allowed by Sec. 319.37-8(a).

(i) If the pest risk is determined to be the same or less, the regulated article established in growing media will be allowed importation under the same conditions as the same regulated article with bare roots.

(ii) If the pest risk is determined to be greater for the regulated article established in growing media, APHIS will evaluate available mitigation measures to determine whether they would allow safe importation of the regulated article. Mitigation measures currently in use as requirements of this subsection, and any

other mitigation methods relevant to the regulated article and plant pests involved, will be compared with the individual pest risk assessments in order to determine whether requiring particular mitigation measures in connection with importation of the regulated article would reduce the pest risk to a level equal to or less than the risk associated with importing the regulated article with bare roots as allowed by Sec. 319.37-8(a). If APHIS determines that use of particular mitigation measures could reduce the pest risk to this level, and determines that sufficient APHIS resources are available to implement or ensure implementation of the appropriate mitigation measures, APHIS will propose to allow importation into the United States of the requested regulated article if the appropriate mitigation measures are employed.

\* \* \* \* \*

Special Requirements  
Pest Risk Analysis

-----  
7CFR 319.40  
IMPORTATION OF LOGS, LUMBER,  
AND OTHER UNMANUFACTURED WOOD ARTICLES  
-----

- Sec. 319.40-1 Definitions.
- 319.40-2 General prohibitions and restrictions; relation to other regulations.
- 319.40-3 General permits; articles that may be imported without a specific permit; articles that may be imported without either a specific permit or an importer document.
- 319.40-4 Application for a permit to import regulated articles; issuance and withdrawal of permits.
- 319.40-5 Importation and entry requirements for specified articles.
- 319.40-6 Universal importation options.
- 319.40-7 Treatments and safeguards.
- 319.40-8 Processing at facilities operating under compliance agreements.
- 319.40-9 Inspection and other requirements at port of first arrival.
- 319.40-10 Costs and charges.
- 319.40-11 Plant pest risk assessment standards.**

\* \* \* \* \*

**Sec. 319.40-11 Plant pest risk assessment standards.**

When evaluating a request to import a regulated article not allowed importation under this subpart, or a request to import a regulated article under conditions other than those prescribed by this subpart, APHIS will conduct the following analysis to determine the plant pest risks associated with each requested importation in order to determine whether or not to issue a permit under this subpart or to propose regulations establishing conditions for the importation into the United States of the regulated article.

**(a) Collecting commodity information.**

(1) APHIS will evaluate the application for information describing the regulated article and the origin, processing, treatment, and handling of the regulated article; and

(2) APHIS will evaluate history of past plant pest interceptions or introductions (including data from foreign countries) associated with the regulated article.

**(b) Cataloging quarantine pests.** For the regulated article specified in an application, APHIS will determine what plant pests or potential plant pests are associated with the type of tree from which the regulated article was derived, in the country and locality from which the regulated article is to be exported. A plant pest that meets one of the following criteria is a quarantine pest and will be further evaluated in accordance with paragraph (c) of this section:

(1) Non-indigenous plant pest not present in the United States;

(2) Non-indigenous plant pest, present in the United States and capable of further dissemination in the United States;

(3) Non-indigenous plant pest that is present in the United States and has reached probable limits of its ecological range, but differs genetically from the plant pest in the United States in a way that demonstrates a potential for greater damage potential in the United States;

(4) Native species of the United States that has reached probable limits of its ecological range, but differs genetically from the plant pest in the United States in a way that demonstrates a potential for greater damage potential in the United States; or

(5) Non-indigenous or native plant pest that may be able to vector another plant pest that meets one of the criteria in paragraphs (b) (1) through (4) of this section.

**(c) Determining which quarantine pests to assess.**

(1) APHIS will divide quarantine pests identified in paragraph (b) of this section into groups depending upon where the plant pest is most likely to be found. The plant pests would be grouped as follows:

- (i) Plant pests found on the bark;
- (ii) Plant pests found under the bark; and
- (iii) Plant pests found in the wood.

(2) APHIS will subdivide each of the groups in paragraph (c) (1) of this section into associated taxa.

(3) APHIS will rank the plant pests in each group in paragraph (c) (2) of this section according to plant pest risk, based on the available biological information and demonstrated plant pest importance.

(4) APHIS will identify any plant pests ranked in paragraph (c) (3) of this section for which plant pest risk assessments have previously been performed in accordance with this section. APHIS will conduct individual plant pest risk assessments for the remaining plant pests, starting with the highest ranked plant pest(s) in each group.

(5) The number of plant pests in each group to be evaluated through individual plant pest risk assessment will be based on biological similarities of members of the group as they relate to measures taken in connection with the importation of the regulated article to mitigate the plant pest risk associated with the regulated article. For example, if the plant pest risk assessment for the highest ranked plant pest indicates a need for a mitigation measure that would result in the same reduction of risk for other plant pests ranked in the group, the other members need not be subjected to individual plant pest risk assessment.

**(d) Conducting individual plant pest risk assessments.**

APHIS will evaluate each of the plant pests identified in

paragraph (c) (4) of this section by:

(1) Estimation of the probability of the plant pest being on, with, or in the regulated article at the time of importation;

(2) Estimation of the probability of the plant pest surviving in transit on the regulated article and entering the United States undetected;

(3) Estimation of the probability of the plant pest colonizing once it has entered into the United States;

(4) Estimation of the probability of the plant pest spreading beyond any colonized area; and

(5) Estimation of the damage to plants that could be expected upon introduction and dissemination within the United States of the plant pest.

**(e) *Estimating unmitigated overall plant pest risk.*** APHIS will develop an estimation of the overall plant pest risk associated with importing the regulated article based on compilation of individual plant pest risk assessments performed in accordance with paragraph (d) of this section.

**(f) *Evaluating available requirements to determine whether they would allow safe importation of the regulated article.*** The requirements of this subpart, and any other requirements relevant to the regulated article and plant pests involved, will be compared with the individual plant pest risk assessments in order to determine whether particular conditions on the importation of the regulated article would reduce the plant pest risk to an insignificant level. If APHIS determines that the imposition of particular conditions on the importation of the regulated article could reduce the plant pest risk to an insignificant level, and determines that sufficient APHIS resources are available to implement or ensure implementation of the conditions, APHIS will implement rulemaking to allow importation of the requested regulated article under the conditions identified by the plant pest risk assessment process.

\* \* \* \* \*

# ***FAO CHECKLIST***

## ***CPRA Version 1.0***

**INSTRUCTIONS:** All numbered blocks (*e.g.*, 1, 5a) must be checked. When a numbered block is followed by two or more blocks with upper case letter designations, check only one of the blocks. Other blocks should be checked only if appropriate.

References in parenthesis (*Ref. 1.0*) refer back to the *International Standards For Phytosanitary Measures, Section 1-Import Regulations, Guidelines For Pest Risk Analysis, Draft Standards, Annex 2.*

### **Stage 1. Initiating the PRA process**

- 1**  **Determine why the PRA was initiated** (check this block only after checking either block A or B). (*Ref. 1.0*)

Why was the PRA initiated (check either Pathway [A] or Pest [B]).

- A**  **Pathway:** PRA initiated by identification of a potential pathway for introduction of plant pests (the pathway may concern a single area of origin or several areas of origin)? (*Ref. 1.1*)

What was/were the identified pathway(s) (check all that apply, but check at least one item if block 1a is checked)?

- by initiation of trade in a new commodity
- by initiation of trade in a commodity from a new origin
- by a request for import
- by the appearance in trade of consignments of a commodity
- by new plant species imported for selection and scientific research purposes
- by identification of a pathway other than an imported commodity:
  - natural spread
  - mail
  - garbage
  - passengers' baggage
  - other \_\_\_\_\_
- a policy decision is taken to establish or revise phytosanitary regulations or requirements concerning specific commodities
- a new treatment, system or process, or new information impacts on an earlier decision
- other \_\_\_\_\_

- B**  **Pest:** PRA initiated by concern with a particular pest. IF this block (1b) has been checked, examine the following list and check all that apply. (*Ref. 1.2*)
- an emergency arises on discovery of an established infestation or an outbreak of a new pest within a PRA area
  - an emergency arises on interception of a new pest on an imported commodity
  - a new pest risk is identified by scientific research
  - a pest is introduced into a new area other than the PRA area
  - a pest is reported to be more damaging in a new area other than the PRA area itself, than in its area of origin
  - audits reveal that a particular pest is repeatedly intercepted
  - a request is made to import, as such, an organism, for example by researchers, educators, biological practitioners, businesses (pet store owners), the food industry (snails for consumption) or hobbyists (aquatic plants for aquaria)
  - a policy decision is taken to revise phytosanitary regulations or requirements concerning specific pests
  - a proposal is made by another country or by an international organization (RPPO, FAO)
  - a new treatment system, process, or new information impacts on an earlier decision
- 2**  **Identify pests** (check this item only after checking either block A or B). (*Ref. 1.4*)
- A**  For pest-initiated PRA, list the pests.
  - B**  For pathway-initiated PRA, complete a list of *potential* quarantine pests for the pathway.
- 3**  **Pertinent PRA's completed previously were identified and cited.** (*Ref. 1.3*)

## Stage 2: Pest Risk Assessment

- 4□ **Verify Quarantine status of pests: Quarantine status of pest verified with regard to geographic and regulatory criteria.** (*Ref. 2.1*) Evidence is provided relative to all criteria for quarantine pest status as evidenced by the assemblage of data Blocks 4a, 4b and 4c must all be completed and checked before checking block 4. The pest is:
- 4a□ “of potential economic importance to the area endangered thereby and not yet present there?”
- 4b□ “not yet present there” OR, is “present but not widely distributed and being officially controlled?”
- 4c□ The geographical and regulatory criteria in the quarantine pest definition have been considered as evidenced by the assemblage of data addressing whether the pest (check only those that apply):
- “is present in the PRA area and has reached the limits of its ecological range (i.e. is widely distributed), then the pest does not satisfy the definition of a quarantine pest and the PRA for the pest stops at this point)”
  - “is present in the PRA area and has not reached the limits of its ecological range (i.e. is not widely distributed), and the pest is subjected to official control in the PRA area, then the pest satisfies this aspect of the definition of a quarantine pest”
  - “is not widely distributed but is under consideration of future official control in the PRA area, then the PRA will determine whether the pest should be placed under official control. If the conclusion is reached that the pest should be subject to official control, then the pest satisfies this aspect of the definition of the definition of a quarantine pest”
  - “is not widely distributed but is not subject to official control or consideration of future official control in the PRA area, then the pest does not satisfy the definition of a quarantine pest and the PRA for the pest stops at this point”
  - “is absent from the PRA area, then it satisfies this aspect of the definition of a quarantine pest”

5.  **Verify Quarantine Status of Pests: Quarantine status of pest verified with regard to the economic importance criteria in the quarantine pest definition have been considered adequately. (Ref. 2.1)** Blocks 5a, 5b and 5c must all be completed and checked before checking block 5.

5a  Data have been gathered demonstrating the potential of the pest for establishment in the PRA area (if the pest has no potential for establishment in the PRA area the PRA stops at this point). (Ref. 2.2.1) Evidence exists to support the finding that (all of the following must be checked before checking block 5a):

5a1  suitable hosts are available (in terms of quantity and distribution of hosts) in PRA area

5a2  the environment in the PRA area is suitable for the pest

5a3  there is potential for adaptation of the pest

5a4  the pest's reproductive strategy is consistent with establishment of the pest

5a5  the pest's has potential to survive in the PRA area

5a6  other (if none, write none and this check block) \_\_\_\_\_

5b  Data have been gathered to support the potential for the pest to spread after its establishment. (Ref. 2.2.2) Evidence exists to support the finding as indicated below. Consider each of the following and check all that apply but at least one must be checked before checking block 5b:

the natural and/or managed environment is suitable for natural spread of the pest

movement with commodities or conveyances

intended use of the commodity

potential vectors of the pest in the PRA area

potential natural enemies of the pest in the PRA area

other (if none, write none and check block) \_\_\_\_\_

5c  Data have been gathered to support the potential economic importance of the quarantine pest. (Ref. 2.2.3) Evidence exists to support this finding with respect to (check all that apply but at least one must be checked before checking block 5c):

type of damage

crop losses

loss of export markets

increases in control costs

effects on ongoing IPM programmes

environmental damage

capacity to act as a vector for other pests

perceived social costs such as unemployment

other \_\_\_\_\_

- 6**  **Introduction Potential.** The introduction potential of the pests have been considered adequately. (*Ref. 2.3*) Blocks 6a and 6b must both be completed and checked before checking block 6.
- 6a  **Entry:** Data have been gathered demonstrating the potential of the pest to enter the PRA area (if the pest has no potential to enter the PRA area the PRA stops at this point). Blocks 6a1, 6a2 and 6a3 must all be checked before checking block 6a. Evidence exists to support the finding that:
- 6a1  Pest has the potential to contaminate the commodities or conveyances.  
6a2  Pest has potential to survive under the environmental conditions of transport.  
6a3  Pest has potential to avoid being detected at entry inspection.
- If the PRA is pest-initiated, also consider each of the following but check only those blocks that apply:
- Pest has potential to enter the PRA area by natural means because of the frequency and quantity of natural pest movement into the PRA area.  
 Pest has potential to enter the PRA area by way of human-assisted movement because of the frequency and number of persons entering from another country at any given port of entry
- 6b  **Establishment:** Data have been gathered demonstrating the potential of the pest to become established in the PRA area (if the pest has no potential to establish in the PRA area the PRA stops at this point). Evidence exists to support the finding that (all of the following must be checked before checking block 6b):
- 6b1  The number and frequency of consignments of the commodity, OR, the number of individuals of a given pest associated with the means of conveyance, are sufficient to support pest establishment.  
6b2  The intended use of the commodity is consistent with pest establishment.  
6b3  The environmental conditions and availability of hosts at the destination and during transport in the PRA area are appropriate to support pest establishment.
- 7**  **Phytosanitary Measures.** All of the essential elements (*i.e.*, Blocks 4-6) have been considered and sufficient evidence exists to support the finding that sufficient risk is present to justify phytosanitary measures? (*Ref. 2,4*) If so proceed, otherwise stop at this point.

### Stage 3: Pest Risk Management

8□ **Risk Management.** The risk management stage was based on the information gathered in the pest risk assessment (stage 2). (*Ref. 3.0*) Blocks 8a, 8b, 8c, 8d and 8e must all be considered and checked before checking block 8.

8a□ A list of options for reducing risks to an acceptable level was assembled based on consideration of each of the following (each of the following blocks must be checked before checking Block 8a): (*Ref. 3.1*)

8a1□ Pest included on the list of prohibited pests

8a2□ Phytosanitary inspection and certification for the pest prior to export

8a3□ Requirements to be satisfied before export were defined with respect to (all must be checked before checking Block 8a3):

8a3a□ treatment

8a3b□ origin from pest-free area,

8a3c□ growing season inspection

8a3d□ certification scheme

8a3e□ other \_\_\_\_\_

8a4□ Requirements regarding inspection at entry

8a5□ Treatments at point of entry, inspection station, or at place of destination

8a6□ Detention in post-entry quarantine

8a7□ Post-entry measures (restrictions on use of commodity, control measures)

8a8□ Prohibition of entry of specific commodities from specific origins

8a9□ Other (if none, write none and this check block) \_\_\_\_\_

8b□ The efficacy and impact of the various options in reducing risks to an acceptable level were assembled and evaluated according to the following (all must be checked before checking Block 8b): (*Ref. 3.2*)

8b1□ Biological effectiveness

8b2□ Cost/benefit of implementation

8b3□ Impact on existing regulations

8b4□ Commercial impact

8b5□ Social impact

8b6□ Phytosanitary policy considerations

8b7□ Time to implement a new regulation

8b8□ Efficacy of option against other quarantine pests

8b9□ Environmental impact

8b0□ Other (if none, write none and this check block) \_\_\_\_\_

- 8c□ The “Minimal impact” principle was given consideration: “Phytosanitary measures shall be consistent with the pest risk involved, and shall represent the least restrictive measures available which result in the minimum impediment to the international movement of people, commodities, and conveyances?”  
(*Ref. 3.2*)
- 8d□ An option for reducing risk to an acceptable level was chosen. (*Ref. 3.3*)
- 8e□ The effectiveness of the option is being monitored. (*Ref. 3.3*)
- 9□ **The PRA was documented.** (*Ref. 3.4*)

(Document reformed 22 August 1995)

ANNEX 1

DRAFT STANDARD

# **INTERNATIONAL STANDARDS FOR PHYTOSANITARY MEASURES**

## **SECTION 1 — IMPORT REGULATIONS**

### **GUIDELINES FOR PEST RISK ANALYSIS**



Secretariat of the International Plant Protection Convention  
of the  
Food and Agriculture Organization of the United Nations  
Rome, 1995

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## REVIEW

This International Standard for Phytosanitary Measures is subject to periodic review and amendment.

The next review date is December 199-.

Amendments will be issued as necessary after endorsement by the FAO Conference.

## ENDORSEMENT

This International Standard for Phytosanitary Measures was approved by the 2-th Session of the FAO Conference, 199-.

Jacques Diouf  
Director-General  
Food and Agriculture Organization of  
the United Nations

## **AMENDMENT RECORD**

Amendments to this standard will be given a consecutive number and will be dated.

Standard holders should ensure that all amendments are inserted, obsolete pages removed and the record below is completed.

## **DISTRIBUTION**

This standard is distributed by the Secretariat of the International Plant Protection Convention to all FAO members, plus the Executive/Technical Secretariats of the Regional Plant Protection Organizations:—

- Asia and Pacific Plant Protection Commission
- Caribbean Plant Protection Commission
- Comité Regional de Sanidad Vegetal para el Cono Sur
- European and Mediterranean Plant Protection Organization
- Inter-African Phytosanitary Council
- Junta del Acuerdo de Cartagena
- North American Plant Protection Organization
- Organismo Internacional Regional de Sanidad Agropecuaria

## INTRODUCTION

### 1. SCOPE

This standard describes the process of pest risk analysis (PRA) for plant pests for the purpose of preparing phytosanitary regulations by National Plant Protection Organizations (NPPOs).

### 2. REFERENCES

FAO, 1990. Glossary of Phytosanitary Terms. FAO Plant Protection Bulletin 38(1):5-23.

FAO, 1992. International Plant Protection Convention

FAO, 1993. Principles of Plant Quarantine as Related to International Trade, 1993. Programme for Global Harmonization of Plant Quarantine. FAO Conference Paper C 93/25-Rev.1 November 1993.

### 3. DEFINITIONS AND ABBREVIATIONS

Area	An officially defined country, part of a country or all or parts of several countries.
Endangered area	An area where ecological factors favour the establishment of a pest whose presence in the area will result in an economically important loss.
Entry (of a pest)	Movement of a pest into an area where it is not yet present, or present but not widely distributed and being officially controlled.
Entry potential	Likelihood of the entry of a pest.
Establishment	Perpetuation, for the foreseeable future, of a pest within an area after entry.
Establishment potential	Likelihood of the establishment of a pest.
Introduction	Entry of a pest resulting in its establishment.
Introduction potential	Likelihood of the introduction of a pest.
IPPC	International Plant Protection Convention, as deposited with FAO in Rome in 1951 and as subsequently amended.
National Plant Protection Organization (NPPO)	Official service established by a government to discharge the functions specified by the IPPC.
Official	Established, authorized or performed by a national plant protection organization.
Pest	Any species, strain or biotype of plant or animal, or any pathogenic agent, injurious to plants or plant products.

<b>Pest-free area</b>	An area in which a specific pest does not occur as demonstrated by scientific evidence and in which, where appropriate, this condition is being officially maintained.
<b>Pest Risk Analysis</b>	Pest risk assessment and pest risk management.
<b>Pest risk assessment</b>	Determination of whether a pest is a quarantine pest and evaluation of its introduction potential.
<b>Pest risk management</b>	The decision-making process of reducing the risk of introduction of a quarantine pest.
<b>Phytosanitary measure</b>	Any legislation, regulation or official procedure having the purpose to prevent the introduction and/or spread of quarantine pests.
<b>Phytosanitary regulation(s)</b>	Official rules to prevent the introduction or spread of quarantine pests, by regulating the production, movement or existence of commodities or other articles, or the normal activity of persons, and by establishing schemes for phytosanitary certification.
<b>PRA</b>	Pest Risk Analysis.
<b>PRA area</b>	Area in relation to which a Pest Risk Analysis is conducted.
<b>Quarantine pest</b>	A pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled. (Subject to formal amendment of the IPPC.)
<b>Spread</b>	Expansion of the geographical distribution of a pest within an area.
<b>Spread potential</b>	Likelihood of the spread of a pest.

#### **4. OUTLINE OF REQUIREMENTS**

Pest Risk Analysis consists of three stages: initiating the process for analyzing risk, assessing pest risk, and managing pest risk. (See Figures 1-3.)

Initiating the process involves identification of pests or pathways for which the PRA is needed. Pest risk assessment determines whether each pest identified as such, or associated with a pathway, is a quarantine pest, characterized in terms of likelihood of entry, establishment, spread and economic importance. Pest risk management involves developing, evaluating, comparing and selecting options for reducing the risk.

PRA is only meaningful in relation to a defined "PRA area" considered to be at risk. This is usually a country, but can also be an area within a country, or an area covering all or parts of several countries (e.g. the area covered by a Regional Plant Protection Organization).

## GENERAL REQUIREMENTS

### 1. STAGE 1: INITIATING THE PRA PROCESS

There are generally two initiation points for a PRA (Fig. 1):

- the identification of a pathway, usually an imported commodity, that may allow the introduction and/or spread of quarantine pests.
- the identification of a pest that may qualify as a quarantine pest.

Either can involve pests already present in the PRA area but not widely distributed and being officially controlled, as well as pests absent from the PRA area, since both are covered by the quarantine pest definition.

#### 1.1 PRA Initiated by a Pathway

A requirement for a new or revised PRA originating from a specific pathway will most frequently arise in the following situations:

- International trade is initiated in a new commodity (usually a plant or plant product) or a commodity from a new origin. The PRA may be triggered by a request for import, or by the appearance in trade of consignments of a commodity. The pathway may concern a single area of origin or several.
- New plant species are imported for selection and scientific research purposes.
- A pathway other than commodity import is identified (natural spread, mail, garbage, passenger's baggage etc.).
- A policy decision is taken to establish or revise phytosanitary regulations or requirements concerning specific commodities.
- A new treatment, system or process, or new information impacts on an earlier decision.

The pests which are likely to follow the pathway (e.g. be carried by the commodity) are then listed, and each is then subjected to Stage 2 in the PRA process<sup>1</sup>. If no potential quarantine pests are identified as likely to follow the pathway, the PRA stops at this point.

#### 1.2 PRA Initiated by a Pest

A requirement for a new or revised PRA originating from a specific pest will most frequently arise in the following situations:

- An emergency arises on discovery of an established infestation or an outbreak of a new pest within a PRA area.
- An emergency arises on interception of a new pest on an imported commodity.
- A new pest risk is identified by scientific research.

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<sup>1</sup> The list of pests may be generated by any combination of databases, literature sources, or expert consultation. Once the list of pests has been established, it is preferable to prioritize it by using expert judgement before the next step. According to the results obtained, it may or may not be necessary to conduct a risk assessment on all pests on the list.

- A pest is introduced into a new area other than the PRA area.
- A pest is reported to be more damaging in a new area other than the PRA area itself, than in its area of origin.
- Audits reveal that a particular pest is repeatedly intercepted.
- A request is made to import, as such, an organism, for example by researchers, educators, biological practitioners, businesses (pet store owners), the food industry (snails for consumption) or hobbyists (aquatic plants for aquaria).
- A policy decision is taken to revise phytosanitary regulations or requirements concerning specific pests.
- A proposal is made by another country or by an international organization (RPPO), FAO).
- A new treatment system, process, or new information impacts on an earlier decision.

The specific pest identified is then subjected to Stage 2 in the PRA process.

### **1.3 Review of Earlier PRAs**

Prior to proceeding with a new PRA, a check should be made as to whether the pathway or pest has already been subjected to the PRA process, either nationally or internationally. If a PRA exists, its validity should be checked as circumstances may have changed. The possibility of using a PRA from a similar pathway or pest, that may partly or entirely replace the need for this PRA, should also be investigated.

### **1.4 Conclusion for Stage 1**

At the end of stage 1, pests have been identified as potential quarantine pests, individually or in association with a pathway.

## **2. STAGE 2: PEST RISK ASSESSMENT**

Stage 1 has identified a pest, or list of pests (in the case of initiation by a pathway), to be subjected to risk assessment. Stage 2 considers these pests individually (Fig. 2). It examines, for each, whether the criteria for quarantine pest status are satisfied:

"a pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled".

In this context, "area" should be understood to mean:

"an officially defined country, part of a country, or all or part of several countries",

and "endangered area" should be understood to mean;

"an area where ecological factors favour the establishment of a pest whose presence in the area will result in economically important loss"

In doing so, the PRA considers all aspects of each pest and in particular actual information about its geographical distribution, biology and economic importance. Expert judgement is then used to assess the establishment, spread and economic importance potential in the PRA area. Finally, the potential for introduction into the PRA area is characterized.

In characterizing the risk, the amount of information available will vary with each pest and the sophistication of the assessment will vary with available tools. For example, one country may have elaborate pest databases and geographical information systems, another may depend on books, printed soil maps, and climate maps. In some cases, virtually no information may be available, or research may be needed to obtain it. Assessments will be limited by the amount of information available on the biology of a particular pest. Countries where the pest is present may provide available information for the country conducting the PRA, on request.

## 2.1 Geographical and Regulatory Criteria

For each pest subjected to the PRA process, the geographical and regulatory criteria in the quarantine pest definition should be considered:

- If the pest is present in the PRA area and has reached the limits of its ecological range (i.e. is widely distributed), then the pest does not satisfy the definition of a quarantine pest and the PRA for the pest stops at this point.
- If the pest is present in the PRA area and has not reached the limits of its ecological range (i.e. not widely distributed), and the pest is subject to official control in the PRA area, then the pest satisfies this aspect of the definition of a quarantine pest.
- If the pest is not widely distributed but is under consideration of future official control in the PRA area, then the PRA will determine whether the pest should be placed under official control. If the conclusion is reached that the pest should be subject to official control, then the pest satisfies this aspect of the definition of the definition of a quarantine pest.
- If the pest is not widely distributed but is not subject to official control or consideration of future official control in the PRA area, then the pest does not satisfy the definition of a quarantine pest and the PRA for the pest stops at this point.
- If the pest is absent from the PRA area, then it satisfies this aspect of the definition of a quarantine pest.

## 2.2 Economic Importance Criteria

For potential economic importance to be expressed, a pest must become established and spread. Thus the risk of a pest, having entered, becoming established and spreading in the PRA area must be characterized. The factors to be considered are set out below<sup>2</sup>.

### 2.2.1 Establishment Potential

In order to estimate the establishment potential of a pest, reliable biological information (life cycle, host range, epidemiology, survival etc.) should be obtained from the areas where the pest currently occurs.

The situation in the PRA area can then be carefully compared with that in the areas where it currently occurs and expert judgement used to assess the establishment potential. Case histories concerning comparable pests can usefully be considered. Examples of the factors to consider are:

- Availability, quantity and distribution of hosts in the PRA area
- Environmental suitability in the PRA area

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<sup>2</sup> Fuller checklists of information which can usefully be considered in assessing the potential for establishment, spread and economic importance, are available from national and international sources.

- Potential for adaptation of the pest
- Reproductive strategy of the pest
- Method of pest survival

If a pest has no potential for establishment in the PRA area, then it does not satisfy the definition of a quarantine pest and the PRA for the pest stops at this point.

### **2.2.2 Spread Potential after Establishment**

In order to estimate spread potential of the pest, reliable, biological information should be obtained from areas where the pest currently occurs.

The situation in the PRA area can then be carefully compared with that in the areas where the pest currently occurs and expert judgement used to assess the spread potential. Case histories concerning comparable pests can usefully be considered. Examples of the factors to consider are:

- Suitability of the natural and/or managed environment for natural spread of the pest
- Movement with commodities or conveyances
- Intended use of the commodity
- Potential vectors of the pest in the PRA area
- Potential natural enemies of the pest in the PRA area

The information on spread potential is used to estimate how rapidly a pest's potential economic importance may be expressed within the PRA area. This also has significance if the pest is liable to enter and establish in an area of low potential economic importance and then spread to an area of high potential economic importance. In addition it may be important in the risk management stage (Figure 3) when considering the ease with which an introduced pest could be contained or eradicated.

### **2.2.3 Potential Economic Importance**

The next step in the PRA process is to determine whether the pest is of potential economic importance in the PRA area.

In order to estimate the potential economic importance of the pest, information should be obtained from areas where the pest currently occurs. For each of these areas, note whether the pest causes major, minor or no damage. Note whether the pest causes damage frequently or infrequently. Relate this, if possible, to biotic and abiotic effects, particularly climate.

The situation in the PRA area can then be carefully compared with that in the areas where the pest currently occurs. Case histories concerning comparable pests can usefully be considered. Expert judgement is then used to assess the potential for economic importance. Examples of the factors to consider are:

- Type of damage
- Crop losses
- Loss of export markets
- Increases in control costs
- Effects on ongoing Integrated Pest Management (IPM) programmes
- Environmental damage
- Capacity to act as a vector for other pests

- Perceived social costs such as unemployment

If a pest has no potential economic importance in the PRA area, then it does not satisfy the definition of a quarantine pest and the PRA for the pest stops at this point.

### 2.3 Introduction Potential

The final stage of assessment concerns the introduction potential which depends on the pathways from the exporting country to the destination, and the frequency and quantity of pests associated with them. Documented pathways for the pest to enter new areas should be noted. Potential pathways which may not currently exist should be assessed if known.

The following is a partial checklist that may be used to estimate the introduction potential divided into those factors which may affect the likelihood of entry and those factors which may affect the likelihood of establishment.

#### Entry

- Opportunity for contamination of commodities or conveyances by the pest
- Survival of the pest under the environmental conditions of transport
- Ease or difficulty of detecting the pest at entry inspection
- Frequency and quantity of pest movement into the PRA area by natural means
- Frequency and number of persons entering from another country at any given port of entry

#### Establishment

- Number and frequency of consignments of the commodity
- Number of individuals of a given pest associated with the means of conveyance
- Intended use of the commodity
- Environmental conditions and availability of hosts at the destination and during transport in the PRA area.

### 2.4 Conclusion for Stage 2

If the pest satisfies the definition of a quarantine pest, expert judgement should be used to review the information collected during Stage 2 to decide whether the pest has sufficient economic importance and introduction potential, i.e. sufficient risk, for phytosanitary measures to be justified. If so, proceed to stage 3; if not, the PRA for the pest stops at this point<sup>3</sup>.

## 3. STAGE 3: PEST RISK MANAGEMENT

Pest risk management (Fig. 3) to protect the endangered areas should be proportional to the risk identified in the pest risk assessment. In most respects it can be based on the information gathered in the pest risk assessment. Phytosanitary measures should be applied to the minimum area necessary for the effective protection of the endangered area.

### 3.1 Risk Management Options

A list of options for reducing risks to an acceptable level should be assembled. These options will primarily concern pathways and in particular the conditions for permitting entry of commodities. Examples of the options to consider are:

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<sup>3</sup> Decision-making schemes, or expert systems, may be useful at this stage to assist expert judgement.

- Inclusion in list of prohibited pests
- Phytosanitary inspection and certification prior to export
- Definition of requirements to be satisfied before export (eg. treatment, origin from pest-free area, growing season inspection, certification scheme)
- Inspection at entry
- Treatment at point of entry, inspection station or, if appropriate, at place of destination
- Detention in post-entry quarantine
- Post-entry measures (restrictions on use of commodity, control measures)
- Prohibition of entry of specific commodities from specific origins

They may also, however, concern ways of reducing the risk of damage, for example, introduction of a biological control agent, or ease of eradication or containment.

### 3.2 Efficacy and Impact of the Options

The efficacy and impact of the various options in reducing risk to an acceptable level should be evaluated, in terms of the following factors:

- Biological effectiveness
- Cost/benefit of implementation
- Impact on existing regulations
- Commercial impact
- Social impact
- Phytosanitary policy considerations
- Time to implement a new regulation
- Efficacy of option against other quarantine pests
- Environmental impact

The positive and negative aspects of the options should be specified. While it is recognized that countries according to the sovereignty principle may exercise their sovereign right to utilize phytosanitary measures, countries should also take particular note of the "Minimal impact" Principle: *Phytosanitary measures shall be consistent with the pest risk involved, and shall represent the least restrictive measures available which result in the minimum impediment to the international movement of people, commodities and conveyances.* Article VI.2(f) of the International Plant Protection Convention makes a similar but less comprehensive provision. Phytosanitary measures recommended should be based on all of the above factors.

In order to determine which options are appropriate, it may be advisable to communicate with interested and affected groups within and outside the PRA area.

### **3.3 Conclusion for Stage 3**

At the end of Stage 3, the appropriate phytosanitary measures concerning the pest or pathway have been decided. Completion of Stage 3 is essential; it is in particular not justified to complete only Stages 1-2 and then take phytosanitary measures without proper assessment of risk management options. After implementation of the phytosanitary measures, their effectiveness should be monitored and the risk management options should be reviewed, if necessary.

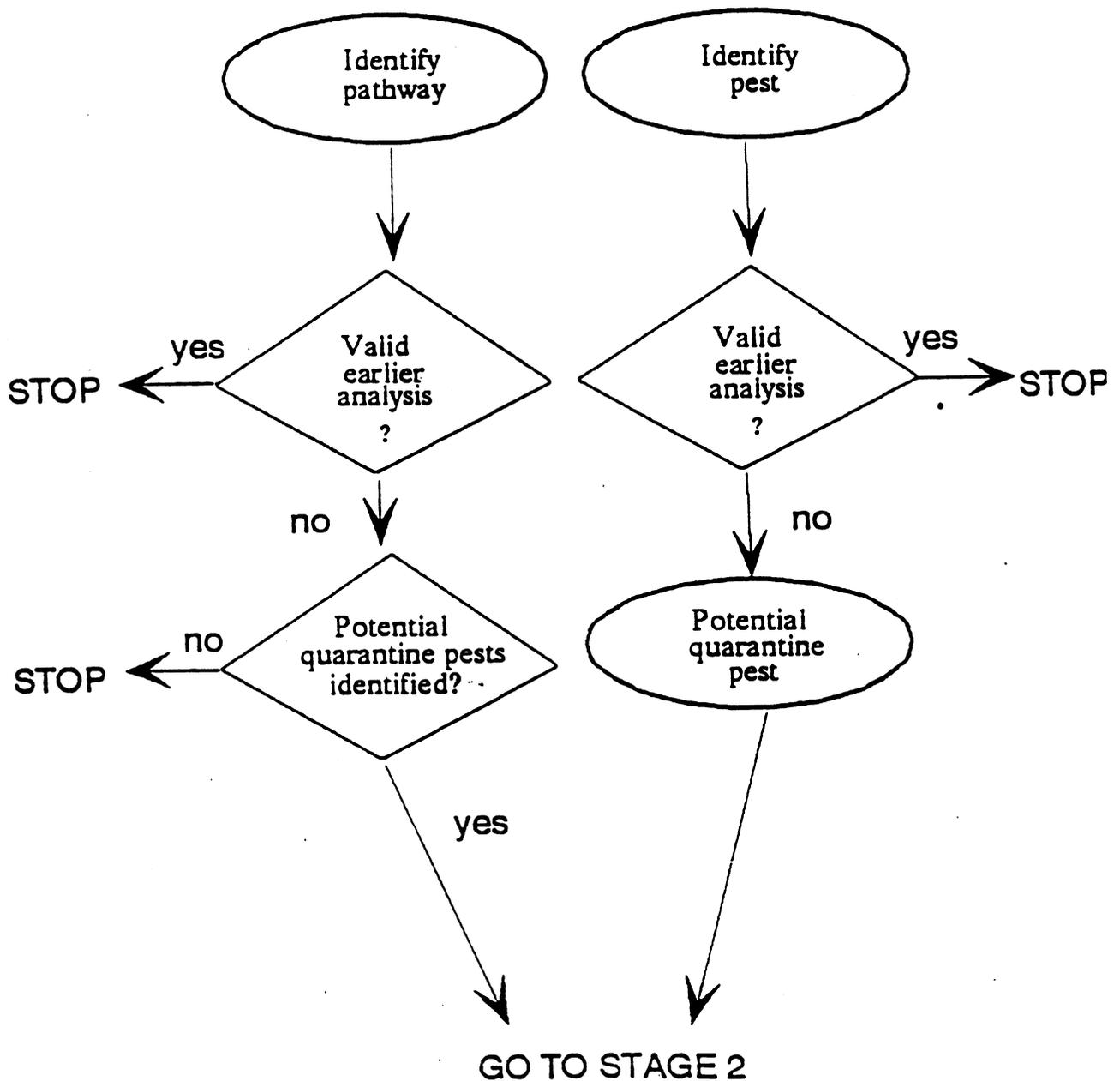
## **4. DOCUMENTING THE PRA PROCESS**

A PRA should be sufficiently documented so that when a review or a dispute arises, the PRA will clearly state the sources of information and the rationales used in reaching a management decision regarding phytosanitary measures taken or to be taken.

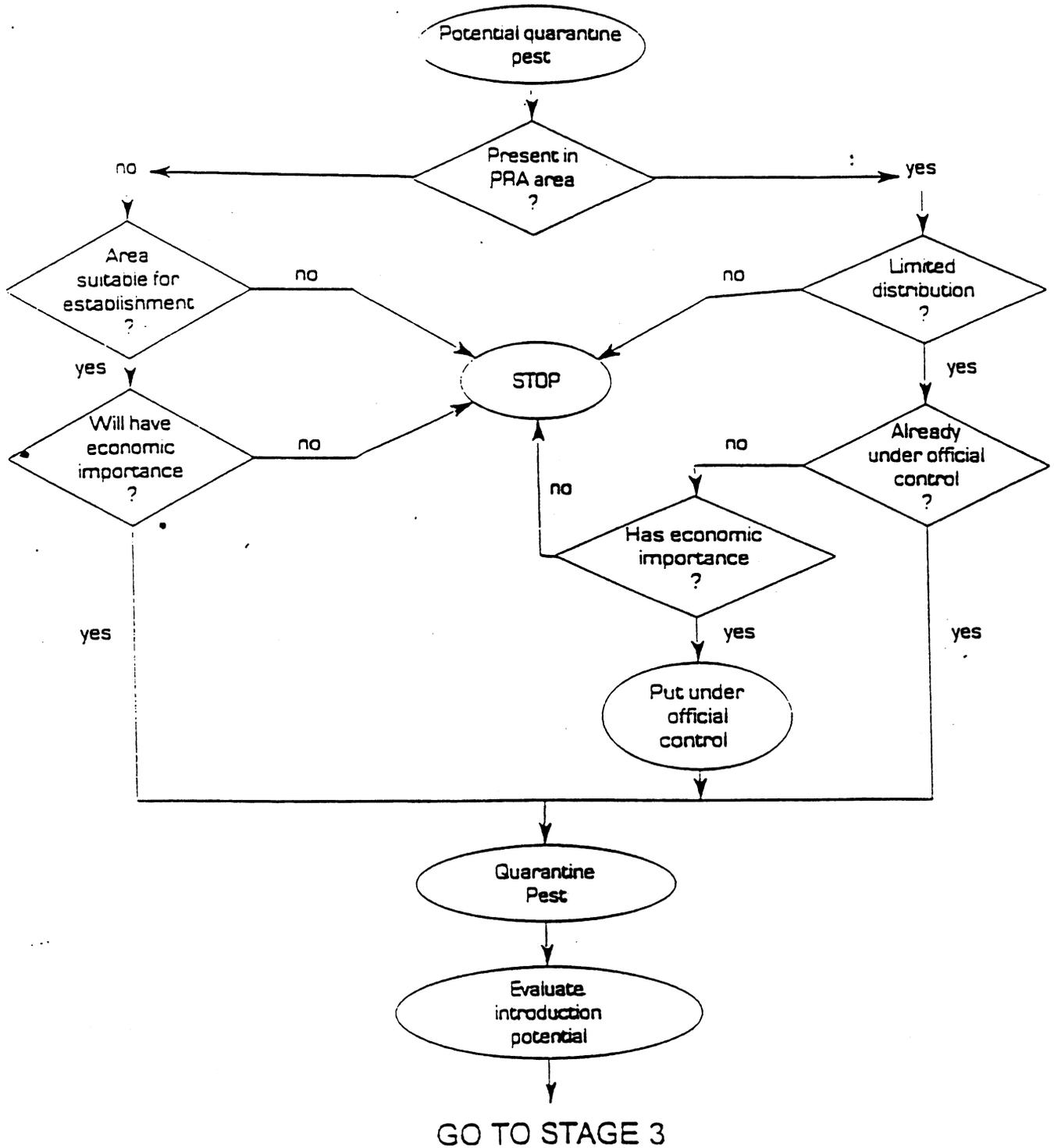
## FIGURE 1

## PEST RISK ANALYSIS

## Stage 1: Initiation



**FIGURE 2**  
**PEST RISK ANALYSIS**  
**Stage 2: Assessment**

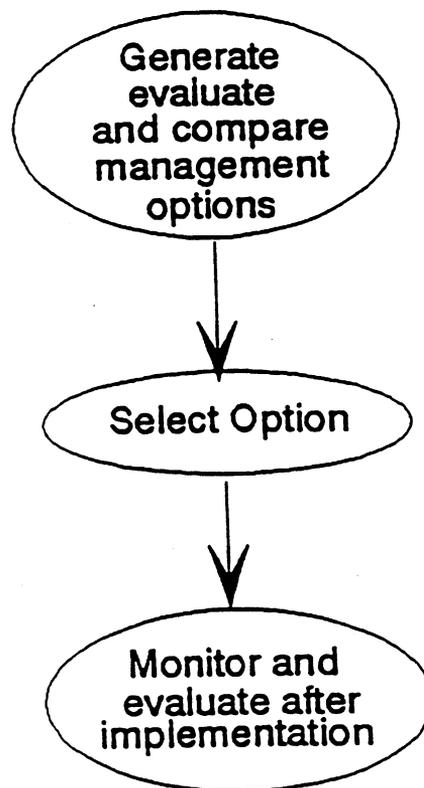


# FIGURE 3

## PEST RISK ANALYSIS

### Stage 3: Management

from stage 2



## **Appendix IV. Pest Risk Analysis Quality Control Standard.**

### **A. Scope**

These standards are to be used to help plan and monitor the performance of pest risk analyses, and to measure the quality of completed PPRA's. It is intended as a guide for content as well as style and format.

### **B. Application**

These standards may be applied to any risk analysis regardless of the methodological approach employed to conduct the risk analysis. Methods often are intermingled, depending upon the issue. These methods estimate risk either qualitatively or quantitatively. Other methods are purely descriptive and therefore are generally in text form. Following is a description of three broad methodological approaches to risk analysis:

- (1) **Professional judgement-** technical experts provide their best estimate of the probability of a hazardous event (such as but not limited to the probability of a quarantine pest entering the US, establishing itself, and dispersing unchecked) and the magnitude and nature of its impacts (i.e. economically as yield loss, crop loss, job loss, or noneconomical expressions of a reduction in value). This approach may rely heavily on precedent.
- (2) **Precedent-** historical precedents are researched and used to assess and develop options to mitigate risk, often by comparison to historical events and actions to mitigate similar risks. This approach does not necessarily require experts; however, if experts were to be consulted, this would tend towards the professional judgement approach.
- (3) **Formal analysis-** a theoretical framework is used to characterize discrete events and dependencies of data (often by using mathematics, statistics, and/or simulation) in order to test assumptions and assess as accurately and precisely as possible the probability of hazardous events occurring and the magnitude of the events, and to identify options to lessen net risk at susceptible control points.

### **C. Checklist for Content**

The PPRA should strive to address the following factors. The quality of the completed PPRA should be evaluated by peer reviewers based on these same factors.

1. **Comprehensiveness**
  - state need for PPRA and its scope in detail
  - state what interest group or individual requested the PPRA

- state objectives (what is the reason for this PPRA)
- describe the background in sufficient detail
- state relevant risk policy of APHIS and industry
- provide dates and copies of last economic analysis for:
  - the regulatory flexibility analysis which, among other things, analyzes the potential impact to society of any subsequent requirement for a regulation, and
  - the analysis of the potential economic impact of those pests identified in the PPRA as ones which may enter and establish in particular areas of the US if left unmitigated
- give dates of last assessment(s)
- provide citations for all sources of information, including literature references, unpublished studies, names of experts consulted, copies of personal communication letters are included, etc.
- address risk mitigation options
  - specify **objectives** by which to measure desirability of consequences
  - define the possible **options**, including "do nothing"
  - identify possible **consequences** of each option and their likelihood of occurring should that option be adopted, including but not limited to risk consequences
  - specify the **desirability** of the various consequences
- realistically appraise human failing confronting the decision-making and decision-implementing process
- assess the quality of the PPRA's conclusions
- address the degree of flexibility of the analysis with respect to the ease in which new information could be included and a reanalysis conducted
- acknowledge the labile or conflicting nature of social values
- identify, if appropriate, the social implications of the risk management options
- where conflicts exist in data, the PPRA shall suggest a potential means of resolving the conflicting information through a reasonable interpretation of the data or suggest experimentation required to do so

2. Logically sound

- the PPRA should present a timely and logically defensible summary
- the PPRA process should be:
  - sensitive to different aspects of the problem
  - reliable
  - justifiable
  - suitable
  - unbiased

- the PPRA document should be peer reviewed, all reviewer's (anonymous to all but APHIS, as specified in the guideline) comments attached, and reasoning for how the comments either were or were not factored into the final PPRA
  
- 3. Practical and Compatible With APHIS' Administrative Procedures
  - PPRA methods should provide a meaningful analysis of risks and evaluation of the efficacy of potential mitigation measures
  - the PPRA should be compatible with APHIS' decision making processes and its capabilities to implement decisions with real people, Agency Directives and procedures, and resource constraints
  - the PPRA, including its comparison of potential mitigation measures, should not be too grand or too small in scope so as to hamper APHIS' ability to meaningfully use the PPRA
  
- 4. Transparent Evaluations, Actions, and Decisions:
  - the PPRA should leave a clear record of deliberations and assumptions to facilitate evaluation and accumulate knowledge
  - final approach should educate participants and build up its own record of precedents
  - it should provide a two-way communication between scientists and decision-makers to improve understanding of one another's problems and uncertainties
  - it should be intelligible to lay observers in order to enhance their ability to follow the process and develop expertise in the issue at hand as well as the subtleties of acceptable-risk questions in general
  - it should have enough scope to be used on many problems so that users can acquire an in depth understanding of technique rather than a superficial grasp of various "fad" methods
  - appraise human failing confronting the decision making and decision-implementing process
  - identify the approach to interpreting data (ie. professional opinion and historical precedent)
  - identify how the approach could be improved given the resources and time
  - recommend where more resources in time and personnel are needed to thoroughly review the information sources and to interpret the data
  - spell-out uncertainty surrounding technical issues and how uncertainty was approached (formal, professional opinion, historical precedent)
  - identify assumptions and leaps of logic where appropriate, especially in cases where data are not existent and where extrapolations of limited data sets are performed
  - identify weakest links in logic so that data, if available in the future, may require us to modify our recommendation

- the assessment should be flexible to accommodate new information, especially from the analysis itself
- the assessment should be "open-ended" and accepting of new data
- the flow of data interpretation should be well identified so that new information can be incorporated easily into the assessment
- the assessment should not make pre-conceived determinations so that as new data become available they are ignored
- the assessment should be able to be tested if "field" data were available
- identify facts (biological pest and host data, physical descriptions of the environment, measurements from observation of nature and man's activities, etc.)
- identify opinion (non-robust extrapolations of data, non-data supported interpretations of real or potential events, etc.)
- the final approach should be self-evaluating in that follow-up studies are planned as part of the approach to monitor the effectiveness of the final decision
- the approach should be defined in sufficient detail so that the approach could be repeated with similar results as judged by the evaluation of outside reviewers

#### **D. Checklist for Style and Format**

The manuscript style of *Phytopathology* and *Plant Disease* (The American Phytopathological Society, 3340 Pilot Knob Road, St. Paul, MN 55121-2097) was partially used for the following:

1. The PPRA format should follow the example provided in **Appendix 11**.
2. All affiliations and addresses of experts consulted should be given, to the extent the experts gave permission to be cited.
3. All references should be in alphabetical order and numbered. Citations given in the text are given by number.
4. All "in press" articles have been accepted for publication, in order to be listed with other references (a copy of the first page of the galley proofs or a letter of acceptance should be included).
5. Copies of personal communication letters are included.
6. Standard International units are used (for length, mass, pressure, volume, etc.). Except for standard units of measurement (1 g, 9 days), words are used in the text for numbers one through nine.
7. Tables and figures are self-explanatory. Only one sentence is used in the title of a table (footnotes are used for other information).

8. Consistent style is used for all tables and figures. Authorities follow Latin binomials of primary organisms discussed the first time they are used, except no authorities are used for bacteria.
9. Nonstandard abbreviations are avoided.
10. Manufactures' names and addresses are listed in parentheses for proprietary materials, equipment, and computer programs identified in text (i.e., materials from which the manufacturer is the primary supplier; no manufacturer name is needed for materials that can be acquired from a number of vendors).
11. Technical jargon should be minimized in the summary of the PPRA so that lay readers will fully understand the scope of the PPRA and its findings. Clear, concise and short sentences shall be used.

Revised 16 May 1996

## Appendix V. Frequently Consulted References.

(This is a semi-comprehensive list at present, and will be reduced to a “commonly consulted” set after thorough discussion.)

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Barley

Beet

Corn

Cotton

Elm

Ornamental foliage plants

Pea

Peanut

Potato

Rhododendron and Azalea

Rice

Rose

Sorghum

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  - Draft Pest Risk Analysis, Economic Impact Assessment
  - Draft Pest Risk Analysis, Probability of Pest Introduction
  - Draft Pest Risk Analysis, Pest Management
  - Draft Guidelines for Survey and Monitoring Systems
  - Draft Inspection Methodology
  - Draft Phytosanitary Certification Administration
  - Draft Requirements for the Establishment of Pest Free Areas
  - Draft Information Management Systems

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Reformatted 15 May 1996

## Appendix VI. Conducting Information Searches.

All PPRA's should include the following:

1. Pertinent regulations of 7 CFR Chapter III and related PPRA's should be cited so that APHIS may appropriately modify them if necessary.
2. List names or titles of databases and published indexing and abstracting services that were consulted, and the period of coverage in month and years. Also record the medium used (on-line, CD-ROM, or published).
3. List keywords and search paradigms that were used in all electronic information searches.
4. List keywords and the time period of coverage in month and year for searches of the APHIS-PPQ Interception Database(s).

The following commercial sources should be consulted:

1. National Agricultural Library's index, *Bibliography of Agriculture* (printed), or its electronic equivalent, *AGRICOLA* (database available on-line or on CD-ROM with coverage beginning in 1970).
2. Commonwealth Agriculture Bureaux International's (CABI) printed abstracts, *Review of Plant Pathology* or *Review of Entomology, Series A, Agricultural*, and other subject-specific reviews or their combined electronic equivalent, *CABI Abstracts* (database available online or on CD-ROM with coverage beginning in 1972).

For locating more obscure organisms and information, the following sources may be consulted:

1. The printed *Biological Abstracts* and its electronic equivalent, *BIOSIS* (database available online or on CD-ROM with coverage beginning in 1969).
2. The Food and Agriculture Organization (FAO) of the United Nation's index, *AgriIndex* and its electronic equivalent, *AGRIS* (database available online with coverage beginning in 1975).
3. The printed *Zoological Abstracts* and its equivalent electronic format, *Zoological Record Online* (database available online coverage beginning in 1978).
4. Cambridge Scientific Abstracts' printed index, *Entomology Abstracts*, and its electronic equivalent is included with several other abstracting services in *Life Sciences Collection* (database available online with coverage beginning in 1978).

## **Appendix VII. Peer Review Performance Standard.**

- (1.) At least three peer reviewers should be chosen by APHIS to confidentially evaluate the technical merits of the PPRA.
- (2.) Peer reviewers should not participate during the PPRA.
- (3.) Peer reviewers should not have a vested interest in the outcome of the PPRA.
- (4.) Peer reviewers should be able to determine whether the PPRA adequately addressed the standards described in **Appendices II, III, and IV.**
- (8.) Peer reviewers should be able to determine whether the best available data and most appropriate methods of analysis were used in the PPRA.
- (9.) Peer reviewers should complete their review within the APHIS and non-APHIS party specified time period.
- (10.) Peer reviewers should be able to complete an unbiased review of this PPRA
- (11.) Peer reviewers may consult with other non-APHIS experts providing the PPRA does not contain Confidential Business Information, unless the non-APHIS party who conducted the PPRA and APHIS agree to it.
- (12.) Peer reviewers should conform to any other requestor and APHIS specified terms.
- (13.) Peer reviewers should be selected based on their being broadly representative and balanced to the extent feasible.
- (14.) Peer reviewers should provide a list of any considerations which were not adequately taken into account in the PPRA.
- (15.) Peer reviewers should not reveal any of the content or recommendations of the review to other parties except as necessary to conduct an objective review as addressed above.

## **Appendix VIII. Equal Employment Opportunity and Civil Rights Policy.**

The U.S. Department of Agriculture (USDA) prohibits discrimination in its programs on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, and marital or familial status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (braille, large print, audiotape, etc.) should contact the USDA Office of Communications at (202) 720-5881 (voice) or (202) 720-7808 (TDD). To file a complaint, write the Secretary of Agriculture, USDA, Washington, DC 20250, or call (202) 720-7327 (voice) or (202) 720-1127 (TDD). USDA is an equal employment opportunity employer.

## **Appendix IX. Treatment Schedules and Examples of Known Mitigation Measures.**

Index to Treatment Schedules (Treatment Manual, Volume I, Schedules, Plant Protection and Quarantine, APHIS, USDA)

Examples of known mitigation measures (photocopied from Code of Federal Regulations, Title 7-Agriculture, Chapter III, Part 319-Foreign Quarantine Notices, Subpart-Fruit and Vegetables, pages 243-250. (For sale by U.S. Government Printing Office, Superintendent of Documents, Washington, DC 20402-9328)

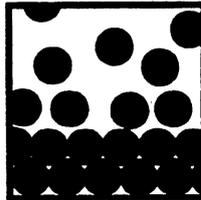
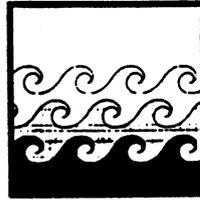
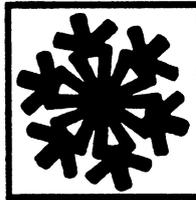
United States  
Department of  
Agriculture

Animal and  
Plant Health  
Inspection  
Service

Plant Protection  
and Quarantine

# Treatment Manual

Volume I  
Schedules



**Index to Schedules**

In the schedules that follow, the series numbers denote the following:

- T100 Series—Commodities intended for consumption (fruits and vegetables)
- T200 Series—Commodities intended for propagation (bulbs, plants, seeds, and tubers)
- T300 Series—Miscellaneous plant materials
- T400 Series—Other materials and carriers
- T500 Series—Plant disease treatments

The first page of each series lists an overview of the treatments covered in the series.

**NOTES:**

1. For propagative material not tolerant to fumigation, use T201(p).
2. All fruits and vegetables (with exceptions as noted in T110) may be quick frozen using T110.
3. For pests not specifically provided for elsewhere, use T403(e).
4. In the case of tarp fumigations, the final gas concentration reading is also the time to end the treatment.
5. Plant disease treatments:

The plant diseases most frequently encountered in plant quarantine inspections are listed in this Index and have T500 numbers. The hosts are listed in association with the specific diseases and the treatment for each.

Treatments marked with an asterisk are suggested treatments because information on their efficacy on the organism concerned may be lacking, the tolerance of the plant to the treatment may be marginal, or the treatment may be the best available at the present time. Many preferred treatments are no longer approved for use.

Advise the importer that all treatments are applied at his risk, and that PPQ cannot

be held responsible for loss or damage to plants or plant products as a result of any treatments prescribed herein. Whenever large or valuable shipments of plant material are involved, the importer or his representative should be informed of the treatment required and should be allowed to decide whether to accept the risk, to reexport, or to abandon the material.

Whenever a treatment marked with an asterisk is used, ports should endeavor to make post-treatment examinations or arrange to have the consignee or importer submit data concerning the material following the treatments. Ports should forward any information of this nature to the Hoboken Methods Development Center.

- Acalypha*, *Pratylenchus* spp., T570, 9.8
- Acer*, dormant plants, T201(a), 6.5
- Achimenes*, *Meloidogyne* spp., T553, 9.6
- Achitina fulica* (giant African snail),
  - Contaminating cargo, T403(a)(1), 8.8
  - Contaminating ships, T402(a)(1), 8.4
  - If low temperature, T403(a)(6)c, 8.10
- Aconitum*, \**Aphelenchoides fragariae*, T570, 9.8
- Acorn,
  - Cydia splendana* (nut fruit tortrix) and *Curculio* spp., T302(h), 7.10
  - Seeds for planting, T203(c)(3), 6.41
- Actinidia*, \**Meloidogyne* spp., T553, 9.6
- Agapanthus*, *Meloidogyne* spp., T553, 9.6
- Aircraft, T409, 8.28-8.41
- Aleurocanthus woglumi* (citrus black fly),
  - Infested plants, T201(n), 6.23
- Alfalfa (*Medicago*) *Verticillium albo-atrum*, T520, 9.5
- Allium* spp. (see bulbs), *Ditylenchus dipsaci*, T552, 9.6
- Aloe*, *Meloidogyne* spp., T553, 9.6
- Alpha grass, *Stipa tenacissima*, *Ampelodesma mauriticus*, T304, 7.15
- Amaranth,
  - External feeders, T101(n<sup>2</sup>), 5.30
- Amaryllis*,
  - Ditylenchus dipsaci*, T552, 9.6
  - Ditylenchus destructor*, T565, 9.8
- Amorphophallus* (tubers), \**Meloidogyne* spp., T553, 9.6
- Ampelodesma mauriticus*, T304, 7.15
- Ampelopsis*, \**Meloidogyne* spp., T553, 9.6

- Anchuse*,  
  \**Meloidogyne* spp., T553, 9.6  
  \**Pratylenchus* spp., T553, 9.6  
*Anemone*, *Meloidogyne* spp., T553, 9.6  
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  Nonplant articles, T411, 8.44  
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  *Anastrepha ludens* (Mexican fruit fly), T107(b), 5.63  
  *Anastrepha* species other than *A. ludens*, T107(c), 5.63  
  *Bactrocera tryoni* (Queensland fruit fly), T107(d), 5.63  
  *Ceratitidis capitata* (Mediterranean fruit fly), T107(a), 5.62  
  *Cryptophlebia leucotreta* (false codling moth), T107(e), 5.64  
  *Epiphyas* spp. (light brown apple moth complex), T108(b), 5.70  
  External feeders except *Tortricidae*, T101(a<sup>1</sup>), 5.2  
  From Australia,  
    *Austrotortrix* and *Epiphyas* spp. (light brown apple moth complex),  
    T109, 5.71  
  From Japan and Korea,  
    *Carposina niponensis* (peach fruit moth), *Conogethes punctiferalis* (yellow  
    peach moth), *Typranychus viennensis* (fruit tree spider mite), *Typranychus*  
    *kanzawai* (Kanzawa mite), T109(a), 5.72  
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  Infested with snails, T201(q), 6.27  
*Armoracia* (horseradish roots),  
  *Globodera rostochiensis*, T553, 9.6  
  *Globodera pallida*, T553, 9.6  
*Araucaria*, dormant plants, T201(b), 6.7  
Arrugula,  
  External feeders, T101(n<sup>2</sup>), 5.30  
Asparagus,  
  External feeders, T101(b<sup>1</sup>), 5.2  
  *Scirtothrips dorsalis*, T101(b<sup>1.1</sup>), 5.3  
Astilbe,  
  *Aphelencoides* spp., T564, 9.8  
  *Meloidogyne* spp., T553, 9.6  
  *Pratylenchus* spp., T553, 9.6  
  Roots with *Brachyrhynchus* larvae, T202(c)(1), 6.31  
Autoclaving,  
  For treating soil, T408(b), 8.24

- Automobiles,  
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- Avocado,  
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*Ceratitis capitata* (Mediterranean fruit fly), *Bactrocera tryoni* (Oriental fruit fly), and *Bactrocera cucurbitae* (melon fly), T101(c<sup>1</sup>), 5.4  
From Hawaii,  
*Ceratitis capitata* (Mediterranean fruit fly), *Bactrocera tryoni* (Oriental fruit fly), and *Bactrocera cucurbitae* (melon fly), T101(c<sup>1</sup>), 5.4;  
T108(a), 5.67  
*Hemiberlesia lataniae* (Latana scale), T101(c<sup>1-1</sup>), 5.4  
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Seeds, depulping, T203(c)(12), 6.51  
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- Azalea,  
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- Azaleadendron*, *Chrysomya* spp., T501, 9.1; T505, 9.2
- Bags and bagging,  
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Flag smut, T504, 9.1  
*Globodera rostochiensis* (golden nematode), T306(a), 7.17  
Potato cyst nematode, T502, 9.1  
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*Trogoderma granarium* (khapra beetle), T306(c), 7.18-7.19  
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- Bagacillo and bagasse, general precautionary, T565, 9.8
- Baled hay,  
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- Banana,  
  External feeders, T101(d<sup>1</sup>), 5.5  
  Roots, T202(c)(2), 6.31
- Bean, dried (except for fava bean)  
  Bruchidae (seed beetles), T101(e<sup>1</sup>), 5.5
- Bean, snap and green,  
  *Maruca testulalis* (exotic legume pod borers), *Epinotia aporema*, and *Cydia fabivora*, T101(k<sup>2</sup>), 5.26
- Beet,  
  External feeders, T101(g<sup>1.1</sup>), 5.6  
  Internal feeders, T101(g<sup>1</sup>), 5.6
- Begonia*,  
  *Aphelenchoides fragariae*, T559, 9.7  
  *Meloidogyne* spp. (tubers), T553, 9.6
- Bellpepper,  
  *Ceratitis capitata* (Mediterranean fruit fly), *Bactrocera dorsalis* (Oriental fruit fly), and *Bactrocera cucurbitae* (melon fly), T106(b), 5.58
- Berberis*, dormant plants, T201(a), 6.5
- Blackberry,  
  External feeders, T101(h<sup>1</sup>), 5.7
- Bletilla hyacinthina*,  
  *Aphelenchoides fragariae*, T553, 9.6; T564, 9.8  
  *Meloidogyne* spp., T553, 9.6
- Blueberry,  
  *Ceratitis capitata* (Mediterranean fruit fly), T101(i<sup>1.1</sup>), 5.9  
  External feeders, T101(i<sup>1</sup>), 5.7
- Bootanomyia* spp. infesting *Casuarina*, T203(c)(13), 6.52
- Bradybaena* spp.  
  Contaminating cargo, T403(a)(5), 8.9  
  If low temperature, T403(a)(6), 8.10
- Brassica* spp. (coles),  
  External feeders, T101(n<sup>2</sup>), 5.30
- Brassware arriving from Bombay, India, T413, 8.46

- Bromeliads*,  
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*Uredo* spp. when destined to Florida refuse entry; to other destinations, T507, 9.2
- Broomcorn and broomcorn articles,  
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- Brucophagus* spp. infesting Leguminosae, T203(c)(13)c, 6.52
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*Ditylenchus dipsaci*, T552, 9.6  
 \**Globodera rostochiensis*, T553, 9.6  
 \**Globodera pallida*, T553, 9.6  
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 \**Meloidogyne* spp., T553, 9.6
- Burbidgea* (tubers), *Meloidogyne* spp., T553, 9.6
- Cabbage,  
 External feeders, T101(j<sup>1</sup>), 5.9
- Cabbageworms (*Pieris* spp.),  
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- Cacti and other succulents,  
 Borers and soft scales, T201(f)(2), 2.16  
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- Fruit of,  
*Ceratitis capitata* (Mediterranean fruit fly), T101(d<sup>3</sup>), 5.40  
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- Cactus,  
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- Caladium*, *Meloidogyne* spp., T556, 9.6  
*Calla* (rhizomes), *Meloidogyne* spp., T556, 9.6  
*Calliopsis*, \**Meloidogyne* spp., T553, 9.6  
*Camella*, *Cylindrosporium camelliae*, T509, 9.2  
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- Carambola,  
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*Anastrepha* species other than *A. ludens*, T107(c), 5.63  
*Bactrocera tryoni* (Queensland fruit fly), T107(d), 5.63  
*Ceratitis capitata* (Mediterranean fruit fly), T107(a), 5.62  
*Cryptophlebia leucotreta* (false codling moth), T107(e), 5.64
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- Celery,  
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# code of federal regulations

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**Agriculture**

**7**

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**PARTS 300 TO 399**

**Revised as of January 1, 1995**

**CONTAINING  
A CODIFICATION OF DOCUMENTS  
OF GENERAL APPLICABILITY  
AND FUTURE EFFECT**

**AS OF JANUARY 1, 1995**

*With Ancillaries*

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**§319.56-2p Administrative instructions prescribing treatment and relieving restrictions regarding importation of okra from Mexico, the West Indies, and certain countries in South America.**

*(a) Conditions for issuance of permits.*

(1) Under §319.56-2, okra may be imported under permit and in compliance with the regulations in this subpart, from Mexico, the West Indies, Colombia, Ecuador, Peru, Suriname and Venezuela and any other South American country specified in the permit, upon presentation of evidence that it has been treated in accordance with the procedure prescribed in paragraph (b) of this section.

(2) Further, it is hereby determined, pursuant to §319.56, that existing conditions as to the pest risk involved in the importation of okra from such countries make it safe to make less stringent the restrictions contained in §319.56-2, by allowing the importation of okra, as provided in paragraphs (c), (d), and (e) of this section without routinely requiring such treatment.

(3) As used in this section—(i) “West Indies” means the foreign islands lying between North and South America, the Caribbean Sea, and the Atlantic Ocean, divided into the Bahamas, the Greater Antilles, and the Lesser Antilles (including the Leeward Islands, the Windward Islands, and the islands north of Venezuela);

(ii) “Inspector” means an inspector of the Plant Protection and Quarantine Programs, Animal and Plant Health Inspection Service of the Department of Agriculture;

(iii) “Enter into the United States” means to introduce into the commerce of the United States after release from government detention;

(iv) “Import into the United States” means to bring within the territorial limits of the United States;

(v) “Port of arrival” means the first place at which a carrier containing okra stops to unload cargo after coming within the territorial limits of the United States;

(vi) “Permit” means a document issued for an article by Plant Protection and Quarantine, Animal and Plant Health Inspection Service, United States Department of Agriculture,

stating that the article is eligible for importation into the United States; and

(vii) “United States” means the several states of the United States, the District of Columbia, the Northern Mariana Islands, Puerto Rico, and all other territories and possessions of the United States.”

*(b) Authorized treatment procedure.* (1) The treatment shall consist of fumigation with methyl bromide at normal atmospheric pressure, under supervision, in a fumigation chamber which has been approved for that purpose, as prescribed in this section. This treatment is specific for the pink bollworm (*Pectinophora gossypiella* (Saunders)) which is known to occur in Mexico, the West Indies, and South America. Under certain cultural conditions this pest will infest okra.

(2) *Approval of fumigation chambers.* (i) Fumigation chambers in the United States or elsewhere will be approved only if they are properly constructed and adequately equipped to handle and treat okra. Within the United States the chambers must be located within the practicable supervisory range of inspectors of the Plant Protection and Quarantine Programs stationed at the ports of entry authorized in permits for the importation of okra. Approval of fumigation chambers outside the United States will depend upon the availability of qualified inspectors for assignment to supervise the treatment and posttreatment handling of okra.

(ii) Determination of eligibility for approval under this section of fumigation plants will be made by an inspector of the Plant Protection and Quarantine Programs.

(3) *Fumigation schedule.* Such fumigation shall be in accordance with the following fumigation schedule:

Temperature (° F.)	Dosage (pounds of methyl bromide per 1,000 cubic feet)	Exposure period (hours)
90-96 .....	1.0	2
80-89 .....	1.5	2
70-79 .....	2.0	2
60-69 .....	2.5	2
50-59 .....	3.0	2
40-49 .....	3.5	2

(4) *Fumigation procedure.* Okra to be fumigated may be packed in slatted crates or other gas-permeable contain-

ers. The fumigation chamber shall not be loaded to more than two-thirds of its capacity. The containers may be stacked one on top of another, but a 3- to 4-inch space must be provided between all containers throughout the load. Good air circulation above and below the load shall be provided as soon as the okra is loaded and must be continued during the full period of fumigation and until the okra has been removed to a well-ventilated location. Strong blasts of air should not be directed against the okra. Fumigation at temperatures in excess of 90° F. may result in injury to okra and should be avoided if possible. Past experience indicates that injury may also result from excess moisture, such as residual moisture from harvesting when dew-covered.

(5) *Supervision of fumigation*—(i) *Other than interior of Mexico.* Inspectors will supervise the fumigation of okra at approved fumigation plants in locations other than those in the interior of Mexico and will specify safeguards in specific cases for the packing, other handling and transportation of the okra before and subsequent to fumigation, if, in the opinion of the inspector, this is necessary to assure that there will be no risk of introducing plant pests into the United States associated with the treatment and importation of the okra. The final release of the okra for entry into the United States will be conditioned upon compliance with the specified safeguards. Such supervision at plants within the United States will be carried on as a part of normal port inspection activities.

(ii) *Interior of Mexico.* Inspectors will supervise the fumigation of okra at approved fumigation plants in the interior of Mexico and will prescribe safeguards in specific cases for the packing and other handling of the okra at the treating plant and the transportation of the okra from the time it leaves the treating plant until it reaches the U.S. port of entry, if in the opinion of the inspector this is necessary to assure that there will be no risk of introducing plant pests into the United States associated with the treatment and importation of the okra. The final release of the okra for entry into the United

States will be conditioned upon compliance with the prescribed safeguards.

(6) *Ports of entry.* Okra required to be treated for the pink bollworm may be imported into the United States only at New Orleans or such other South Atlantic or gulf ports with approved treatment facilities as may be named in the permit, except that, in addition, Mexican okra required to be treated for the pink bollworm may be imported into the United States at Mexican Border ports named in the permit.

(7) *Costs.* Persons desiring to import okra required to be treated under this section must make advance arrangements for approval of the fumigation plant and for supervision of the fumigation by an authorized inspector. All costs of constructing, maintaining, and operating fumigation plants and facilities, and carrying out specified pretreatment and posttreatment safeguards, and all additional costs to the Department arising from supervision under this section, by an inspector away from his regular place of official duty or outside of his regular hours of official duty (including as appropriate, base salary, overtime and holiday pay, travel subsistence, transportation, employee benefits, and incidental expenses) shall be borne by the owner of the okra or his representative. Where normal inspection activities preclude the furnishing of supervision during regularly assigned hours of duty, supervision will be furnished on a reimbursable basis. The owner of the okra or his representative must furnish the Deputy Administrator of the Plant Protection and Quarantine Programs with acceptable assurances that he will provide funds to the U.S. Department of Agriculture to cover all costs of supervision, in accordance with §§354.1 and 354.2 of this chapter and this paragraph.

(8) *Department not responsible for damage.* While the prescribed treatment is judged from experimental tests to be safe for use with okra, the Department assumes no responsibility for any damage sustained through or in the course of treatment or because of pretreatment or posttreatment safeguards. There has not been an opportunity to test these treatments under

all conditions or on all okra varieties or on okra from all areas involved.

(c) *Importations of okra without treatment from the Dominican Republic, Mexico, and Suriname* Okra produced in the Dominican Republic, Mexico, or Suriname, may be entered into the United States without treatment for the pink bollworm only if:

(1) The okra is imported from the Dominican Republic, Mexico, or Suriname under permit;

(2) The okra is made available for examination by an inspector at the port of arrival and remains at the port of arrival until released by an inspector;

(3) During March 16 through December 31, inclusive, the okra is not moved into California; and

(4) During May 16 through November 30, inclusive, the okra is not moved into Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, Nevada, North Carolina, South Carolina, Tennessee, or any part of Illinois, Kentucky, Missouri, or Virginia south of the 38th parallel.

(d) *Importation of okra without treatment from the West Indies and certain countries in South America.* Okra produced in the West Indies, Colombia, Ecuador, Peru, Venezuela, or other South American country, designated in accordance with §319.56-2 in a permit to import okra, may be imported into the United States through any North Atlantic port with approved treatment facilities, under permit and subject to inspection at the port of arrival but without treatment for the pink bollworm in paragraph (d)(2) of this section if destined to: Alaska, Colorado, Connecticut, Delaware, Hawaii, Idaho, Indiana, Iowa, Kansas, Maine, Maryland, Massachusetts, Michigan, Minnesota, Montana, Nebraska, New Hampshire, New Jersey, New York, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, South Dakota, Utah, Vermont, Washington, West Virginia, Wisconsin, or Wyoming, or the District of Columbia, or any part of Illinois, Kentucky, Missouri, or Virginia, north of the 38th parallel.

(e) *Importation of okra without treatment from Andros Island of the Bahamas; and okra without treatment from the West Indies for importation into the American Virgin Islands.* Okra produced in Andros

Island, Bahamas, may be imported into the United States under permit through any port named in the permit, without treatment but subject to inspection at the port of arrival. Okra produced in the West Indies may be imported into the American Virgin Islands without treatment but subject to inspection at the port of arrival.

(f) *Treatment of okra for pests other than pink bollworm.* If, upon examination of okra imported in accordance with paragraphs (c), (d), or (e) of this section, an inspector at the port of arrival finds injurious insects, other than the pink bollworm, that do not exist in the United States or are not widespread in the United States, the okra will remain eligible for entry into the United States only if it is treated for the injurious insects in the physical presence of an inspector in accordance with the Plant Protection and Quarantine Treatment Manual. The Plant Protection and Quarantine Treatment Manual is incorporated by reference. See §300.1 of this chapter, "Materials incorporated by reference." If the treatment authorized by the Plant Protection and Quarantine Treatment Manual is not available, or if no authorized treatment exists, the okra may not be entered into the United States.

[35 FR 18033, Nov. 25, 1970, as amended at 36 FR 24917, Dec. 24, 1971. Redesignated at 50 FR 9788, Mar. 12, 1985; 50 FR 10750, Mar. 18, 1985; 54 FR 33666, Aug. 16, 1989; 57 FR 54489, Nov. 19, 1992]

**§319.56-2q Administrative instructions; conditions for importation of grapefruits, oranges, and tangerines from Mexico.**

(a) *Approved treatment.* Fumigation with methyl bromide at normal atmospheric pressure in approved chambers, in accordance with the following procedure, is hereby approved as a condition of entry under permit, through ports specified in the permit, for lots of grapefruits, oranges, and tangerines grown in Mexico. This treatment is specific for fruit flies of the genus *Anastrepha* known to exist in Mexico.

(1) A lot of grapefruits, oranges, or tangerines grown in Mexico shall be eligible for fumigation if a representative sample of fruit, selected from the

lot, has been cut, inspected, and not found to indicate a level of infestation of fruit flies of 0.5% or above for the lot.

(2) Fumigation shall be in an approved fumigation chamber at normal atmospheric pressure as follows:

Temperature of fruit pulp	Methyl bromide dosage (ounces per 1,000 cubic feet or grams per cubic meter)	Exposure period (hours)
70 °F to 85 °F (21 °C-29°C) ..	40	2.0

The chamber load shall not exceed 80 percent of the chamber's volume. The fumigation chambers shall be approved for use if found by an inspector to be adequate to meet the requirements of this treatment.

(3) The fumigation shall be conducted under the supervision of an inspector. The unloading of the fruit from the means of conveyance, delivery of the fruit to an approved fumigation chamber, the fumigation of the fruit, and any other handling of the fruit before or after fumigation shall be in accordance with safeguards determined by an inspector to be necessary to prevent the introduction into the United States of fruit flies.

(b) *Costs.* All costs of treatment and required safeguards and supervision, other than costs for the services of the supervising inspector during regularly assigned hours of duty and at the usual place of duty, shall be borne by the owner of the fruit or the owner's representative.

(c) *Department not responsible for damage.* Damage may be sustained on oranges and tangerines, and damage to all fruits may result from inexactness or carelessness in using the approved treatment. The Department does not accept responsibility for any damage sustained through or in the course of treatment, or because of posttreatment safeguards.

(d) *Ports of entry.* Grapefruits, oranges, and tangerines which are accompanied by a valid certificate that has been issued by an inspector and that represents that they have been treated in Mexico in accordance with the treatment provisions in this section may enter the United States only at a port of entry listed in §319.37-14(b) of this chapter specified in the import permit.

Grapefruits, oranges, and tangerines which are to be treated in the United States may enter the United States only at a port of entry listed in §319.37-14(b) of this chapter and specified in the import permit, except that they may not enter, stop at, or pass through ports south of Baltimore, Maryland, or in California.

(Secs. 8 and 9, 37 Stat. 318, as amended (7 U.S.C. 161, 162); secs. 105, 106, 71 Stat. 32, 33 (7 U.S.C. 150dd, 150ee); 7 CFR 2.17, 2.51, 371.2(c)) [49 FR 39039, Oct. 3, 1984. Redesignated at 50 FR 9788, Mar. 12, 1985; 50 FR 14691, Apr. 15, 1985]

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