

National Plant Board

Plant Quarantine, Nursery Inspection and Certification Guidelines

March 30, 2015

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National Plant Board

Introduction

Regulatory agricultural agencies in the U.S. have been charged with a plant pest prevention mission: to protect agriculture, the environment and our citizens from the damaging effects of plant pests. It is a major challenge to satisfy this mission while providing for equitable trade in both domestic and international markets.

The ideal pest prevention system is one that is mutually agreed upon and uniformly applied. It must effectively identify the damage potential of a pest and assess and manage pest risk. Mutual agreement among regulatory agencies cannot be achieved unless each agency understands the functions, activities and tasks involved in identifying harm caused by pests and uses valid pest risk assessment and management procedures. Harmonization is difficult to achieve unless regulatory standards are established against which regulatory activities can be measured or evaluated.

A pest prevention program consists of five major elements:

1. Pest Exclusion - The goal of pest exclusion is to keep exotic pests out of the area of concern. Pest pathways must be identified and evaluated as to their potential as avenues of entry. The basic modes of pest spread or dispersal are natural and artificial. Artificial pathways are the major focus of pest exclusion efforts and are distinguished from natural pathways which regulatory agencies cannot control using traditional pest risk mitigation measures. As examples, lack of control over natural spread is evidenced in the fact that winged insects and pathogenic propagules often can be spread great distances on wind currents; and soil borne pests can be transported over long distances in water. While natural barriers such as oceans, deserts and mountain ranges impede natural spread and facilitate pest exclusion efforts, natural spread is generally accepted as being beyond control especially when there is a continuum of hosts and natural modes of movement exist.

The best strategy for dealing with natural spread is a regional one that focuses on keeping exotic pests out of large geographic areas or establishing pest-free areas via quarantine, detection and eradication programs. These strategies require close cooperation and coordination among all those governmental agencies within the geographic area of concern. For example, keeping the Mediterranean fruit fly out of the continental United States requires the cooperation of federal, state and local governments. Optimally, it also requires the cooperation and support of the Canadian and Mexican governments; and governmental efforts must have support from the regional and the National Plant Boards, industry and the public. In North America, the North American Plant Protection Organization (NAPPO) is responsible for

harmonizing the pest prevention systems of its three member nations: Canada, Mexico and the United States. The North American Free Trade Agreement identifies the NAPPO as one of the organizations responsible for dealing with international quarantine issues.

The basic artificial pathways are aircraft, buses, ships, trains, trucks and automobiles. Each of these pathways serves as conduits in a number of ways: commercial, military and public transport of infested commodities; hitchhiking pests; and smuggling. Aircraft operations include cargo (domestic and foreign mail, private parcel carriers and commercial airlines), passenger (charter and commercial), private and military. Ship operations likewise include cargo, passenger (or cruise ships), private yachts, and military. Bus, train, automobile, and truck operations are narrower, but their high numbers and frequency of international and interstate movement keep them high on the list as significant pest pathways. Consequently, international airports, harbors, and land ports of entry; and foreign mail centers are key inspection points for foreign pest exclusion. Within the United States, airports; bus, express package carrier, truck and train terminals; U.S. Postal Service sectional centers; highway border agricultural inspection stations; and terminal arrival points such as nurseries, grain mills, wholesale pet stores, etc. are the principal points for state-operated domestic pest exclusion inspection activities. Internet sales are a pathway of recent origin which can result in undetected movement of contraband articles. As smuggling operations are a growing concern, states may wish to establish an investigation team to perform undercover operations and gather facts needed for successful prosecution of violations.

2. Pest Detection - Even the best pest exclusion system is not perfect. Pests still penetrate the pest exclusion barrier and get established. The goal of pest detection is to discover infestations while they are still small enough to eliminate. Various systematic and periodic visual surveys and annual detection trapping programs are conducted to accomplish this end.

Once an exotic pest is found, additional visual survey or trapping is performed to determine if an infestation exists; and, if so, how extensive it is. The latter survey is referred to as a delimitation survey and is a prerequisite for determining the feasibility of eradication. It also is needed to identify the areas where eradication treatments and quarantine measures need to be applied.

Formal detection survey and trapping are complemented by the support of university researchers and extension agents, pest control advisors and operators, farmers and the public in the form of reporting unusual pests, diseases and abnormalities discovered in the normal course of their business or private activities.

3. Eradication - Eradication involves the application of appropriate treatments and quarantine measures followed by post-treatment visual survey, or trapping, or other monitoring strategies to determine if eradication has been accomplished. Typically, eradication is defined by negative

survey or trapping for one to three full seasons or life cycles after the termination of eradication treatments. Ultimately, it is determined between trading partners.

4. Pest Diagnostics and Record-Keeping - The foundation of an effective pest prevention program is the ability to provide timely and accurate pest diagnostics (traditional morphometric and molecular diagnostics) for specimens and samples collected in the performance of the exclusion and detection work. Record-keeping is a critical adjunct in that exclusion interception and detection records are essential for making valid and meaningful pest pathway studies, risk analyses, and quarantine evaluations.

5. Public Information and Education - Effective pest prevention programs require an educated and supportive public. People must know what quarantine restrictions exist and why they exist in order to be motivated to comply with them and to support funding for them. Informed members of the public can and have played a role in pest detection, *e.g.*, giant African land snail and Asian longhorned beetle eradication programs. Historically, this element of pest prevention is the least funded and most neglected; however, more emphasis is being placed on this activity. This is a well placed work effort as it is clear that international commerce continues to significantly increase and more people are traveling to foreign locations for business and pleasure.

National Plant Board

The existing array of international, federal and state plant pest and disease regulations varies considerably. Current trends in government-related pest prevention require consistent, effective regulatory agriculture programs due to:

- more state responsibility in managing plant protection work
- greater concern over environmental impacts of pesticide use
- importance of pest prevention programs and negative surveys in furthering exports
- frequent violations of existing quarantines
industry cost control methods, such as just-in-time delivery
- ecosystem impacts of introduced exotic pests
- budgetary constraints
- occasional disputes and charges of unfair trade practices

The National Plant Board (NPB) is an organization comprised of the state plant pest regulatory agriculture agencies in the U.S., Guam and the Commonwealth of Puerto Rico (<http://nationalplantboard.org/>). The NPB, consistent with its organization purpose, has adopted guidelines to assist states in meeting their plant quarantine and inspection needs. Five major concepts are addressed in these guidelines.

1. Quarantine actions should be used only on quarantine pests.

Quarantine pests are pests of economic concern that do not occur in a specified geographic area, or that are being officially controlled (Federally Recognized State Managed Phytosanitary Program, USDA APHIS PPQ) in that area. Determining whether a particular pest is of quarantine significance requires that a pest risk analysis be performed. Pest risk analysis (PRA) provides the rationale for phytosanitary measures for a specified PRA area. It evaluates scientific evidence to determine whether an organism is a pest. If so, the analysis evaluates the probability of introduction and spread of the pest and the magnitude of potential economic consequences in a defined area, using biological or other scientific and economic evidence. If the risk is deemed unacceptable, the analysis may continue by suggesting management options that can reduce the risk to an acceptable level. Subsequently, pest risk management options may be used to establish phytosanitary regulations. These regulatory agriculture guidelines provide information for agencies to identify quarantine pests, select measures to reduce pest risk to acceptable levels and to mitigate future infestations.

2. States may regulate non-quarantine pests.

The quality of various commodities can be seriously affected by the damage they cause. The mere presence of a pest may result in regulatory action. Therefore, apart from quarantine restrictions, states may regulate commodity quality with respect to non-quarantine pests that may be affecting plant quality. Requirements placed by states for pest-free nursery stock are one regulatory example.

3. Importing states establish commodity entry standards.

This concept is consistent with that used by countries throughout the world as they determine entry requirements for plant material and other commodities. These guidelines are to facilitate the pursuit of regional and national commerce while protecting natural and cultivated plant resources.

4. Phytosanitary and Nursery Stock Certificates serve different purposes.

State phytosanitary certificates are issued by duly authorized officials to affirm, declare or verify that a shipment of regulated commodities complies with quarantine requirements. Nursery stock certificates serve a similar purpose, but only with regard to state freedom of pest's standards for non-quarantine pests. The guidelines will assist states in the development of certificates that meet minimum standards.

5. Pre-clearance and origin inspection programs should be fostered.

The guidelines encourage cooperative interstate programs that provide inspection and clearance (*e.g.*, compliance agreement, master permit, Systems Approach to Nursery Certification (SANC) compliance agreement) of regulated commodities at origin. These programs may reduce destination inspection workload, delivery delays, facilitate orderly trade and marketing, and minimize spread of pests.

Each state is encouraged to periodically review its quarantine and nursery inspection programs, compare them to the guidelines, and modify those programs where necessary with input from appropriate industry and other regulatory agriculture stakeholders.

6. State Summaries of Plant Protection Laws and Regulations

The National Plant Board maintains a summary of plant protection laws and regulations on its website: <http://nationalplantboard.org/laws-and-regulations/>. The U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine Program (USDA APHIS PPQ) and the plant health agencies in each of the 50 states, regulate the shipment of nursery and greenhouse stock in an effort to minimize the spread of harmful insects, diseases, and other pests. The Federal and State quarantine summaries is designed as a reference tool for nursery stock growers, brokers, purchasers, and others involved in the buying selling, and interstate transport of nursery and greenhouse plant crops. It outlines the basic quarantine and other plant health requirements of APHIS, all 50 states, and the Commonwealth of Puerto Rico and Guam. The information presented here is designed as an aid to help users avoid costly delays, rejections of plant material shipments, and introduction of harmful pests into new areas.

Each State summary lists the relevant plant health agency and contact information; definition of nursery stock; general shipping requirements; and quarantines or other specific certification requirements that apply for shipment into that state.

The information contained on this site is designed as a quick reference tool only. Full information on approved treatments and documentation requirements may be needed. Working with plant regulatory agencies in your state and the destination state, as well as USDA APHIS PPQ regional offices in the case of Federal quarantines, is advised — especially when you are shipping to new markets. ([List of State Plant Regulatory Officials contact information and their web sites](#)).

Nursery stock quarantines and certification requirements are subject to frequent change. Though this site will be updated periodically, coordination with both your state and the destination state plant regulatory agencies may be necessary to stay up-to-date on revised requirements.

This information does not supplant or replace the [Code of Federal Regulations](#) (see Title 7 Agriculture, Chapter III APHIS), and/or state statutes. This site is designed as an aid in

determining basic quarantine information, and should not be relied on exclusively when making purchasing and transportation decisions.

The information, as provided, is for informational purposes only and should not be interpreted as complete, nor should it be considered legally binding.

PURPOSE

The regulatory agricultural agencies in the United States are charged with protecting agriculture, the environment and citizens from the economic and environmental harm that injurious plant pests can cause. Satisfying this charge while, at the same time, providing for equitable and orderly domestic and international trade, is a major challenge. The ideal harmonized pest prevention system is one that is mutually agreed to and uniformly applied and will:

- Identify pest harm
- Assess pest risk
- Manage pest risk

Increasingly, the responsibility of implementing and managing inspection, certification and quarantine programs falls completely, or at least partly, on the states. Certain marketplace trends are impacting the effectiveness of plant health programs. For example, in the past most orders were placed well in advance of delivery, and vendor-buyer relationships were generally more stable. Presently, the marketplace often demands delivery on short notice. "Just-in-time" inventory practices result in more frequent small deliveries. Sales may be arranged by brokers, including e-commerce via internet sales, who may never take possession of the product nor know the origin of a plant material. Impediments are raised at big box stores with paperwork deficiencies (shipping and inspection documents) and consignment ownership-type. Difficulties associated with trace backs/forwards of plant material can occur. Such trends place a greater strain and level of expectation on federal, state and local regulatory programs.

There is an increasing awareness and concern about the adverse environmental impacts of injurious pests resulting in a higher level of expectation for plant regulatory programs. Also, area-wide IPM approaches and pest-free areas to facilitate exports are becoming more important to international commerce. It is also recognized that breaches of federal and state plant health requirements underscore the need to achieve greater consistency and effectiveness among state programs.

These guidelines were developed to address a number of specific and interrelated charges as follows:

- Define the process of risk analysis to ensure valid quarantines
- Provide a model for plant pest quarantine, including the basic elements necessary for an effective quarantine
- Describe a typical nursery inspection
- Standardize shipping regulations including labeling, origin of nursery stock, treatments and quarantine compliance
- Identify basic (minimum) information to be included on license or permit applications for nursery growers and dealers
- Provide an arbitration system for quarantine and nursery stock violations/rejections that ties-in to the nursery standards and definitions of plant pests.
- Develop a model for the certification of nursery stock shipped out-of-state and for virus indexing and special certification of nursery stock (see Systems Approach for Nursery Certification).

ROLE

These guidelines have been developed by the NPB for use by regulatory agriculture officials to provide guidance for:

- Identification of quarantine plant pests
- Identification of plant pest impact
- Assessment of plant pest risk
- Identification of risk mitigation methods for plant pests
- Development, implementation and management of pest risk mitigation strategies including quarantines, origin inspection, preclearance, pest-free areas, special permits compliance agreements and Systems Approach for Nursery Certification compliance agreements
- Harmonization in plant pest prevention in tolerance of quality pests among the regulatory agriculture officials and marketing
- Basis for review and evaluation of plant pest prevention programs
- Present arbitration as a means to resolving disputes over the propriety of pest risk mitigation strategies imposed by regulatory agriculture officials

PEST RISK ANALYSIS AND MITIGATION

The North American Plant Protection Organization (NAPPO) has developed a standard for pest risk analysis which is further aligned with the International Plant Protection Convention (http://agriculture.gouv.fr/IMG/pdf/ispmm02_versionang_2007.pdf). The process of evaluating biological or other scientific and economic evidence to determine whether an organism is a pest, whether it should be regulated, and the strength of any phytosanitary measures to be taken against it [FAO, 1995; revised IPPC, 1997; ISPM No. 2, 2007]. The pest risk analysis (PRA) process is a technical tool used for identifying appropriate phytosanitary measures. The

The mission of NAPPO is provide a forum for public and private sectors in Canada, the United States and Mexico to collaborate in the development of science-based standards intended to protect agricultural, forest and other plant resources against regulated plant pests, while facilitating trade (<http://nappo.org/>). The International Plant Protection Convention (IPPC) is an international agreement on plant health to which 181 signatories currently adhere. It aims to protect cultivated and wild plants by preventing the introduction and spread of pests (<https://www.ippc.int/>). The Secretariat of the IPPC is provided by the Food and Agriculture Organization of the United Nations. The relationships of the many agencies are shown in Fig. 1.

The World Trade Organization and its Agreement on the Application of Sanitary and Phytosanitary Measures (https://www.wto.org/english/tratop_e/sps_e/spsund_e.htm) came into effect in January 1995. The SPS Agreement focuses on the application of food safety and animal and plant health regulations. It allows countries to set their own standards; however, the regulations must be based on science. They should be applied only to the extent necessary to protect human, animal or plant life or health. And they should not arbitrarily or unjustifiably discriminate between countries where identical or similar conditions prevail. The SPS Agreement builds on previous General Agreement on Tariffs and Trade rules to restrict the use of unjustified sanitary and phytosanitary measures for the purpose of trade protection. The basic aim of the SPS Agreement is to maintain the sovereign right of any government to provide the level of health protection it deems appropriate, but to ensure that these sovereign rights are not misused for protectionist purposes and do not result in unnecessary barriers to international trade.

The SPS Agreement increases the transparency of sanitary and phytosanitary measures. Countries must establish SPS measures on the basis of an appropriate assessment of the actual risks involved, and, if requested, make known what factors they took into consideration, the assessment procedures they used and the level of risk they determined to be acceptable. Although many governments already use risk assessment in their management of food safety and animal and plant health, the SPS Agreement encourages the wider use of systematic risk assessment among all WTO member governments and for all relevant products.

The PRA process may be used for organisms not previously recognized as pests (such as plants, biological control agents or other beneficial organisms, genetically modified organisms (GMOs)), recognized pests, pathways and review of phytosanitary policy. The process consists of three stages: 1: Initiation; 2: Pest risk assessment; and 3: Pest risk management. Pest risk analysis (PRA) provides the rationale for phytosanitary measures for a specified PRA area. It evaluates scientific evidence to determine whether an organism is a pest. If so, the analysis evaluates the probability of introduction and spread of the pest and the magnitude of potential economic consequences in a defined area, using biological or other scientific and economic evidence. If the risk is deemed unacceptable, the analysis may continue by suggesting management options that can reduce the risk to an acceptable level. Subsequently, pest risk management options may be used to establish phytosanitary regulations .

GLOBAL ANIMAL AND PLANT PEST PREVENTION PERSPECTIVE

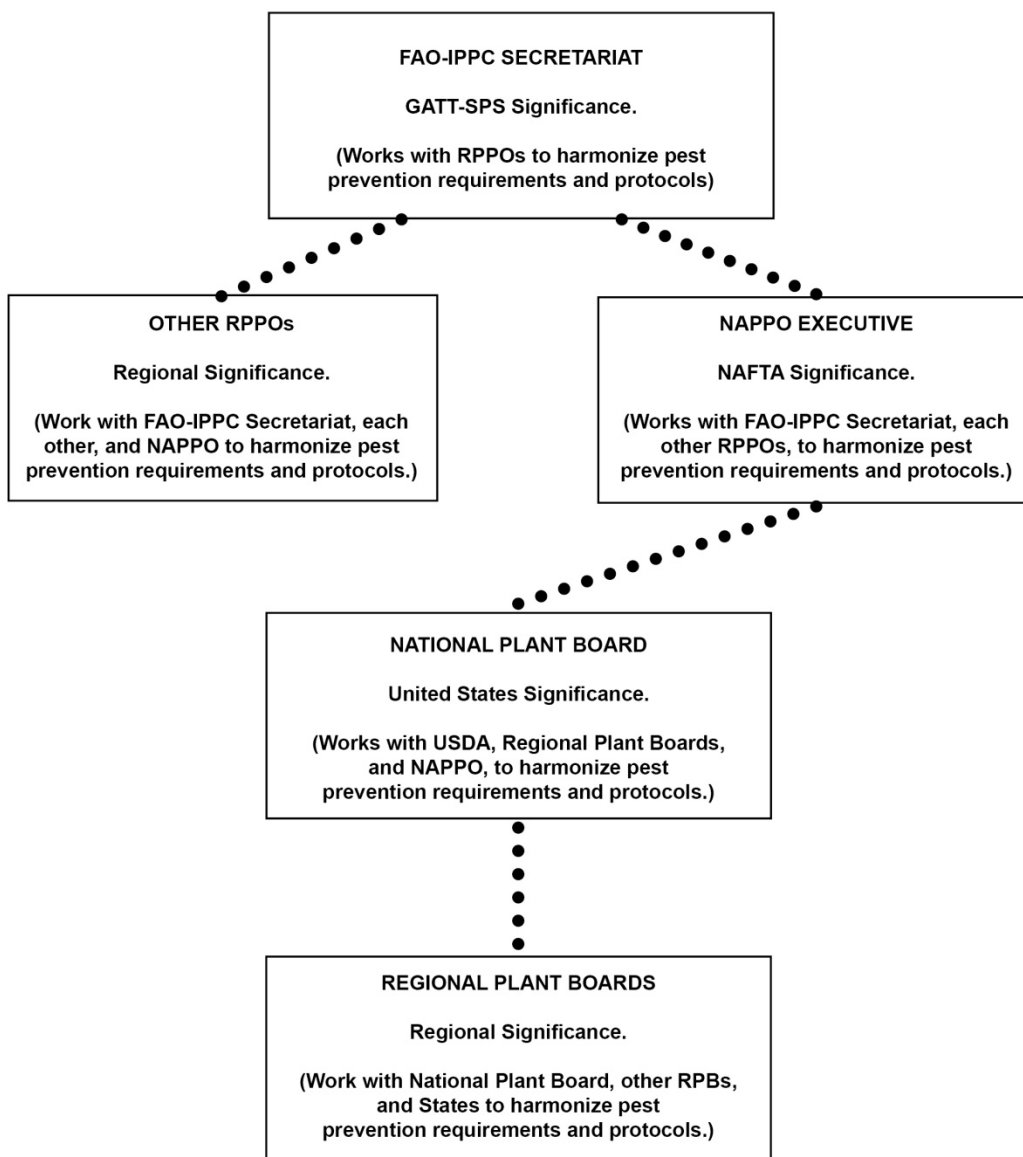


Figure. 1. Global animal and plant pest prevention perspective.

A critical task in PRA is quarantine pest identification. For the purposes of these guidelines a quarantine pest is an economically important pest that does not occur in an endangered area, or which is being officially controlled in an endangered area, and for which economic impact cannot be reduced to an acceptable level by means or methods other than phytosanitary measures. This definition has the following elements:

A pest is any biotic agent (any living agent capable of reproducing itself) or any of the following that is known to cause damage or harm to agriculture or the environment. This would include: a) any form of animal life; b) any form of plant life; or c) any infectious, transmissible, or contagious disease of any plant; or any disorder of any plant which manifests symptoms or behavior which, after investigation, review and evaluation, is found and determined by a duly constituted federal, state or local pest prevention agency, to be characteristic of an infectious, transmissible or contagious disease

A plant includes any part of a plant, tree, plant product, shrub, vine, fruit, vegetable, seed, bulb, stolon, tuber, corm, pip, cutting, scion, bud, graft or fruit pit.

The phrase “does not occur” means that a valid detection survey has been conducted and the pest was not found; or, that any previous occurrences of the pest in the area were eradicated or otherwise eliminated. Pests known to be widespread or cosmopolitan in areas adjacent to the area of concern are presumed to be present in the endangered area unless definitely demonstrated to be absent.

A valid detection survey is an official systematic search for a target pest that is performed using methods mutually acceptable between trading partners.

Endangered areas include continent, region, country, state, county, province, municipality or any other discretely delineated political or otherwise lawfully constituted geographic area which has been officially identified for protection from injurious pests not already present.

Officially controlled relates to the conduct, by an official public pest prevention agency, of eradication or intensive suppression activity including various treatments, quarantine and other measures with the goal of eliminating an isolated infestation or prevention of further spread within the endangered area. It does not include general agricultural, urban forestry, or home garden pest control measures conducted by individuals against pests permanently established in the endangered area.

An economic impact is a significant damage or harm clearly identified in a formal pest risk analysis and may consist of:

- Plant or crop destruction or injury

- Increased cultural or pest control costs from disruption of existing pest control strategies such as biological control, integrated pest management, sustainable agriculture or forestry, and cropping patterns or loss of a high value crop without replacement by an equally valuable and marketable crop
- Social adversities or costs such as interference with home/urban gardening, human health, worker safety, food safety, or jobs
- Environmental quality impact including added pesticide use, scenic and watershed damage, destruction of ecosystems, and food chain interference.
- Significant damage or harm identifies a level of adverse impact that results in economic damage, injury or loss that exceeds the cost of control for a particular crop.

There may be an acceptable level or a probable level of harm that is so low that the imposition of phytosanitary requirements is not required; or the probable level of harm that the trade partners agree to achieve through the imposition of pest risk mitigation measures or strategies and accept for continued trade when confirmed by phytosanitary certification of specified host commodities.

Phytosanitary measures are inclusive of growing season treatments, methods of production/processing or inspection, and post-harvest treatments specified (in formally adopted quarantines) as requirements to assure that the pest risk associated with shipments of host commodities is mitigated to an acceptable level.

When using methods other than phytosanitary measures are considered, this may include plant registration and certification programs, nursery stock and other commodity pest freedom standards, special permits, compliance agreements, etc. These methods might provide an acceptable level of phytosanitary security for moderate to low impact quarantine pests.

A pest-free area is an area kept free from a specific pest. The area can mean any political division or subdivision or any officially defined area including adjacent parts of contiguous political divisions or subdivisions. Political divisions include nations and states or provinces within them. Political subdivisions include counties, parishes or municipios (in Mexico), and cities or municipalities. Officially defined areas also may include any other clearly defined and identifiable area including a specific property or facility.

A valid detection survey has been performed showing that a specific pest is not present when identifying an area as free from a plant pest.

Pest Survey and Pest Ratings Lists

Pest prevention is a planned, organized and ongoing governmental program for the purpose of halting the introduction, colonization, and establishment of pests that would cause significant

agricultural, environmental, and/or societal harm in an area where the pest does not already occur. There are many factors that limit the ability of government to accomplish this goal efficiently. The product of these functions would be a pest distribution database that is a basic essential for pest prevention.

Pest prevention agencies must be able to 1) see the possibility for harm, 2) determine the probability for harm, and 3) take appropriate avoidance measures. Pest surveillance plays a critical role in the ability to see the possibility for harm; and pest prevention agencies are largely dependent on other pest prevention agencies to maintain pest distribution databases and make them readily accessible. Many countries simply do not have the resources to do this, leaving importing countries with the need to inspect pest host commodities arriving at ports of entry and using the pest interception data generated there as a means of identifying the possibility for harm.

To determine the probability for harm, pest risk analysis (PRA) is required (Fig. 2). A pest prevention agency must know what pests are already present in the area it represents; the biologies and host ranges of quarantine pests of concern; when, where, why and how harm could occur and to what degree; how the pest could be introduced; and the likelihood of colonization and establishment. In order to know what pests are already present in the area it represents, a pest prevention agency must conduct its own surveillance and survey activities.

Once the risk is identified, a pest prevention agency must decide if the cost(s) associated with preventing the probable level of harm are worth the benefits. If so, then it must take appropriate avoidance measures. It must select the appropriate pest risk mitigation measures or strategies, codify (enact as law) those requirements, enforce them, and reevaluate and revise as appropriate.

Sources of plant pest distribution data include plant protection agencies, research institutions, university extension agents, consultants including pesticide advisers and dealers, scientific societies, nursery operators, growers, museums, and the general public. Information from these sources might be published or unpublished in the form of diagnostics and research reports; regulatory, scientific, and survey reports; trade articles; historical records; and contemporary observations.

This information should be entered into well-managed system for periodic or ongoing access, verification, compilation and reporting of plant pest distribution data from as many sources as is economically feasible. The state plant protection agency should develop a central database and data retrieval system, verify all new data added, and provide for access by other agencies and interested or affected parties. Ideally, a read-only data base system would be used.

Basic needs include adequate legal authority together with the staff, technical equipment and other resources necessary to operate the system.

To obtain the necessary pest distribution data might require legal mandates, cooperative agreements, and memoranda of understanding, directives, or other vehicles that assure reporting.

PEST RISK ANALYSIS AND MITIGATION

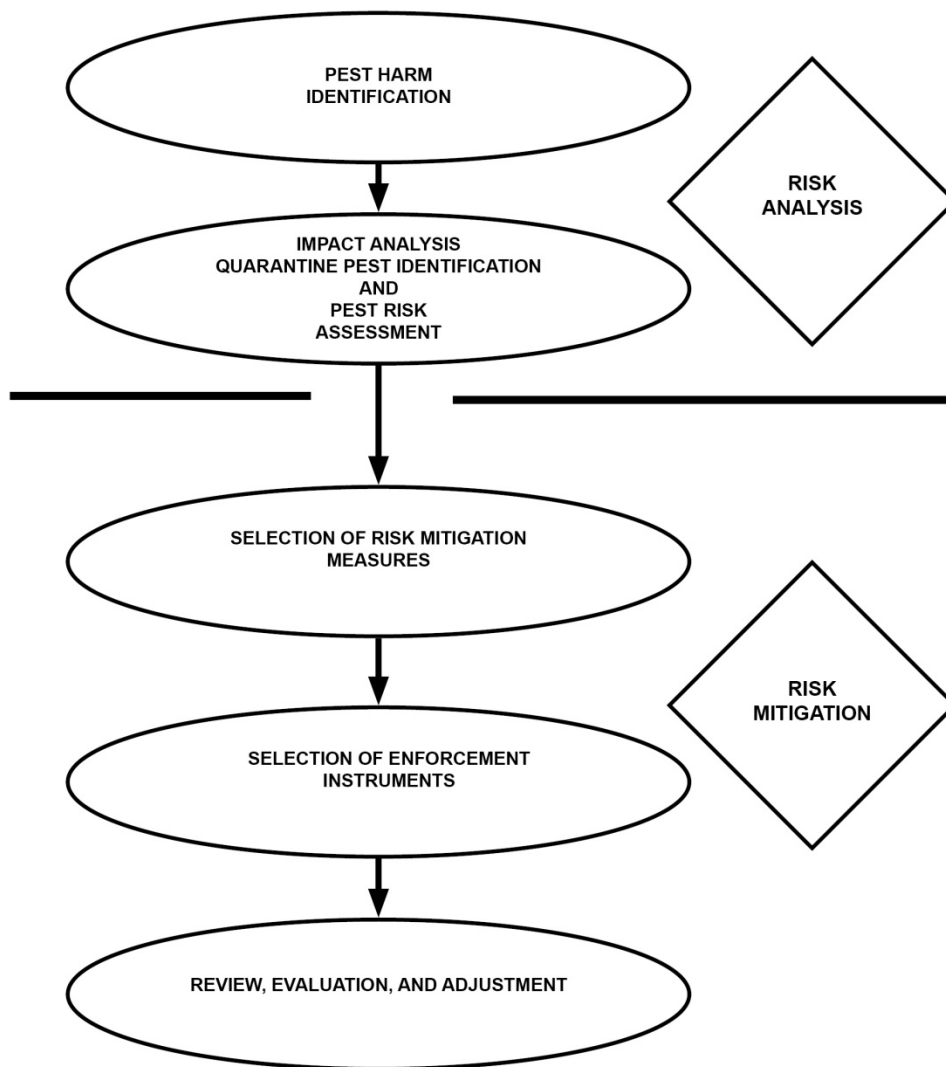


Figure 2. Pest risk analysis and mitigation.

Pest Harm Identification

A common starting point in Pest Harm Identification is a series of questions:

Is the agent a pest? What is its biological nature and can it cause agricultural or environmental damage and related adverse impacts? What is its relationship to plants and other biological entities? Does it cause significant harm or damage in places where it already exists? Is it being controlled there? How? For what purpose?

Impact Analysis

Next is that of Impact Analysis, again with a number of questions: What is the severity of the harm? Various combinations of high, moderate and low (host, host range, control, market, social and environmental) impacts will affect the overall outcome of the impact analysis as being high, moderate or low (Fig. 3).

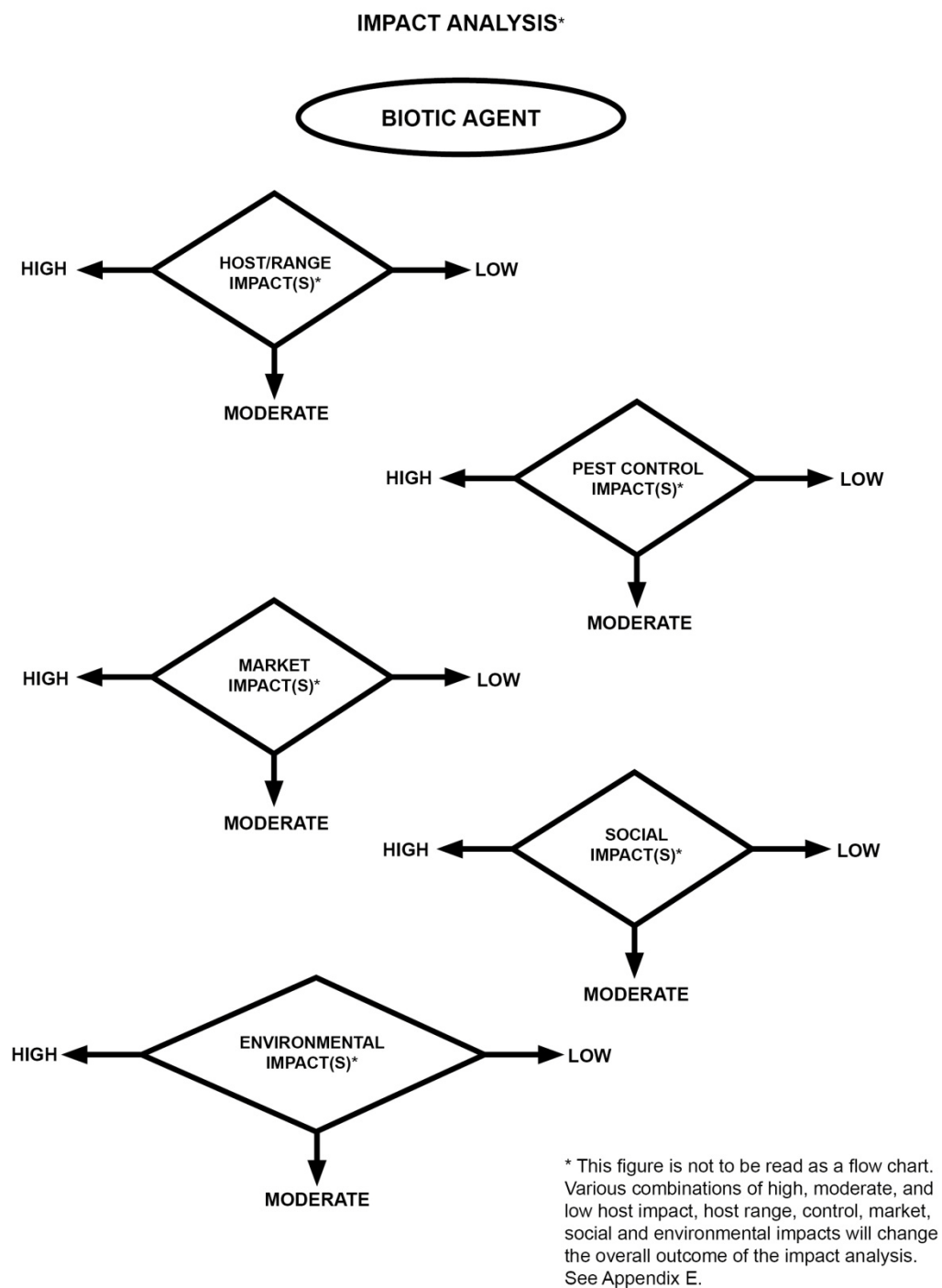


Figure 3. Impact Analysis

- Host Impacts -- To what extent would hosts be injured (destroyed or debilitated to varying degrees)? Would the presence of the pest interfere with the establishment, normal growth and maintenance of new plantings? Would the presence of the pest worsen the impacts of other pests? Would the presence of the pest reduce the yield, quality, or shelf life of the affected crop(s)?
- Host Range Impacts -- How many different host/crops would be affected? What is the value or importance of these hosts/crops?
- Pest Control Impacts -- Can the pest be detected easily and reliably? Can the pest be eradicated with ease? If the pest were to be detected as a small established infestation in the area of concern, would it be eradicated or officially controlled? Can the pest be controlled with ease using available methods? Or, are costly growing season treatments required? Are post-harvest commodity treatments available? Are there natural enemies present in the area of concern or which could be introduced to effect acceptable control? Would required control treatments disrupt organic farming, integrated pest management, sustainable agriculture, or cropping patterns? Would some high value crops be lost?
- Market Impacts -- If the pest becomes established in the area of concern, would the desirable market characteristics of shape, color, size, overall appearance and shelf-life be adversely affected? Would quarantine restrictions be imposed by plant protection agencies in areas where the pest does not exist? Can phytosanitary requirements be met? At what cost? What will be the effect of quarantines on foreign and domestic markets? What will be the effect on agricultural profitability?
- Social Impacts -- Will lifestyles be altered (home gardening, outdoor food service/consumption, aesthetically appealing landscapes, etc.)? Will pest control efforts result in increased levels of pesticide in the environment? Will human health and food safety be compromised? If so, how? Will jobs be lost or gained?
- Environmental Impacts -- Will additional pesticides be added to the environment? Will forested areas be affected? Will there be adverse impact(s) on water resources, threatened and endangered species, native plants, or natural systems?

Criteria for a Quarantine Pest

In the case of a potential biotic agent (Fig. 4), it is a quarantine pest if: it is a pest, could cause significant harm, is likely to be moved artificially into or already exists in the endangered area and is being or would be officially controlled, could survive in the endangered area, and the risk could not be reduced to an acceptable level by means other than phytosanitary measures? Is the biotic agent present in the endangered area? Has a survey been performed? Does the survey design provide a high level of confidence that negative results mean the biotic agent is not present? What do pest records show as to previous or current presence and distribution?

QUARANTINE PEST IDENTIFICATION

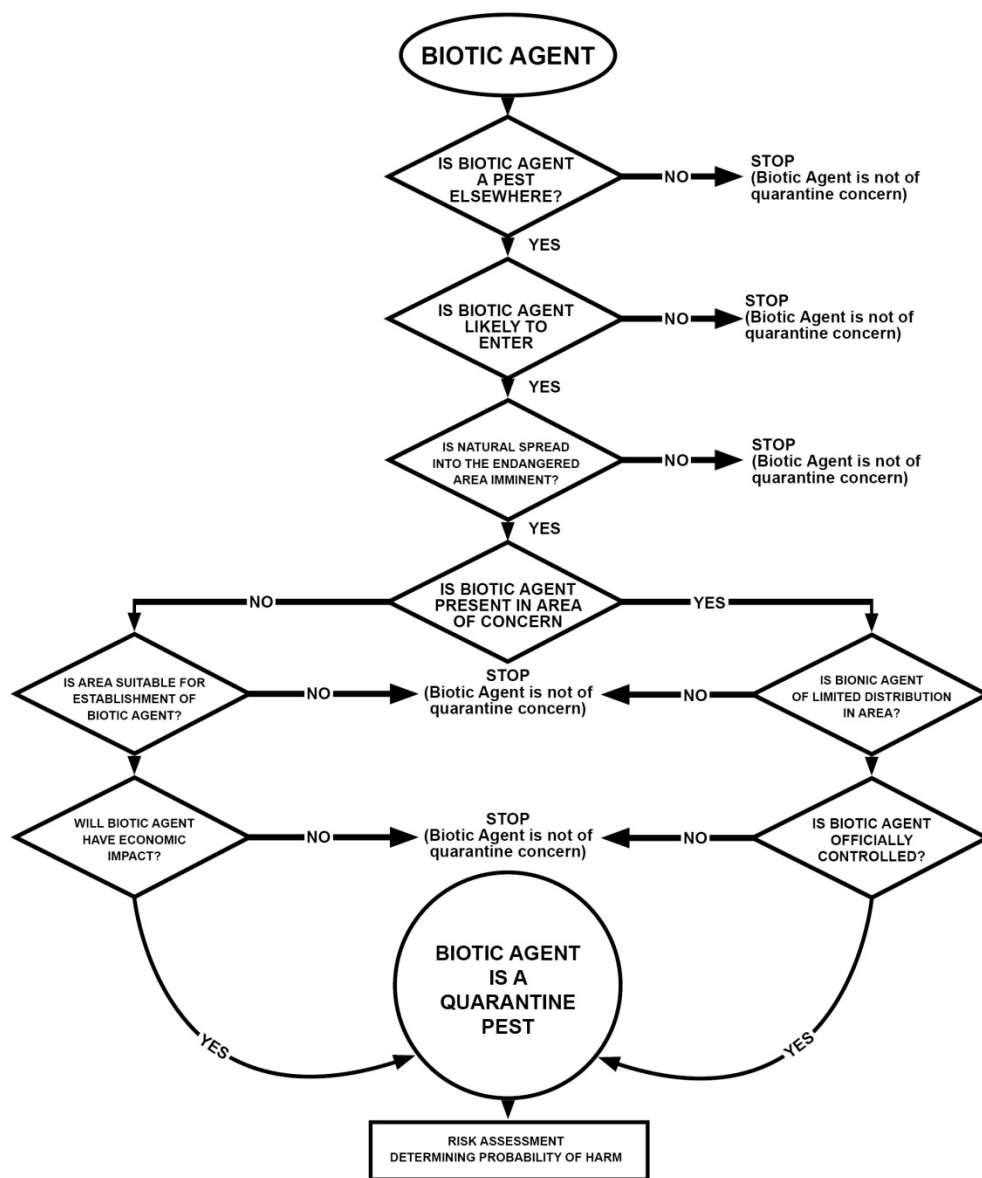


Figure 4. Quarantine pest identification.

There are several existing pest rating systems and they may not necessarily be comparable.

Risk Assessment

In a risk assessment (determining the probability of harm), the probability of an adverse event and the magnitude of the consequences can be estimated through gathering information on several critical elements that comprise risk: probability (or likelihood, chance), impact, uncertainty and ability to manage. Determining probability that harm, damage, or loss will occur is a prerequisite to the appropriate (and defensible) selection, implementation, and enforcement of effective mitigation measures, strategies, and regulatory mechanisms.

Risk assessment involves identifying predictable danger of loss, injury, or harm:

To what extent are agricultural and environmental interests and resources actually jeopardized or put into peril?

Could the biotic agent move from currently infested areas into the endangered area?
How: naturally or artificially? If natural spread from adjacent infested areas is imminent, quarantine measures are not justified. If artificially, what are the pathways and modes of movement? What is the likelihood of spread into the endangered area and within it after introduction, colonization and establishment?

Could the biotic agent survive in the endangered area? (Consider biological requirements in relation to climate, available hosts, human activities, microhabitats, etc.) If the biotic agent could survive, how, when, and where would it be likely to do so? Does it already exist in the area of concern? Is it being officially controlled?

Risk Characterization

Risk characterization involves determining the probability of harm and the relative economic importance of quarantine pests. It is desirable to achieve a risk mitigation measure that represents the least drastic action in terms of interference with the movement of people, goods, and vehicles.

There are many criteria that may be used to characterize the probability and magnitude of quarantine pest impact into three levels: Low, Medium and High.

Low Impact

Introduction Potential

Pest is not carried at a significant level on regulated commodities; i.e., not more than one-tenth of one percent of shipments is likely to be infested and those shipments that are infested are likely to contain no more than a few specimens of a pest not capable of reproduction as individuals

- Public demand for potentially affected commodities is low
- Number of pathways for artificial spread into the area of concern are few and well controlled
- There are effective commodity treatments (growing season or post-harvest).
- Pest is easily detected at ports of entry

Establishment Potential

- Ease of establishment/colonization is low due to climatic limitations or lack of a suitable host continuum in the area of concern
- Pest is not carried from one season to the next on the regulated material
- Pest does not persist in the field from one crop to the next in the absence of another host
- Crop must be planted annually
- In the endangered area

Pest Control Impacts

- Existing crop protection strategies would provide adequate control in agriculture, home gardens and landscapes
- Control efforts would not disrupt existing pest management programs

Quarantine Impacts

- The pest already exists in important export market areas
- Countries where the pest does not exist would not impose quarantine restrictions that could not be satisfied without significant cost and market disruption

Environmental Impacts

- There would be little or no adverse impact on forests, ecosystems, ecological habitats, or watersheds
- There would be no significant increase in the use of pesticides

Medium Impact

Introduction Potential

- Pest is carried at a significant level on regulated commodities; i.e., more than one-tenth of one percent of shipments is likely to be infested and those shipments that

are infested are likely to be infested at a level that would reasonably be expected to allow for reproduction

- Public demand and trade in potentially affected commodities is significant
- There are several pathways for artificial spread into the area of concern and closing them would be difficult and expensive
- There are effective commodity treatments (growing season and post-harvest)
- Pest is not easily detected at ports of entry

Establishment Potential

- Climatic conditions and host availability would allow establishment/colonization with some difficulty
- Pest could carry over from one season to the next
- Pest could persist in the field from one season to the next
- Perennial crops or important annual crops would be attacked

Pest Control Impacts

- Additional crop protection measures would be required to prevent economic damage to agricultural crops, garden produce, or landscaping
- Crop protection methods are available and feasible
- Additional control efforts would have only minor adverse impacts on existing pest management programs

Quarantine Impacts

- The pest does not exist in important export market areas
- Countries where the pest does not exist would impose phytosanitary restrictions
- Phytosanitary requirements could be met without major market impacts and costs

Environmental Impacts

- There would be little or no adverse environmental effects

High Impact

Introduction Potential

- Pest is carried at significant levels on regulated commodities
- Public demand and trade in affected commodities is high
- There are many pathways for artificial spread into the area of concern. Smuggling and hitchhiking on non-host commodities and carriers are likely
- Misidentification in package documents
- Commodity treatments are few, costly and of limited effectiveness
- Pest is not easily detected at ports of entry

Establishment Potential

- Climatic and host availability would make establishment/colonization likely
- Colonization could result from the introduction, escape, and survival of an individual.
- Pest could easily carry over from one season to the next
- Pest could persist in the field from one season to the next in the absence of a host or due to a succession of hosts
- Perennial crops would be attacked
- Detection would be difficult

Pest Control Impacts

- Additional, costly crop protection measures would be required to prevent economic damage in agriculture, home gardens, and landscapes
- There are few effective crop protection methods available and their use would create environmental, food safety, or public health consequences
- Additional control efforts would greatly disrupt existing pest management practices.
- Eradication would be a long-term effort, difficult, and costly

Quarantine Impacts

- Pest does not exist in important export market areas
- Countries where the pest does not exist would impose prohibitions or severe phytosanitary restrictions on affected commodities
- Markets could be lost or phytosanitary requirements could not be met without major market impacts and costs

Environmental Impacts

- There would be significant adverse environmental impacts

Pest Risk Mitigation Measures

Identification and Analysis

A series of questions are commonly posed in the search for suitable mitigation of the pest risk (Figs. 2, 5). The acquired information and analysis may lead to a decision that quarantine measures may not be justified or that they would be essential to protect an uninfested area.

What mitigation measures are available for use: prohibition of shipments from infested areas; growing season crop protection, cultural practices, or treatments; closed production facilities; post-harvest inspection and sorting; post-harvest heat or cold treatments; post-harvest chemical treatments; processing or special packaging?

Which of the available mitigation measures are most effective? Can they be used in combination to create an effective and feasible mitigation strategy? Are there methods or strategies that can be used without imposing a quarantine?

Is it feasible to use origin inspection, special permits, pest-free zones, pre-clearance and other such strategies?

Selection, Implementation, and Monitoring

There are a number of possible outcomes depending on the information gathered from the identification and analysis phase (Fig. 5).

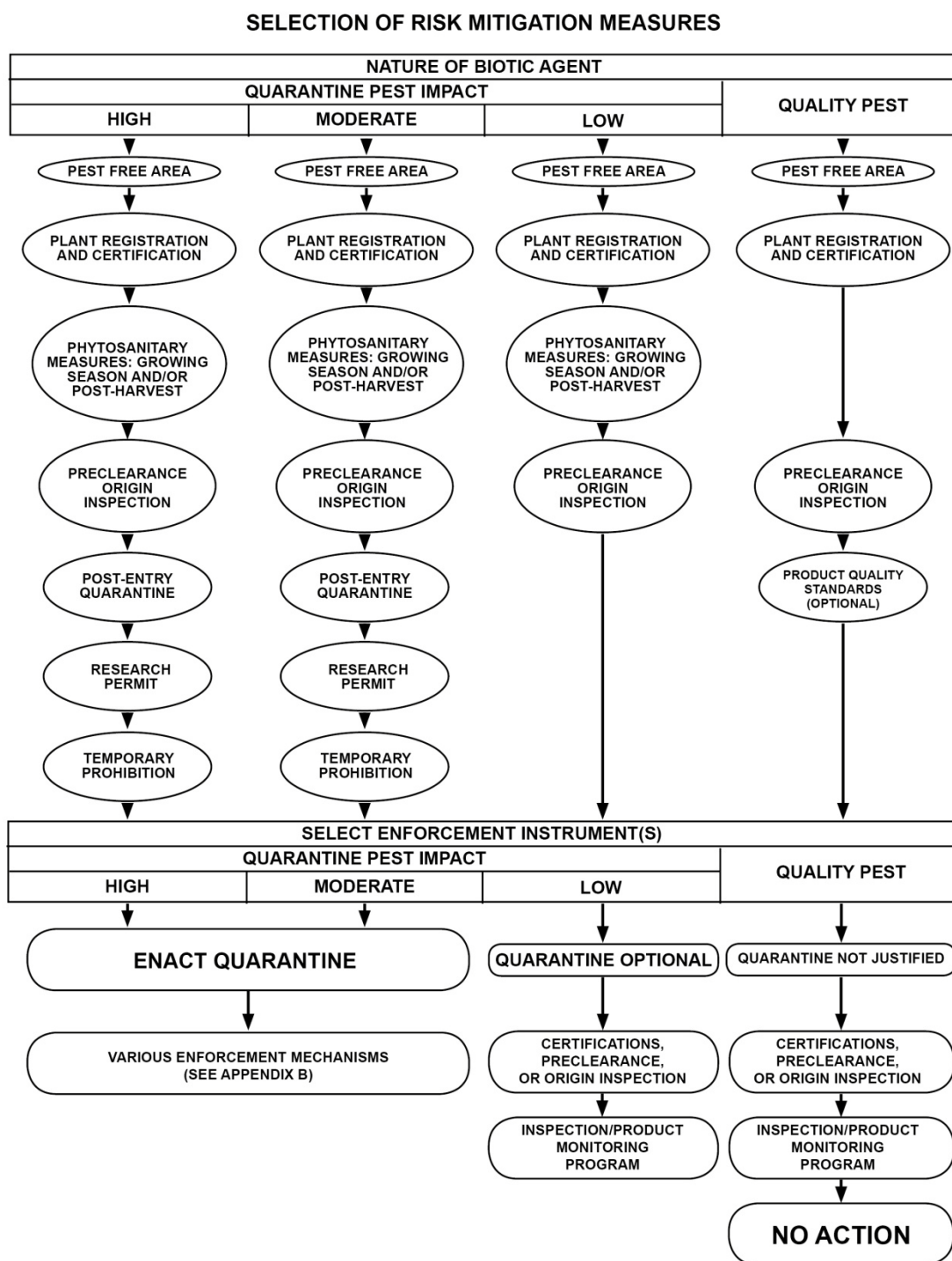


Figure 5. Selection of risk mitigation measures.

Selection - Certain of the risk mitigation measures alone might reduce the risk to an acceptable level. When that is the case, more than one might be selected for listing as alternatives to each other. For example, a formal registration and certification program or growing season treatments could be as effective as post-harvest commodity treatments. So one could be required or all three could be cited as equivalently acceptable alternatives.

In other cases, a combination of measures might be required in order to effectively address all the elements of risk. Various combinations might be required as an overall pest risk mitigation strategy. For example, growing season treatments and negative trapping together with post-harvest sorting and inspection requirements might achieve an acceptable level of risk.

When pests are not of quarantine significance but are still economically important, commodity standards for freedom may still be imposed. Among the reasons justifying quality standards is the fact that the feeding activities of certain insects (and other animal pests such as snails and slugs) and virus infections can disfigure or otherwise damage the appearance of plants in the marketplace and landscape plantings.

In any case, regulatory activity associated with established plant pest freedom standards must not be confused with quarantine or phytosanitary measures or their enforcement. In the case of commodity standards, tolerances are involved and shipments in violation should not be destroyed. At the discretion of receiving state officials, stock infested with pests at levels which exceed standards may be held off-sale or on-hold until treated to bring them into compliance or rejected and returned out-of-state.

In the case of quarantine shipments, they are in violation if they are not properly identified or certified or if they are found to be infested with a quarantine pest. Quarantine enforcement options include returning the shipment to the shipper, destroying it, or (when feasible) treatment.

Implementation - If a high economic impact quarantine pest is involved and phytosanitary measures are selected, most governmental plant protection agencies will choose to implement them by imposing a quarantine which names the pest, infested areas subject to the quarantine, hosts regulated, and required treatments and certification. However, other mechanisms may be utilized. They include compliance agreements, interagency agreements, interstate origin inspection/preclearance agreements, memoranda of understanding, permits, and policy, guidelines, and procedures.

Enforcement Mechanisms

There are a number of mechanisms or tools available for use by governmental agencies to enforce quarantine and nursery regulatory program laws, regulations and rules. Commonly used are:

Compliance agreements are issued by a regulatory agency to a grower, packer, shipper or other private party. Compliance agreements identify what requirements must be met, when they must be met, and how they must be met; and the penalties for failure to comply. They may require that officials in the importing country or state be notified when each shipment is made. Compliance agreements are powerful tools when authorized by law and properly used. For example, California law provides specific authority for their use and makes failure to comply with the terms of a compliance agreement subject to a \$10,000 civil penalty. A civil penalty of up to a specified limit may be assessed administratively by the regulatory agency.

Interagency Agreements are usually contractual in nature, requiring performance on the part of one of the parties and payment or reimbursement on the part of the other.

Interstate Origin Inspection/Preclearance Agreements are three-party agreements among the origin and destination state agencies and the commercial shipper.

The interstate origin inspection/precleanance agreements are distinguished from precleanance programs that involve the performance of inspections just prior to shipment by regulatory officials of the importing country or state. While the latter form of precleanance is utilized, it is discouraged because it is very costly and, where the exporting country or state employs competent phytosanitary officials with a good record for credible phytosanitary certification, it is no more effective in mitigating pest risk. Furthermore, precleanance by officials of the importing country or state does not guarantee acceptance of the precleaned commodity. Typically, shipments are held and inspected again at the port of arrival or terminal in the importing country or state and frequently rejected--sometimes on an arbitrary basis.

Memoranda of Understanding are prepared to describe programs, establish responsibility and accountability, outline procedures, establish guidelines, or set policy where more than one governmental agency is involved with program conduct. No funds are exchanged.

Permits are used within the quarantine arena to allow the movement of limited shipment of a prohibited commodity for a specific purpose (limited permit), movement of a restricted commodity under special conditions (research permit), alternative methods of certification (import permit), etc. Permits may be issued to individual shippers or a master permit may be issued by one state regulatory agency to another state regulatory agency to cover a number of shippers meeting specified conditions and terms.

Policy, Guidelines and Procedures - Quarantine and nursery regulatory agencies often develop and issue policies, guidelines, and procedures as educational tools and as a means of assuring consistency and uniformity and preventing arbitrary or capricious

actions by their employees in the enforcement of established rules and requirements. Policies, guidelines, and procedures should not establish restrictions that function as "underground" regulations. Often these documents are compiled in the form of manuals which are distributed to the appropriate staff.

As a matter of law, the implementation of a quarantine usually involves notification and opportunities for comment by affected entities) before the quarantine regulation or rule becomes effective.

In the United States, the National Plant Board has established a set of plant quarantine principles. The regional plant boards have participated in the development of those principles and agreed to abide by them as a matter of policy. Noncompliance with these principles is a factor in determining the validity of any quarantine imposed.

After adoption of a quarantine, all interested and affected parties should be notified in writing at least 30 days before the effective date if at all feasible. In emergency situations, notice should be given quickly via fax, E-Mail, telephone, or other rapid communication technologies, followed by written notification.

An inspection or other monitoring system should be used to enforce and assure compliance with requirements. The system should include prompt notification to shippers when violations are discovered. Good monitoring and record-keeping enables planned periodic review and evaluation of the requirements to assure that requirements are 1) current, 2) revised and reissued as needed, and 3) still in compliance with the NPB principles of plant quarantine and these guidelines.

PLANT QUARANTINE

Historical Background and Need

"Principles of Plant Quarantine" was adopted by the National Plant Board on 1931, amended in 1936 and supplemented in 1969 with a set of basic definitions and general guidelines to be considered in preparing quarantines and supporting documents, to promote greater uniformity of plant quarantine actions throughout the United States. In August 1972, the NPB adopted "Principles of Plant Pest Control."

Principles of Plant Pest Control

Definition - Plant pest control means (in this instrument) the employment of a publicly supported program to eradicate, retard the spread of, or to reduce the level of loss resultant from a plant pest.

- a. Eradication means the complete removal of a plant pest from a given area.
- b. Plant pest means a living organism which damages, or is capable of damaging, desirable vegetation and may include insects, mites, other invertebrate and vertebrate animals, viruses, bacteria, fungi, and other plants not to exclude seed plants. (An organism not commonly considered a pest may, under certain conditions become damaging, and may then be designated a pest by appropriate authority.)

Basis in Logic - Since the measures required to implement a pest control program usually involve treatment of private and public property for the benefit of wider interests or the public welfare, they could not be undertaken by private individuals or groups, and therefore to resort to procedures under public authority is logical.

3. *Necessity* - The necessity for a publicly supported program for control of a plant pest rests on the following fundamental prerequisites:

- a. The pest concerned must be of such nature as to seriously threaten substantial interests.
- b. The benefits expected must outweigh the cost of the control program.
- c. The program must offer promise of being both biologically and technically feasible.
- d. In calculating the cost-benefit relationship of a program, significant adverse effects on nontarget organisms or on the environment will be included in the evaluation.
- e. If the pest under consideration is of less than general distribution, control and eradication efforts should be supported by appropriate quarantines, unless the pest is deemed not to be susceptible to quarantine management.
- f. Any pest control program shall be supported by an active research program except in emergency instances in which case a research program must be established without delay.

4. *Analytical Evaluation* - A pest control program shall be subjected to continuous study and reevaluation in the light of current research and of other information acquired during the program's operations. In a control program, whenever such reevaluation indicates the feasibility of eradication of the pest species, immediate attention should be given to the redirection of such a program toward the goal of eradication.

5. *Public Cooperation* - In any control program, the active cooperation of the general public must be sought and maintained as much as feasible.

6. *Cooperative Management* - The cooperating agencies shall be equal partners in any pest control program and no unilateral action on the part of any one of the partners, which would materially affect the program, should be taken without prior consultations with the other partners in the cooperative endeavor.

7. *Termination* - Whenever the study and reevaluations, called for above, indicate that the ends of the program cannot be met or that the anticipated cost-benefit equation has shifted materially so that the expected benefits no longer outweigh the cost, the program should be promptly terminated.

Historically, plant pest and disease prevention and, more narrowly, plant quarantine have been relatively stable and new developments have been slow in coming. However, recently there have been many momentous changes including:

- Approval of the North American Free Trade Agreement (NAFTA) by Canada, Mexico and the United States (<http://www.ustr.gov/trade-agreements/free-trade-agreements/north-american-free-trade-agreement-nafta>);
- Approval of the General Agreement on Trade and Tariffs (GATT) with its provisions for dealing with sanitary and phytosanitary measures (SPS) (http://www.wto.org/english/tratop_e/gatt_e/gatt_e.htm);
- Increased regional plant protection organization (RPPO) activity, i.e., (<http://www.nappo.org/en/>)
- Establishment of the International Plant Protection Convention (IPPC) (<https://www.ippc.int/>) Secretariat in the Food and Agricultural Organization (FAO) (<http://www.fao.org/home/en/>).

The GATT agreement recognizes, as international standards, the guidelines and recommendations for plant health developed under the auspices of the Secretariat of the IPPC in cooperation with the RPPOs operating within the framework of the IPPC. Similarly, the NAPPO is recognized in the NAFTA as the international body having responsibility for the establishment of phytosanitary standards for North America (Fig. 1).

National Plant Board Principles of Plant Quarantine

A quarantine is a restriction, imposed by duly constituted authorities, whereby the production, movement or existence of plants, plant products, animals, animal products, or any other article or material, or the normal activity of persons, is brought under regulation, in order that the introduction or spread of a pest may be prevented or limited, or in order that a pest already introduced may be controlled or eradicated, thereby reducing or avoiding losses that would otherwise occur through damage done by the pest or through a continuing cost of control measures.

Since the ends to be attained by a quarantine and the measures required by it could not be undertaken by private individuals or groups, involving as they do restrictions on areas, persons, or activities for the benefit of wider interests or the public at large, resort to regulation imposed by public authority is logical. The logical foundation for quarantine action is defined and attention is directed to the fact that private or group action cannot take the place of a regulation imposed by public authority.

Establishment of a quarantine should rest on fundamental prerequisites, as follows: (1) the pest concerned must be of such nature as to offer actual or expected threat to substantial interests; (2) the proposed quarantine must represent a necessary or desirable measure for which no other substitute, involving less interference with normal activities, is available; (3) the objective of the quarantine, either for preventing introduction or for limiting spread, must be reasonable of expectation; (4) the economic gains expected must outweigh the cost of administration and the interference with normal activities.

Four substantial prerequisites of quarantine action are set forth. It is believed that these four, as defined, are self-explanatory. Thus, if the pest concerned is not one which offers either actual or expected threat to substantial interests, it should not involve the machinery and restrictions of a quarantine. If some measure is available and presumably effective which is less costly or burdensome than a quarantine, that measure should be the one adopted. If the quarantine cannot be expected to accomplish anything its promulgation is questionable. If the economic gains from a quarantine are likely to be less than the cost of it, including the economic losses that it occasions, it cannot be defended.

A quarantine must derive from adequate law and authority and must operate within the provisions of such law. Promulgation of a quarantine which does not have behind it statutes or authority adequate to permit its enforcement is an invitation to annulment. Where such authority does not exist, it should be sought. A quarantine established for the purpose of attaining an objective other than that which it indicates or defines is open to serious criticism, even though the actual objective is itself desirable. It is important to recognize that the purpose of this paragraph is to point out the danger inherent in a quarantine which, though presumably

intended for control of a pest or similar purposes, is actually based on another objective, such as furtherance of trade.

If the circumstances will permit, public notice of a proposed quarantine should be given and those interested should be invited to contribute facts in their possession. But if the objective would be defeated by the delay required for such notice and discussion, duly-constituted authorities should assume responsibility for the decision to impose or withhold quarantine action. The principle is submitted that public notice of a proposed quarantine is desirable when possible, but on the other hand, public notice should not be absolutely required, because occasion may arise when to delay until public notice can be given would mean defeat of a critically important objective.

The extent of restrictions imposed by a quarantine should be only such as are believed necessary to accomplish the desired end, but on the other hand the objective of a quarantine should not be jeopardized by omission of any necessary restriction. The principle here involved is one of adequate measures to accomplish the necessary end, but along with this the exercise of care not to impose unnecessary restrictions.

If a quarantine is imposed in order that eradication of a pest from a given area may be undertaken, the restrictions involved may properly be relatively extensive, because of the importance of the objective sought, and because the time through which the quarantine will operate may be expected to be relatively limited.

If a quarantine is imposed for the purpose of limiting or retarding spread of a pest, but without expectation of eradication, the restrictions imposed should be such as are in line with the objective of the quarantine and should recognize the fact that continuance of the pest in the area where it is established, or possibly its spread in time to new areas, is accepted.

It is possible that a quarantine based on the hope of actual eradication of a threatening pest may properly involve more severe restrictions than those permissible in a quarantine which can hope only to retard spread. In the former case the objective to be gained is greater, the time through which the measure will prevail is presumably more limited, and the restrictions imposed may legitimately be more severe. In the latter case, the actual objective should be clearly understood and the measures adopted should be such as are allowable in view of the end sought.

Since quarantines usually involve relations between public authorities, such as those of the government of one country with that of another, or of Federal and State governments, or of State government and local authorities, the cooperative relationship that is necessary to adequate enforcement should be clearly recognized and duly provided for. The cooperative relationships which are nearly always involved in a quarantine should be recognized and should be provided for in the measures proposed.

Because of the fact that the success of a quarantine requires that its restrictions be fully maintained, it is essential that all persons who are affected by it adhere to its requirements. In order that this end may be attained the administration of a quarantine should seek the intelligent cooperation of the public affected, rather than depend exclusively on police powers, the imposition of penalties, or resort to court action, law enforcement activities and agricultural warrants. A successful quarantine means complete adherence to its provisions on the part of all concerned. Since usually very large numbers of the public are involved, cooperation of the public should be sought.

In order that a quarantine may be administered readily and consistently, it should be designed with care, should be phrased clearly, and should be made as simple as is consistent with legal requirements and the objectives to be attained. Quarantines have a tendency toward complexity. Sometimes this is inevitable. To meet this difficulty, special effort should be made to phrase a quarantine order in the clearest and most logical language possible.

Since the persons affected by a quarantine may not reasonably be expected to possess full or accurate knowledge of the circumstances that make it necessary, or the nature and importance of the aim sought, and since compliance with quarantine restrictions will be more complete if the objective and plans are understood, measures should be taken to set forth the conditions existing, the means to be employed, and the end to be attained, and these measures should be continued from time to time as the undertaking proceeds toward accomplishment. The fact is recognized that any quarantine is likely to be criticized from time to time, and sometimes seriously so. Much criticism arises from an imperfect understanding of the objective of the quarantine and the necessity for its provisions. It is submitted, therefore, that constant and consistent effort should be made to keep the public advised as to the actual objectives of a given measure and the reasons why it imposes the restrictions that it involves.

If an emergency requires the establishment of a quarantine before satisfactory biological data are available, provision should be made as soon as possible for extending the fund of biological knowledge. The authority that exercises the right to establish a quarantine should request or secure the means for biological research, both in order that the quarantine may be made more efficient, and in order that the restrictions may be lessened where possible. The need for research, however, should not be permitted to delay the establishment of a quarantine believed by authorities to be desirable, thereby jeopardizing the objective that might otherwise have been attained.

Often a quarantine must be set up before even reasonably complete knowledge of the pest concerned is available; and, on the other hand, the fact that study of the pest, and of many other phases of the matter, should go on, in order that wise improvements may be possible. These improvements may consist of additional necessary restrictions not appreciated at the start, or they may include relaxation of certain restrictions not found necessary.

As conditions change, or as further facts become available, a quarantine should promptly be modified, either by inclusion of restrictions necessary to its success or by removal of requirements found not to be necessary. The obligation to modify a quarantine as conditions develop is a continuing obligation and should have continuing attention.

If a quarantine has attained its objective, or if the progress of events has clearly proved that the desired end is not possible of attainment by the restrictions adopted, the measure should be promptly reconsidered, either with a intent repeal or with intent of substituting other measures. Just as there should be readiness to take prompt action in imposing restrictions, so also there should be readiness to take equally prompt action in relaxing them or repealing them, when the progress of events indicates such changes to be proper and safe.

Upon establishment of a quarantine, and upon institution of modifications or repeal, notices should be sent to the principal parties at interest, especially to Federal and State authorities and to organizations representing the public involved in the restrictive measures.

This is essentially a matter of helpful practice, based on the fact that various parties, including quarantine officers of other jurisdictions, should know promptly of any changes in the quarantine structure.

In defining the boundaries of a quarantined area, it is usually desirable to utilize state, county or township lines. However, if a suitable natural feature such as a mountain range or a large river more satisfactorily defines the actual area, such natural features should be utilized in a description of a quarantined area. In some instances, where it appears that the use of natural boundaries is more convenient and works less hardship on commerce and at the same time adequately marks the boundary of a quarantined area, it seems advisable to use such boundaries.

Types of Quarantine Action

Several types of quarantine action may be taken, depending upon the problems involved. These may be defined as follows:

1. *Hold Order*. An authenticated order or notice issued to the owner or person in charge or possession of a premise, plant, conveyance, or article infested or exposed to infestation, making it unlawful to move the specified article(s) set forth in the order or notice unless treated in accordance with prescribed procedures. If no less drastic procedures are available, the order may require destruction of the infested article. Hold orders normally are issued to take prompt regulatory action in emergencies. If continuing quarantine action is required, a formal quarantine should be invoked. Hold orders may be issued to retain necessary quarantine action on a few properties if

eradication treatments have been applied and continuing quarantine action is no longer necessary for the majority of the regulated area.

2. *Emergency Regulation.* A regulation placed in effect without prior public notice in order to take immediate regulatory action.

3. *Federal quarantine.* A quarantine invoked under provisions of the Plant Quarantine Act. There are two general types--those regulating domestic interstate movement and those regulating movements from foreign countries. Federal domestic plant quarantines are applicable to pests within the United States. Control over the movement of regulated articles is applied at source. Federal domestic quarantines apply only to interstate movement. Federal foreign quarantines are applicable to pests in foreign areas known to be infested. Control over movement is applied at the U.S. port of entry (except under special circumstances through special arrangement with the exporting country).

4. *State Plant Quarantine.* A quarantine adopted under authority of State law.

(a) *State Interior Quarantine:* A quarantine regulation adopted by a State against a pest of no apparent quarantine significance to any other State; to prevent spread of the pest within its borders; or one adopted by a single infested State against a pest of regional or national significance when no Federal domestic quarantine is adopted to prevent spread of the pest within and from the infested State.

(b) *Parallel State Interior Quarantine:* A quarantine regulation adopted by an infested State, against a pest which is not distributed throughout the State; and the pest is also subject of a Federal domestic quarantine, and it is desired to regulate only the infested portion of the State. Areas to be regulated should be described in both the State and Federal domestic quarantines and both quarantines should be parallel with respect to the basic requirements needed to prevent spread. The State quarantine regulates intrastate movement and the Federal quarantine regulates interstate movement from the regulated portion of the State. Such quarantine action is required if the Federal quarantine is to apply only to the infested portion of the State.

(c) *Uniform State Quarantine:* A quarantine or regulation adopted by two or more infested States which are parallel with respect to their basic requirements. The regulated area in each such uniform State quarantine should describe the area to be regulated in the issuing State and should include a reference to regulated areas of all other infested States under uniform State quarantine. If a pest of regional or national significance occurs only in limited areas of one or a few States and no Federal domestic quarantine is anticipated, an effective State Interior Quarantine adopted by a single infested State [see (a) above], or the adoption of Uniform State quarantines by all

infested States, which will control both intrastate and interstate movements *from* all known infested areas, is preferable to the adoption of Standard State Exterior quarantines [see (d) below] by all other noninfested States.

(d) *Standard State Exterior Quarantine*: A quarantine regulation adopted by a noninfested State. If the pest is widespread in distribution and involves several States, it may be more practical for the noninfested State(s) to invoke regulations requiring such controls at destination as are necessary to provide protection to their industry. In cases where two or more States take quarantine action against such a pest, it is recommended that there be agreement and that similar action be taken by all States adopting or maintaining a quarantine against the particular pest. Such quarantines should be referred to as Standard State Quarantines.

Operating Principles

Reporting New Pests. State regulatory officials should immediately report new plant pest discoveries within their State to the Plant Protection unit and regulatory officials of other States as deemed necessary. The report should include the name of the pest, identifier, and location of the find. Quarantine action or other safeguard measures being taken to prevent spread while the infestation is under investigation should be indicated. In this initial notification, the statement may simply indicate that all pest carriers, including host products, are being properly safeguarded before movement is allowed from the infested area either by the State regulatory personnel alone or in cooperation with the Plant Protection Division shall inform all States concerning the discovery and include in the report other available information, such as potential importance and actions that may be considered by other regulatory officials. As additional information develops, follow up reports should be submitted through the same channels to keep all State regulatory officials properly informed.

Notification. Quarantine action taken prior to public notice should be brought to the attention of all concerned regulatory officials immediately. If a Federal quarantine is in effect against this pest or a Federal quarantine is anticipated, all State regulatory officials should be informed and the affected State(s) consulted prior to making any announcement of action anticipated to adopt, amend or repeal such a quarantine. It is recommended also where Standard State Exterior Quarantines are applied that other regulatory officials be informed of anticipated amendments or revocations.

Federal Precedence. Biologically sound Federal quarantines take precedence over State regulations against the same pest. However, any State may adopt a quarantine or regulation against a pest or an area not covered by a Federal quarantine. Any State may seize, destroy, or require treatment of products moved from a federally regulated area if they were not moved in accordance with the Federal quarantine regulations or, if certified, they were found to be infested with the pest organism. USDA APHIS PPQ administers the Federally Recognized State

Managed Phytosanitary Program. The allows APHIS-PPQ to recognized State programs to eradicate, exclude or contain any plant pest that is not eradicated or contained by APHIS-PPQ. Under the guidance of the IPPC, shipments containing pests under recognized state management will be subject to equivalent phytosanitary requirements in domestic and foreign commerce.

Pest Eradication. It may not be necessary to adopt or amend a Federal quarantine to include a State that is known to be infested, provided the State is taking necessary quarantine action under its State law and is applying eradivative measures independently or is participating with the Federal agency in treatments to control or eradicate the pest. In such instances, State officials should adopt a specific quarantine or regulation which provides for the same control over the movement of regulated articles as is provided for in the Federal quarantine. The State also should, in cooperation with the Federal agency, conduct necessary surveys to detect, delimit, and suppress populations.

Uniform Quarantines. If all States known to be infested with a pest adopt uniform quarantines, which provide protection to all noninfested States as well as to noninfested portions of the infested States, noninfested States should not invoke a quarantine against the infested States. By mutual agreement, Federal regulatory agencies may participate with State regulatory officials in the enforcement of Uniform State Quarantines and State Interior Quarantines directed against pests of regional or national significance.

Treatments and Safeguards. Before adopting or amending any treatment or safeguard procedure to be utilized in a Federal domestic plant quarantine, there should be agreement between the affected State regulatory officials and the Federal agency. Likewise, treatments and safeguard procedures to be utilized in State Uniform Quarantines and State Interior Quarantines directed against pests of regional or national significance should be agreed upon by all States adopting such regulations and with the Plant Protection Division if it participates in the program directed against the pest. Agreement between State regulatory officials also is desirable for Standard State Quarantines.

Interstate Shipments. Any regulated article that is prohibited interstate movement or is required to be certified, if moved interstate from a regulated area by a State or Federal quarantine at source, should be refused by any destination State regulatory official if so moved in violation of, or not certified in accordance with, the quarantine in effect at the source. If only a portion of the source State is under such a State or Federal quarantine at source, the destination State regulatory official should not refuse or require a certificate on any such article moved interstate from any nonregulated portion of the source State, unless the article is found to be infested or is prohibited or required to be certified under a specific quarantine of the destination State. The owner or carrier of regulated products which are reportedly originating in nonregulated portions of a quarantined State must provide proof of origin of the regulated

products through an invoice, waybill, or other shipping document to the satisfaction in the receiving State regulatory official.

Basic Provisions for Inclusion in Quarantines

1. *A notification of the quarantine and quotation by authority.*

2. *Name of pest organism.*

3. *List of regulated articles.* The list should include the specific hosts and articles with which the pest organism definitely may be associated, and provide for the regulation of any other article the movement of which may present a hazard of spread whenever such a hazard has been determined by an authorized inspector, and when the owner or possessor thereof has been so notified.

4. *Provisions for exempting articles from specified requirements.* Certification or treatment may be waived for certain articles under specified conditions. These may be specified in a separate document or in the listing of regulated articles, whichever procedure is the most feasible.

5. *Description of Regulated Areas.* Depending upon the nature of the pest and known distribution, the regulated area to be described in the quarantine may involve the entire State, portion(s) of the State (areas), or list of names and locations of infested properties.

(a) Regulated areas may be subdivided into suppressive and generally infested areas in those quarantines where it is desirable to augment suppressive or eradication measures being applied in certain areas, and it is believed necessary to control movement into such areas from generally infested areas.

(b) Wherever basic laws provide the authority to do so, it would be desirable to include provisions in the quarantine for adding to the regulated area any other area known to be infested, or which is found to be infested after adoption of the quarantine, when so declared by the authorized regulatory official through publication of a notice to that effect in local newspapers or through direct written notice to affected property owners or by other legally prescribed procedures.

(c) When it is determined that infestation in a certain regulated area has been eliminated through the application of treatments, to the extent that movements of the regulated articles therefrom would no longer present a pest risk, except movement from a few remaining infested properties in the area which can be

controlled by the regulatory official of the source State by serving a written hold order on each owner of an infested property, the quarantine may be lifted on such a regulated area, and it should not be necessary to list in the quarantine the names and locations of the infested properties under hold order. Another approach would be to exempt such areas from specified requirements until eradication had been achieved.

6. Conditions governing the movement of regulated articles from or within regulated areas.

(a) Certificates or permits should be required for the movement of non-exempted regulated articles when:

- (1) Moving from a regulated area to any point outside thereof.
- (2) Moving from a generally infested area into a suppressive area.
- (3) Moving within a suppressive area where such control over this movement is desirable.

(b) Certificates or permits should not be required for any regulated article originating outside of a regulated area moving to another nonregulated area, or moving through or reshipped from a regulated area when the point or origin of the article is clearly indicated on a waybill, bill of lading, shipper's invoice, or other similar document accompanying the shipment, provided that shipments moving through or being reshipped from a regulated area must be safeguarded against infestation while within the regulated area in a manner satisfactory to an inspector.

(c) Certificates should not be issued unless provisions of other applicable quarantines have been met and the regulated articles:

- (1) Originate in a noninfested portion of the regulated area and have not been exposed to infestation while within the regulated area; or
- (2) Have been examined and found to be free of infestation (This method of certification should not be allowed on certain programs if it is impossible to visibly determine whether the pest is present, *e.g.*, nematodes, witchweed seed. The thorough cleaning of a product is an authorized treatment procedure but the examination of such product after cleaning is to determine whether it is cleaned and not to visually inspect it for the pest.); or

(3) Have been treated in accordance with approved procedures; or

(4) Have been grown, produced, manufactured, stored, or handled in such a manner that, in the judgment of the inspector, no infestation would be transmitted thereby.

(d) Limited permits may be issued to allow the movement of regulated articles to a specified destination for limited handling, utilization, or processing, provided the inspector has determined that such movement will not result in the spread of the pest and requirements of other quarantines have been met.

(e) Control over the movement of regulated articles from infested premises to noninfested areas within a regulated area may be provided for when such control over movement within a regulated area is desired to prevent pest spread. This provision usually will be applicable only when eradication treatments are being applied and would be handled through a direct written notice to the property owner concerned.

(f) Compliance agreements should be required as a basis for the issuance of certificates or permits in bulk to industry for their issuance, and they are desirable to explain the main provisions of the quarantine for that particular concern.

7. Provisions for movement under permit for scientific purposes.

8. Waiver of liability of any damage to any regulated products as a result of treatment and any cost associated with treatments that may be required.

9. Penalties for violations.

Role of a Quarantine

Plant pest quarantines are imposed to prevent artificial introduction or to limit the spread of harmful plant pests of agricultural and natural resources. Such quarantines may restrict the production, movement or existence of plants, plant products, animals, animal products, or any other articles or material, or activity of people which could result in the artificial introduction or spread of the specified pest(s).

A quarantine is a legal instrument duly imposed or enacted by a governmental agency as a means of mitigating pest risk. A quarantine enables enforcement of prohibitions, restrictions, treatments and certification requirements and other pest risk mitigation or management

measures identified as being necessary to prevent the harm or damage that could result from the introduction and permanent establishment of an exotic pest in an endangered area.

Authority and Preemption - Quarantines are seldom statutory in nature, *i.e.*, they are not enacted through the legislative and executive branches of government. Instead, a quarantine is usually in the form of administrative law duly authorized by statute and promulgated as rules or regulations pursuant to a procedure elaborated in statutory law. Quarantine should be based on statutory authority

Federal quarantine law preempts state quarantine requirements. Similarly, local quarantine requirements are preempted by state quarantine requirements. Inasmuch as the purpose of plant quarantines and the means required to achieve them cannot be undertaken by private individuals or groups, quarantines properly are the responsibility of government. Quarantines shall not be imposed as trade barriers.

Quarantines will be as narrow in scope as possible while maximizing the potential for accomplishing their purpose.

Quarantines imposed in connection with plant pest eradication projects may be broader in scope and/or more restrictive because of the importance of the quarantined pest, the prognosis for its eradication or control, and its effects on the environment.

Quarantines imposed to prevent or slow the spread of established pests should be narrow in scope.

Quarantine areas should be as limited as possible and should be consistent with the area known to be infested. Whenever possible, boundaries shall be based upon existing state, county or township lines, major highways or roads, or geographic features such as rivers and mountain ranges.

Quarantines should be written as clearly and concisely as possible.

Adoption of a quarantine against a serious plant pest new to the endangered area will be accompanied by an information campaign. The scope and intensity of this campaign should be in proportion to the economic and/or environmental importance of the pest.

The scope of and restrictions imposed by a quarantine should be reduced or increased based on experience and information obtained in the administration of the quarantine.

Regulations establishing quarantines will be repealed when their purposes have been accomplished or they are no longer feasible.

Model Quarantine Elements

A quarantine consists of several essential elements each of which is identified and discussed here.

- Pest(s) Covered - The pest(s) targeted for exclusion must be identified to assure that those who must comply with the quarantine know what is covered and to prevent circumvention and any caprice or arbitrariness in the administration of the quarantine.
- Area(s) Covered - The area(s) covered, also known as the area(s) under quarantine, must be identified to enable all interested and affected parties to determine where the quarantine requirements or restrictions apply and where they do not. Areas covered must be consistent with:
 - The known presence/absence of the pest(s)
 - The biology of the pest(s) and its means of spread
 - Geographic barriers
 - Identifiable infrastructure such as roads and highways, geographic features such as oceans and mountain ranges, and political subdivisions such as city limits, county or parish lines, and state and country borders
- Hosts and Possible Carriers (or Articles and Commodities Covered) - a list of prohibited or restricted regulated items.
- Definitions - Any terms used that might not be readily understood should be clearly defined.
- Restrictions or Treatments Required - Approved pest risk mitigation measures such as growing season inspection, trapping, treatments, or cultural practices and post-harvest inspection or commodity treatments must be identified together with what kind of supervision and documentation is required.
- Special Handling Requirements - If special containers, packing, and shipment security methods are required, these should be specified.
- Identification - If treatment or packing facility or other identification is required, it should be stated.
- Certification - The kind and form of acceptable certification for treatment, handling, identification or origin must be specified. When origin certification is required for shipments produced, assembled or made in areas outside of the area(s) under quarantine, certifying officials must not certify materials that do not meet the commodity origin criteria discussed in the following section or which would reasonably be believed to result in the further spread of a quarantine pest.

Commodity Origin

The issue of commodity origin is critical in the matter of quarantine certification. What is the true origin of a commodity? When does a quarantined product or commodity change its status as to origin? What factors should be considered?

Neither the mere relocation nor the passage of time change the pest risk associated with commodities from particular quarantine origins. Moving an infested commodity from an area under quarantine to one not under quarantine will only further the spread of pests to new areas. Furthermore, host commodities might become infested with additional quarantine pests while passing through or temporarily held in another area.

The real issue is the mitigation of pest risk to an acceptable level. Actions that might reduce pest risk to an acceptable level include:

1. Processing in a way that eliminates the pest and creates a new product.
2. Treatment that eliminates the pest followed by additional growth in a new area.
3. Growing through a climatic period or holding under conditions that would eliminate the pest.

Certifying officials are responsible for such determinations and must be committed to making them on the basis of preventing spread of quarantine pests to new locations identified for protection. This means that officials must be alert to efforts to "launder" shipments by movement from a quarantine area through one that is not under quarantine. Requiring shippers to maintain records showing the source of all stock presented for phytosanitary certification is advised as one way of dealing with this problem.

Terminal Inspection

Some states enforce their quarantine and nursery pest freedom standards by inspecting shipments as they arrive at various terminal points within the state. Terminal inspection points include bus, train, and truck terminals; express parcel carriers (*e.g.*, Federal Express, United Parcel Services) terminals; grain elevators; florists and nurseries; land, sea, and air ports of arrival; and U.S. Postal Service post offices, and sectional or bulk mail centers.

To facilitate inspection activity, two states operate border agricultural inspection stations and have state statutes requiring that all shipments be held for inspection at time of arrival, and that inspection officials be notified of the arrival of all shipments. Express parcel carrier and U.S. Postal Service (USPS) operational problems associated with holding requirements include profiling packages (determining which ones contain plant materials), timely inspection, and legal constraints.

The profiling problem is mitigated to some degree by laws requiring that, at a minimum, parcels containing plant materials bear a label stating that the parcel contains plant materials, and giving the name and address of the shipper. However, the emphasis for express parcel carriers and the USPS is on prompt delivery. Therefore, little or no time is spent reading labels. Detector dog teams are now being used to facilitate the profiling (parcel sorting) process and are having great success in detecting plant materials.

As a matter of uniformity, it is recommended that all states require commercial express parcel carrier and USPS plant materials shippers to label their packages in the following manner:

1. A red sticker is applied to parcels that contain plant material to signal that they must be held for agricultural inspection upon arrival. The wording, format and approximate size should be as follows:

WARNING!
PLANT MATERIAL
HOLD AT DESTINATION CENTER
FOR AGRICULTURAL INSPECTOR

2. A green and white sticker be applied to parcels that contain plant materials that have been precleared under the terms of preclearance or interstate origin inspection programs and that need not be inspected upon arrival at a carrier terminal or USPS post office or sectional or bulk mail center..

3. A statement is applied to all parcels containing plant materials authorizing the opening and inspection of the contents. (This requirement is to facilitate inspection at USPS points of arrival. First class, Express, and Priority mail parcels are otherwise sealed against inspection and can only be detained upon probable cause and opened for inspection upon the issuance of a search warrant by a federal magistrate.) The recommended statement is: "May be Opened for Agricultural Inspection".

The stickers and the statement in paragraph 3 should be placed in close proximity to the address on the parcel.

It is recommended that the foregoing requirements be effectuated through compliance agreements, interstate origin inspection agreements, preclearance permits, or memoranda of understanding. States with holding and terminal inspection requirements are expected to take the lead in working with their counterparts in other states and with the carriers to meet their specific holding and inspection needs.

Periodic Review and Evaluation

Plant quarantines should be reviewed at least every five years to determine their continued need, validity, and cost-benefit. A new pest risk and risk mitigation analysis should be performed as outlined in these National Plant Board Guidelines. When need and validity issues are raised or complaints are filed by other pest prevention agencies, review and evaluation also will be required. As part of recent efforts directed to strategic alliance strategies between APHIS-PPQ and the NPB, a working group is formulating guidelines for potential deregulation of pests in a quarantine program.

Interstate Origin Inspection and Preclearance Programs

Pest risk mitigation tactics or strategies can be enforced at the point of origin or at the point of arrival of the shipment. Enforcement at the point of origin can be more efficient and effective. It has the additional advantage of much more orderly marketing. Interstate origin inspection programs can be developed to achieve compliance with both quarantine and product quality standards.

Phytosanitary Certification

Phytosanitary certification specifically relates to certification of compliance with the quarantine requirements of a foreign country or another state. The standard clarifies what phytosanitary certification is, why it is important, and what contributes to validity and reliability. Program administrators will want to make compliance with it a matter of agency policy.

NURSERY INSPECTION

Inspector Qualifications

Regulatory agriculture inspectors must be knowledgeable about plant pest prevention systems. An inspector is one who is authorized to issue quarantine and other certificates under his or her own signature. The following are desirable minimum qualifications:

- Education - Graduation from an accredited college or university with a degree in a biological science (alternatively including specialization in agronomy, biology, entomology, horticulture, plant pathology, or zoology)
- Experience - At least two years performing plant pest prevention work (alternatively including biological control, nursery inspection, quarantine inspection, pest management; or a combination thereof)
- Continuing education - professional societies and organizations
- Appropriate federal authorization for issuance of federal certificates

Typically, inspectors receive both classroom and on-the-job training. Some states have inspector education, experience, examination and certification requirements. The issuance of federal phytosanitary certificates requires additional qualifications and training. Continuing education is a valuable component to ensure an inspector's knowledge of changes in pests, survey strategies, control methods and regulations remain current.

In addition to the National and regional plant boards, there are many professional societies and organizations in the United States which relate to pest prevention and nursery issues. There are also the trade organizations such as the American Farm Bureau Federation, state farm bureau organizations, the AmericanHort, Society of American Florists, industry associations of nurserymen, the American and state societies of florists, etc. Professional societies include the American Phytopathological Society, the Entomological Society of America, the Society of Nematologists, and Horticultural Inspection Society. The foregoing list of societies and organizations is only intended to be illustrative. There are many others, and not referring to them is not meant to indicate they are less important or valuable. Such organizations play a valuable part in keeping plant quarantine officers, nursery inspection personnel, nursery growers and others abreast of current issues, developments and trends. Trade organizations represent their membership before the Congress and state legislatures on legislative matters and before federal and state agencies on quarantine, pesticide and other regulatory issues.

Membership and participation in professional societies helps quarantine and nursery inspection personnel develop good working relationships with those organizations that directly interface with them in the performance of their duties. Additionally, it helps to keep them current on new technologies which can aid or facilitate their work.

Purpose

Nursery inspection programs, alone, can seldom be relied upon to provide quarantine security. The basic purpose of nursery inspection programs is to assure compliance with standards of pest freedom for quality pests. The key to making nursery stock certificates meaningful and achieving uniformity among the states is establishing a national standard. And that standard should emphasize orderly marketing and consumer protection, and not exotic pest prevention. Quarantine (exotic) pest prevention must be dealt with separately via quarantine requirements and in close coordination with nursery inspection programs. However, before promulgating a quarantine, pest prevention agencies should consider whether establishing a nursery stock quality standard would be adequate for mitigating the risk associated with quarantine pests that are of moderate to low impact.

In the case of interstate origin inspection programs, focus is placed on 1) the performance of plant quarantine or nursery stock inspection requirements at the point of origin in the shipping state, and 2) acceptance by the receiving state regulatory officials of the inspection as equivalent to any inspection they might make of the contents of the shipment upon arrival at the premises of the consignee.

Chiefly, the role of an interstate origin inspection program is pest risk mitigation; but, a facilitator role also is involved in that pest inspection can be made effectively and more efficiently where the shipment is assembled; and delays associated with holding and inspection at the consignee's location can be eliminated. Orderly marketing is enhanced when an interstate origin inspection program can be implemented and effectively administered.

Nursery Inspection Programs

All nursery inspection programs should be legally authorized and their requirements should be established by law. Most states have statutory authority to establish nursery inspection and other requirements by rule or regulation. Typically, rules or regulations are administrative law as opposed to statutory law which is passed by a state legislative body and approved by the governor.

Unlawful activities (*i.e.*, those subject to legal remedies including prosecution, incarceration, fines or civil penalties) should be statutory while administrative remedies (such as license suspensions and revocations; holding plant material off sale; authorization, and suspension and revocation of nursery stock certificates) should be in the form of rules or regulations.

Every nursery inspection program should include the following elements.

1. Definitions - Pertinent definitions from the model laws should be incorporated into any set of nursery inspection statutes, regulations or rules.

2. Pest Control - Shipping nurseries should be required to have a pest control program in effect that will assure consistent compliance with pest freedom standards.

3. Inspection Requirements - At least one visual inspection should be made each year of all the nursery stock being grown by a shipping nursery. All inspections should be documented and kept on file for at least three years. The frequency and manner of inspection of nursery stock at retail nursery establishments should be at the discretion of state regulatory nursery officials.

Nursery stock not in compliance with pest freedom standards should be identified as part of the nursery inspection record, and sale of nursery stock not in compliance should be prohibited.

Ideally, nursery stock brought into the nursery should be held and inspected upon arrival. If the stock does not meet quarantine requirements, a quarantine rejection notice should be issued alternatively specifying return out-of-state, destruction, or treatment to eliminate the pest (if feasible). Copies of the quarantine rejection notice should be sent to the shipper (consignor) and the origin state regulatory agency. If the stock does not meet nursery stock pest freedom standards, a nursery stock notice of violation or noncompliance should be issued and sale of the stock should not be allowed until it is brought into compliance with the state's pest freedom standards.

4. Pest Freedom Standards - All determinations of compliance should be based on visual inspection.

For Surface Pests - Surface pests include aphids, ants, mealybugs, mites, scales, snails and other invertebrate pests, and nematodes and weeds in containers.

- "Effective Control" -- Common (non-quarantine) pests generally distributed within the state should be kept under "effective control" which means that no more than a few individuals of any specific pest are found on no more than a few plants in the block or lot of nursery stock being inspected.

- "Free From" -- No plants are infested with any individual specimen of a pest. This standard applies to two categories of pests based on distribution:

1) Pests of limited distribution, where limited distribution means that only a few localized infestations exist in the state.

2) Pests not known to occur within the state.

For Unhealthy Plants - Weak plants or plants showing disease or nematode symptoms may be subjected to laboratory testing to determine the cause, and should be removed and destroyed unless curative treatment is applied.

Sale of nursery stock that does not comply with the foregoing standards should be prohibited. Infested nursery stock should be isolated to prevent pest spread to other stock, treated (where feasible), or destroyed. Follow-up inspection should be made to ensure that no other hosts are infested.

5. Other Standards - Other standards or requirements may be established for quality, labeling, grades, and advertising. In the interest of maintaining national consistency, the following documents should be reviewed for acceptability, and may be incorporated in such standards by reference:

American Standard for Nursery Stock (ANSI Z60.1) is a nationally-recognized, standardized system for sizing and describing plants. It was established to facilitate orderly trade in nursery stock.

Guides for the Nursery Industry, adopted by the Federal Trade Commission, are designed to foster and promote fair and competitive conditions in the interest of protecting industry, trade, and the public. The Guides cover such topics as deception, misrepresentation, and size and grade designations as they apply to labeling and advertising.

In addition, the following also may serve as a guide for other standards:

a. Quality - Nursery stock should not be dead or dying; seriously damaged, broken, or frozen; abnormally pot-bound; or harmed in any other way that would interfere with normal development after planting.

Quality standards may include plant hardiness requirements.

b. Labeling - The botanical name and cultivar name (when applicable) should be required, except on roses, fruit trees, and annuals. The following should be required for other kinds of nursery stock: recognized common name and cultivar for fruit trees; the kind and cultivar for turf; and the cultivar name for roses, annuals, dormant bulbs, tubers, roots, corms, rhizomes, pips, and other kinds of nursery stock. However, exception may be made to allow the use of the recognized common name when no cultivar name has been given or can be determined.

It is recommended that nursery stock be properly identified with the correct name when sold at wholesale and shipped, delivered, or transported to any purchaser.

Local ordinances might sometimes require informational labeling regarding mature plant size, poisonous plants, flowering dates, degree of messiness, amount of pollen produced, and other such characteristics. However, these matters are discouraged as subjects of state law.

c. Grades - Grades that might be established should be plant performance based and designed to help assure equity in the marketplace. When consideration is being given to establishing grades, the American Standard for Nursery Stock (ANSI Z60.1) and any grades already established by other states should be reviewed for acceptability.

d. Advertisements - Nursery laws should include a provision that makes it unlawful to: disseminate any false or misleading advertisement regarding nursery stock in any manner or by any means; or represent nursery stock as being registered or certified unless it has been produced and labeled in accordance with the procedures and in compliance with the rules and regulations of an official registration and certification agency.

6. Licensing - Persons applying to a state agency for accreditation, registration, a license to sell nursery stock, or a permit to operate a nursery should be required to provide basic information essential for the conduct of that state's nursery regulatory program.

7. Invoices and Nursery Stock Certificates

a. Invoices - Each interstate shipment of nursery stock should be accompanied by a manifest that clearly indicates:

- 1) The name and address of the consignor (shipper or owner).
- 2) The name and address of the consignee (person to whom the shipment is forwarded or shipped) or the name of his or her agent.
- 3) An itemized list of the contents showing each plant species by container size or other distinguishing characteristics and the number of each in the shipment.

When the shipment is covered by a quarantine, it would be desirable to include the origin of the quarantined nursery stock

b. Nursery Stock Certificates

1) General Requirements - Each commercial interstate shipment of nursery stock must:

a) Have originated from a nursery/person that is properly accredited, licensed, or registered with the origin state government nursery inspection agency as an entity engaged in the business of producing or selling nursery stock and shipping it interstate; AND which is currently authorized to use that state governmental agency's nursery stock certificate on interstate shipments.

b) Be accompanied by a nursery stock certificate which indicates that the nursery stock has been visually inspected and found to be in compliance with National Plant Board standards of pest freedom.

2) Format - Interstate Nursery Stock Certificates should be essentially in the following form:

(Name of State) NURSERY STOCK CERTIFICATE

No. _____

This plant material or nursery or premises from which this shipment was made has been visually inspected

and found to be in compliance with National Plant Board standards of pest freedom.

(Date optional)

Issued by: (Name of State Governmental Nursery Inspection Agency and Headquarters City.)

a) The certificate number should be a state governmental agency assigned accreditation, license, or registration number that is unique to the firm and which, when provided by any interested or affected party, can be used to identify the person making the shipment.

b) No particular size or shape restrictions are established except that any reproduction (printing, label, rubber stamp or other impression) must be conspicuous and legible. Any solid background color may be used provided that the printing on it is of sufficient contrast that there is good legibility.

3) Noncommercial Shipments - A special nursery stock certificate may be affixed by a regulatory official to any private shipment of plant materials inspected and found to be in compliance with NPB pest freedom standards. The state should develop a sequential numbering system for certificates used in this manner.

Nursery Stock Registration and Certification Programs

Many state governmental agencies responsible for nursery stock regulatory activities also have developed registration and certification programs for various kinds of nursery stock and germplasm. The purpose of these programs is to mitigate pest and other problems that cannot be effectively managed via the standard nursery regulatory program of visual inspection. These programs are, instead, based on official inspection, sampling, testing and record-keeping aimed at assuring that the finished plant products meet specified requirements. Typically, laboratory testing, using well established diagnostic procedures, is the basis for determining disease or pest freedom. Targeted pests typically are viral, bacterial, and other plant pathogens; plant disorders; and soil-borne pests such as nematodes. Participation in registration and certification programs normally is voluntary and participants pay fees to cover the additional and special inspection and testing required. Nursery stock meeting the requirements of such programs is typically identified by tags, seals, or other indicia of certification affixed to the individual plants, bundles, cartons, or other units of sale.

Registered or certified nursery stock should meet the basic nursery standards as well as those separately established by the state's registration and certification rules or regulations. The much greater freedom from pests and diseases in some cases also may satisfy quarantine requirements (Fig. 6).

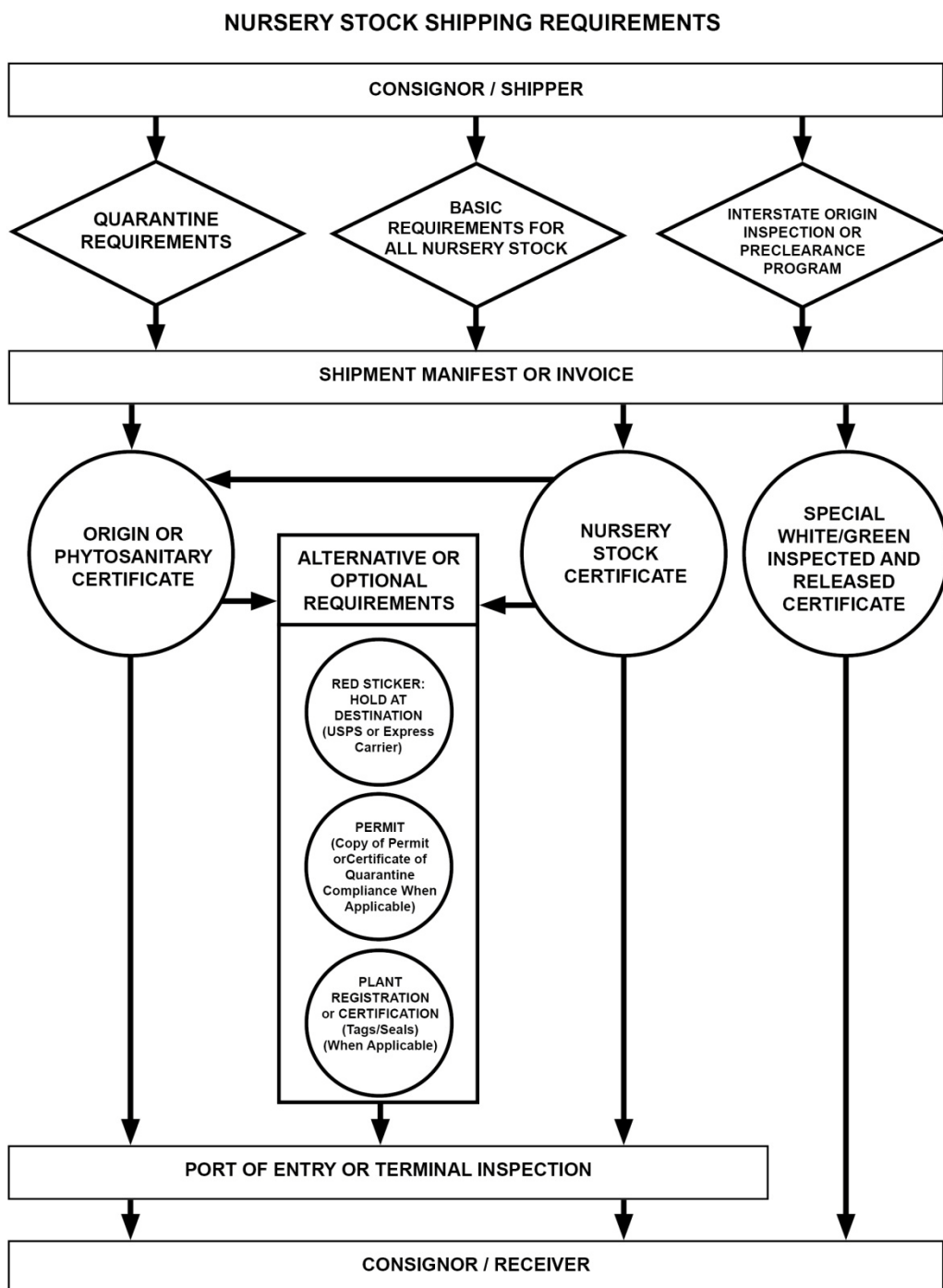


Figure 6. Nursery stock shipping requirements.

Interstate Origin Inspection and Preclearance Programs

Pest risk mitigation tactics or strategies should be employed at the point of origin and verified at the point of arrival of the shipment. The Systems Approach for Nursery Certification is a recent enhancement to nursery inspection and movement of plant material. It has the additional advantage of much more orderly marketing. Interstate origin inspection programs can be developed to achieve compliance with both quarantine and product quality standards.

Plant Quarantine (Phytosanitary)

1. Identifying the pest(s) covered - The pest(s) covered must be specifically identified because the criteria for what constitutes a quarantine pest are distinctly different from those for "quality" pests. Furthermore, there are differences of economic impact and importance among pests that would meet the criteria for quarantine pests.

2. Identifying the federal, state, or local pest prevention organization - Part of the risk associated with an origin inspection program relates to the capability and motivation of the governmental agency that must be relied upon to administer it at origin. Administrators must fully understand what is involved with pest prevention in the United States and be committed to its effectiveness both in its own best interests as well as those of the receiving state(s). This includes basing decision-making on scientific and biological considerations and keeping political considerations in the background. Indeed, political factors are involved and play a role in many phytosanitary decisions, but they must not be the overriding factors.

3. Selecting Shippers for Participation - As a minimum, the following criteria should be used to evaluate and select shippers to participate in a plant quarantine interstate origin inspection program:

a. Good Shipping Record - At least a six-month shipping record of good compliance with quarantine requirements. "Good" compliance means proper identification and phytosanitary certification of shipments, very low incidence of pest interceptions, no shipping of prohibited commodities, and compliance with other receiving state requirements.

b. Production Area Pest Management - A system of pest control including pest exclusion, inspection (and/or testing), and treatment (as required) should be in place with someone responsible for them and held accountable for their effectiveness.

c. Hosts Shipped - Extremely good hosts for quarantine pests might be excluded from the interstate origin inspection program *unless* an effective commodity treatment is available and used to prevent infestation; or pests can be excluded during production, packing, and shipping.

d. Commitment - The participating shipper must be committed to compliance with quarantine requirements. The economic advantages that will accrue must not be the motivating factor and the program administrators should interview all potential candidates and inspect the growing/shipping facilities to ascertain that the candidate is both capable of satisfying the requirements and willing to do so. The pest situation in the growing/shipping area together with the shipping record will be two good indicators of this.

4. Agreement - A three party agreement should be executed. The shipping state agency should be made responsible and accountable for administering the program locally and for monitoring the operations of the shipper to assure compliance. The shipper should be made responsible for pest exclusion, monitoring, treatment, record-keeping for treatments and shipping, and the proper use of special certificates. The receiving state should be responsible for working with the origin state agency to administer the program, monitoring, prompt reporting of any deviations, and taking corrective actions.

5. Certificates - The use of a special certificate (See part IV of this appendix) or some other form of documentation should be authorized by the receiving state to indicate to carriers and receivers that its quarantine requirements have been met and that the stock need not be held for inspection upon arrival at the premises of the consignee. One person should be designated by the participating shipper as responsible and accountable for the proper use of the special certificate or other documentation specified in the agreement.

6. Corrective Actions - The agreement should specify what action(s) will be taken upon the discovery of violations; and provide for suspension or revocation in cases of repeated violations, change of ownership, or other such critical factors.

Nursery Inspection

1. Identifying what is covered - Programs can be developed to cover a wide range of quality pests or just a particular class of pests of special concern to the receiving state. Typically, the pest(s) listed will relate to the receiving state's nursery stock pest freedom and other standards. For example, if a state is concerned about nematode pests on nursery stock for farm planting, nematode pests could be specifically targeted. Other standards might include such things as plant quality, identification, and labeling requirements; plant grades; and plant registration and certification.

Plant materials subject to quarantine may be excluded and covered by the previously described plant quarantine interstate origin inspection program; or covered by special provisions. As stated at the outset of this appendix, it is possible to "marry" plant quarantine and nursery inspection interstate inspection programs to meet both sets of needs.

2. Identifying the federal, state, or local pest prevention organization - In most cases, these organizations will be the same as those that administer plant quarantine programs. However, there are situations where two different organizational units or branches are involved, typically with a common administrator. In any case, the same criteria would apply in determining whether an *agency* is capable and willing (properly motivated) to effectively administer a nursery stock interstate origin inspection program.

3. Selecting Shippers for Participation - The criteria specified for a plant quarantine interstate origin inspection program should be applied together with any special considerations associated with nursery inspection such as current licensing and authorization to use the origin state's nursery inspection certificate.

4. Agreement - A nursery stock interstate origin inspection certificate also will be a three party agreement with the same entities as for plant quarantine, except that different governmental units might be involved. The areas of responsibility also will be the same. However, certain tests, inspections and tolerances for pests may be included; and the action(s) that would be taken upon the discovery of a violation should not be as severe as those for plant quarantine violations.

5. Certificates - A special interstate origin inspection certificate should be authorized for use by the participant as a means of letting carriers and consignees know that the receiving state's requirements have been met and that the shipment need not be held for inspection upon arrival. One person should be designated by the participant as responsible and accountable for the proper use of that certificate.

The plant quarantine interstate origin agreement model that is attached (Attachment A) serves equally well as a model for a nursery inspection agreement.

Interstate Origin Inspection Program Certificates

Format - The following format and color scheme is promoted by the NPB and should not be used except on shipments that are not required to be held upon arrival at destination (carrier terminal or premises of the consignee) pursuant to a formally approved interstate origin inspection or other preclearance program as described in this appendix.

(Name of State)/(Name of State)

INTERSTATE ORIGIN INSPECTION/PRECLEARENCE

NURSERY STOCK CERTIFICATE

No. _____ (White area)

This plant material or nursery or premises from which this shipment was made has been inspected pursuant to an (Name of State)/(Name of State) origin inspection/preclearance agreement and found to be in compliance with its terms.

THIS SHIPMENT NEED NOT BE HELD

BY THE CONSIGNEE FOR

AGRICULTURAL INSPECTION IN

(Green area) (NAME OF STATE)

(Date optional)

Issued by: (Name of State and address) and (Name of State and address)

Authorization - Program participants should be formally authorized to use the Interstate Origin Inspection/Preclearance Nursery Stock Certificate. Attachment B is the recommended format for authorizing use.

Use on Commercial Shipments - No interstate nursery stock certificate or interstate origin inspection/preclearance nursery stock certificate shall be used:

- On any shipment of nursery stock that is not in compliance with National Plant Board pest freedom standards and an interstate origin inspection/preclearance agreement.
- On any shipment of nursery stock any portion of which was grown by a nursery not eligible to use such nursery stock certificates, unless such portion of the shipment is duly inspected by a state nursery inspection program representative and found to meet National Plant Board pest freedom standards and the terms of the origin inspection/preclearance agreement.
- By any person other than the shipper to whom it is issued.
- On any shipment of nursery stock for which movement is restricted by a specific quarantine unless also accompanied by the required quarantine (phytosanitary) certificate or permit, or as specifically approved in an interstate origin inspection/preclearance program agreement.

Use on Noncommercial Shipments - State governmental nursery inspection agency representatives may affix an interstate nursery stock certificate on noncommercial shipments

of plants not subject to quarantine restrictions which they inspect and find to be in compliance with National Plant Board nursery stock pest freedom standards. No special agreement is required for this use.

Model Interstate Origin Inspection/Pre-Clearance Agreement

Example A

(Name of State) AND (Name of State)

INTERSTATE ORIGIN INSPECTION AGREEMENT

NO. (Official State Name Abbreviation followed

by OI - License, registration number, or sequential number)

1. Nursery Name and Mailing Address 2. Shipping Address

3. Kind(s) of Approved Nursery Stock 4. Authority

The **(Name of State)** Department of Agriculture hereby approves **(Name of Firm)** to make shipments into **(Name of State)** of the stated kinds of plant materials which may be released without holding for destination inspection. This approval does not preclude inspection and sampling or testing at the discretion of the **(Name of State)** Department of Agriculture, and rejection as a consequence of the findings of that inspection and/or test(s). **(Name of Firm)** is authorized to use the **(Name of State)/(Name of State)** Origin Inspection Certificate as shown on the attached "Authorization for Use of **(Name of State)/(Name of State)** Origin Inspection Certificate".

This approval and authorization is made subject to compliance with the following requirements. **(Name of Firm)** shall:

1. Maintain a growing season and post-harvest pest control program approved and monitored by the **(Name of State)** and meet all pest freedom standards outlined by the **(Name of State)** Department of Agriculture. **(Name of State)** Department of Agriculture will supply the grower/shipper with information describing the aforementioned pest control program and pest freedom standards.
2. Assign a person(s) to be responsible for growing season and post-harvest pest control and quality control monitoring.
3. Implement a pest quality control program that includes post-packing and pre-shipment checks of finished products and the correction of any problems relating to pests, proper

identification of shipment contents or compliance with the requirements of the agreement discovered prior to shipment or upon arrival in **(Destination State)**.

4. Ship only plant material named in this agreement. Plant materials not initially approved under this agreement may be added in a memorandum between the **(Name of State Department of Agriculture)** and the **(Name of State Department of Agriculture)**.

5. Affix to each carton in the shipment a **(Name of State)/(Name of State)** Origin Inspection Certificate obtained from the **(Name of State)** Department of Agriculture and approved by the **(Name of State)** Department of Agriculture.

6. Maintain a chronological record of all shipments to **(Name of State)** receivers and, upon request, make such records available to officials of the **(Name of State)** Department of Agriculture and/or the **(Name of State)** Department of Agriculture. The record shall include the kind(s) and quantity of each kind of plant material shipped, the date of shipment, and the name of the consignee.

7. Comply with all of the following special requirements:

a. Assure that only eligible commodities are packed in cartons bearing interstate origin inspection certificates. Particular note should be given to the fact that the shipment from **(Name of State)** of (commodity) is prohibited under (give statute).

b. Assure that plant materials purchased or otherwise obtained from outside sources are inspected and rendered free of pests listed by the **(Name of State)** Department of Agriculture as quarantine pests; and are essentially free of pests that are treated as quality pests pursuant to established standards.

c. Assure that all cartons shipped bear the following:

1. Name and address of the approved grower/shipper;

2. Name and address of person (or his or her agent) to whom the shipment is being sent;

3. Name of the county, state, or territory where the contents were grown;

4. A statement of the contents;

5. The statement, "May be opened for agricultural inspection".

8. Comply with all other requirements the **(Name of State)** Department of Agriculture deems necessary to assure compliance with **(Name of State)** pest freedom standards.

9. Designate one person to be responsible for assuring compliance with all of the requirements of this agreement.

Upon the discovery of a quarantine pest in the grower/shipper's shipment in **(Name of State)**, the **(Name of State)** Department of Agriculture will commence an investigation of the cause(s) of the infestation, work with (Name of Firm) to take corrective action, and notify the **(Name of State)** Department of Agriculture of the results. These actions will be completed within 10 calendar days, unless shipments using the interstate origin inspection/preclearance certificate have been suspended.

Noncompliance with the requirements stated herein may result either in suspension or revocation of authorization to use the origin inspection certificate. Otherwise, this agreement shall remain in force until revoked by either the **(Name of State)** Department of Agriculture or by the **(Name of State)** Department of Agriculture or the ownership and management of (Name of Firm) changes. Revisions to this agreement may be made by memorandum as necessary to include, delete, or modify requirements.

(Name of Firm) (Name of State)

Ownership/Management Department of Agriculture

(Name of State) Effective Date

Department of Agriculture

Example B

AUTHORIZATION FOR USE

OF

(NAME OF STATE)/(NAME OF STATE) ORIGIN INSPECTION CERTIFICATE

NO. (Official State Name Abbreviation followed

by OI - License, registration number, or sequential number)

(Name of Firm) (Name of Firm)

(Address of Firm) (Address of Firm)

This authorization to use **(Name of State)/(Name of State)** Inspection certificates is issued concurrent with **(Name of State)** and **(Name of State)** Origin Inspection Agreement No. **(Official State Name Abbreviation followed by OI - License, registration number, or sequential number)**. It is subject to revocation or suspension in accordance with provisions of the Origin Inspection Agreement. This certificate is not transferable either to location or ownership. Use is limited to those kinds of plant materials specified in the Origin Inspection Agreement.

This certificate may not be reproduced. For additional copies of this certificate, contact the **(Name of State)** Department of Agriculture at **(Phone Number)**.

(NAME OF STATE)/(NAME OF STATE) ORIGIN INSPECTION CERTIFICATE

FOR INTERSTATE SHIPMENTS

NO. (Official State Name Abbreviation followed WHITE

by OI - License, registration number, or sequential number)

This plant material or nursery or premises from which this shipment was made has been inspected pursuant to an (Name of State)/(Name of State) origin inspection/preclearance agreement and found to be in compliance with its terms.

GREEN THIS SHIPMENT NEED NOT BE HELD BY THE

CONSIGNEE FOR AGRICULTURAL INSPECTION IN (NAME OF STATE)

Issued by: (Name of State Department of Agriculture and Address)

Issued _____

Effective Date _____

Signed _____ Signed _____

(Name of State Department (Name of State Department of Agriculture) of Agriculture)

When products are being exported to a foreign country, issuing officials must make sure that the proper certificate is used. Issuance of a federal phytosanitary certificate is one way to assure compliance on a consistent basis. The USDA federal phytosanitary certificate is modeled after and consistent with the FAO model phytosanitary certificate which is accepted by all the countries that subscribe to the IPPC.

Certification requirements for nursery stock are shown schematically.

Publication and Distribution of Nursery Lists

Each state governmental agency responsible for nursery program administration should compile annually a list of those persons duly accredited, licensed or registered for the wholesale marketing and interstate shipping of nursery stock. The list should include agents, brokers, commission merchants, dealers, and producers. A copy of the nursery list should be made available upon request. The list should contain the title, address and telephone number of the person responsible for maintaining the list. Up-to-date information should be provided upon request.

Nursery License/Registration/Certification Information

LICENSE DEFINED

"License" means a document issued by a state regulatory agency authorizing any person to engage in the nursery business at a particular location under a specified business name. Some states may refer to them as permits or registration certificates.* Thus, persons duly authorized are referred to as licensees, permittees, or registrants.

LICENSING PURPOSES

Pest Control - Licenses are generally issued to comply with pest control provisions of the where nursery stock is being grown, sold, or shipped. These lists enable regulatory agencies to conduct an orderly inspection program to: 1) determining compliance with established pest freedom and other standards for nursery stock and/or 2) establishing a basis for phytosanitary certification of nursery stock that must meet quarantine requirements. Basic nursery inspection typically is complemented or augmented by a) special inspections or b) supervision and documentation of required treatments.

Professional - Licenses sometimes serve professional purposes. A few states have established professional standards and administer examinations or perform other functions to determine compliance with those standards. Once the standards are met, a license or permit is issued.

Funding - Another important purpose of licensing is to generate funds that can be used to cover the costs of performing required nursery inspection work. At least one state uses license fee funds to also cover the cost of phytosanitary certification. However, it is more typical to charge phytosanitary certification fees to cover the latter.

Some states do not license nurseries. Instead, they perform inspections of the nursery stock being grown or sold at nurseries and if the stock is in compliance with pest freedom requirements, they issue an inspection certificate.

OWNERSHIP: CHARACTER AND GOOD FAITH

States might consider requiring that an applicant for a license to sell nursery stock satisfy the licensing authority of its "character and good faith in seeking to carry on the nursery business." This requirement would not relate to moral character; but, rather, to the applicant's compliance with laws that govern the business.

Whether a state decides to establish such a requirement or not, the fact is that ownership truly does govern the degree of compliance with nursery, quarantine, pesticide, labor, environmental and other laws affecting nursery operations. At least, nursery licensing agencies should issue licenses to the person who makes application and not to the business. That way, when ownership changes, a new application must be made and the licensing agency will be in a position to evaluate both the applicant's capability for and the degree of commitment to compliance with nursery standards, quarantine requirements, etc.

SALES LOCATIONS

Licenses should be issued for every location from which nursery stock is delivered direct to a customer. This definition is critical for determining which locations must be licensed. It would exclude growing areas, but include landscaper holding areas where plants can become infested if held for a period of time. Inspection would be required at such locations and states that fund their work through license fees would have landscaper holding yards as an additional source of revenue. Work performed at unlicensed growing grounds could be funded by an acreage fee that would be assessed in addition to the basic fee assessed for each sales location.

Licensing

The definition of "nursery stock" is very broad. It includes container and field-grown (ball and burlapped, bare-root, and boxed); plants collected from the wild, residential or commercial landscapes, or farm plantings; bulbs, tubers, corms, pips, *etc.*; florist materials such as cut flowers and cut greens; Christmas trees; and propagative materials such as budwood, scions, rootstocks, seedlings, seed, *etc.* Consequently, nursery regulatory agencies need to determine which kinds of nursery operations should be licensed to facilitate orderly marketing, assure consumer protection, or to fulfill any other purpose served by nursery inspection in their states. For illustrative purposes, assume that a state's nursery licensing law is a pest control provision of the law and that license fees are assessed to fund the cost of the inspection or enforcement workload. One licensing scenario would be as follows:

Fee Paid License

Unlawful for any person, not expressly exempted, to sell nursery stock unless such person holds a valid license issued in accordance with state licensing requirements (see Appendix C for definition of "Person").

Basic annual license fee for each location from which nursery stock is delivered direct to a customer.

Annual acreage fee for land used in the production, storage, or sale of nursery stock in excess of one acre. (A scale of acreage fees could be established to implement this provision).

- Establish annual license period(s) with deadline for renewal
- Establish late or penalty fee for renewal after deadline date
- Establish fee refund provision for use when licenses are not issued.

Fee Exempt License

Any person who sells plant materials of his or her own production for planting only within the county where grown and the annual value of stock so produced does not exceed a specific dollar value specified in law. (Note that an application would still be made, a license would be issued, and appropriate inspection would be made--only the fee is exempted.)

Licensing Exemptions

- Any person who sells and ships only seeds
- Any person who sells plants at retail for indoor decorative purposes only.
- Any person who sells cut Christmas trees

(Note that each state licensing agency would have to determine what kinds of operations should be exempt. Certain agencies might choose to license those who sell seed, sellers of indoor decoratives at retail, and those who sell cut Christmas trees.)

Refusal, Revocation, and Suspension

A license may be refused, suspended or revoked if the licensee or applicant has:

- Willfully refused to comply with laws and regulations relative to nursery stock or to any pest that might be carried on nursery stock
- Intentionally engaged in fraud or deception in the procurement of the license
- Been guilty of fraud or misrepresentation in the handling or sale of nursery stock
- Failed to maintain nursery stock produced or sold by him or her in accordance with pest freedom standards established by the state
- Failed to comply with any lawful order issued by the state nursery law enforcement agency

Enforcement

- Nursery law should declare certain acts or omissions as being unlawful.
- Criminal and/or civil penalties should be considered for violations. Provision for the administrative assessment of a civil penalty is advised. (See also foregoing section on license refusal, revocation and suspension.)

APPLICATION

Application Forms May Include the Following Information:

- Firm Name (Name of Nursery or Business), mailing address, and phone number
- Name of owner(s) and nature of ownership (individual, partnership, corporation, etc.)
- Address(es) and Acreage(s) of All Sales Locations. Number and Street or Road (not a P.O. Box), City, and County
- Type of Business (Wholesaler, retailer, producer, landscaper, jobber, broker/commission merchant, shipper out-of-state, etc. (as appropriate)
- Categories of Nursery Stock Produced (only for those who indicate that they are "Producers")

Examples: coniferous evergreens, broad-leaved evergreens, deciduous shade trees, deciduous shrubs, rose plants, indoor decorative plants, cacti and succulents, deciduous fruit and nut trees, grapevines, citrus plants, caneberry plants, (*e.g.* raspberry) strawberry plants, vegetable plants, sod, ground cover, palms, etc.

- Address(es) and Acreage(s) of all growing areas: Number and Street or Road (not P.O. Box), City, and County
- Sources of nursery stock imported by the licensee: Name of nursery, address, and telephone number. (Confidential business information should be protected consistent with state law.)
- Fee Schedule and Provision for Calculation of Fees Due (if applicable)
- Directions for submission of application and payment of fees
- Statement Certifying that the information provided is true and correct together with signature block for authorized representative, official title, and date

Model Application for Fee Paid Licenses

STATE OF TIMBUKTOO
DEPARTMENT OF FOOD AND AGRICULTURE
NURSERY, SEED & COTTON PROGRAM
1220 N STREET, SOMEPLACE, TIMBUKTOO

64-029 (Rev. 4/95)

"The Department of Food and Agriculture has established time periods for the processing of permit applications, in compliance with Government Code section 15374-15632. Failure to comply with these time periods may be appealed to the Secretary of Food and Agriculture, 1220 N street, Someplace, Timbuktu, pursuant to Regulations set forth in Title 3, Timbuktu Code of Regulations, Section 103. Under certain circumstances, the Secretary may order that the applicant receive a reimbursement of filing fees."

Please print or type information requested in spaces where indicated.

APPLICATION FOR LICENSE TO SELL NURSERY STOCK
NEW BRANCH
RENEWAL CHANGE OF OWNERSHIP

CHANGE OF ADDRESS (ONLY)

Current or Previous License No.

	Firm Name:	
MAILING ADDRESS	Mailing Address:	
	City: State: Zip Code: Phone: ()	
	County: Address: <i>DO NOT USE P.O. BOX NO.</i>	
SALES LOCATION	City: State: Zip Code:	
OWNER(s) NAME(s)	CORPORATION / PARTNERSHIP / INDIVIDUAL	
PART I Check one or more.	RETAILER - An Operator of a sales outlet which has no growing grounds except small areas devoted to the production of plants for local distribution and those producing less than \$1,000. INCIDENTAL RETAILER - An Operator of a retail sales outlet for nursery stock which is handled incidental to other merchandise. JOBBER / BROKER / COMMISSION / MERCHANT	LANDSCAPER - A Landscaper contractor who maintains a sales yard or holding yard for nursery stock he handles. PRODUCER - A Commercial Producer who grows and sells a total of \$1,000 or more of nursery stock in one year. CUT FLOWERS/CUT GREENS - Wholesale
PART II Check as many as applicable. If you are a commercial producer, please complete this section.	1. CONIFEROUS EVERGREENS 2. BROAD-LEAVED EVERGREENS 3. DECIDUOUS SHADE TREES 4. DECIDUOUS SHRUBS 5. ROSE PLANTS 6. HERBACEOUS ORNAMENTAL, ANNUAL AND PERENNIAL PLANTS, AND AQUATICS 7. BULBS, CORMS, RHIZOMES, PIPS, ETC. 8. DECORATIVE PLANTS, FOLIAGE OR FLORIST'S POT PLANTS INCLUDING ORCHIDS, ETC. 9.	(A) DECIDUOUS FRUIT AND NUT TREES (B) GRAPEVINES AND KIWI PLANTS (C) CITRUS FRUIT TREES (D) OTHER SUBTROPICAL AND TROPICAL FRUIT TREES, INCLUDING AVOCADO (E) STRAWBERRY AND BUSHBERRY, ETC. (F) VEGETABLE PLANTS (G) SOD (TURFGRASS) (H) GROUND COVER, IVY ORNAMENTAL STRAWBERRY, ICE PLANTS, ETC. (I) PALMS

CACTI AND SUCCULENTS

PART III

LIST LOCATIONS WHERE NURSERY STOCK IS GROWN, **BUT NOT SOLD** NOR DELIVERED DIRECTLY TO CUSTOMERS. GIVE ROAD OR STREET ADDRESS.

ADDRESS (LOCATION)	CITY	COUNTY	ACRES
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Employers are required by Section 16545 of the Business and Professional Code to subscribe to the following: I am aware of the provisions of Section 3700 of the Labor Code, which requires every employer to be insured against liability for Workmen's Compensation.

PLEASE ANSWER THE FOLLOWING QUESTIONS: Pursuant to the provisions of Sections 38, 44 and 670 and 670 1-6743 of the Food and Agricultural code, State of Timbuktu, applicant must complete the following questions for the purpose of obtaining license(s) to engage in the business of selling nursery stock. Each individual has the right to review files maintained on him by the agency. Information collected is maintained for a minimum of five years. (Phone: (555) 654-0423)

HAVE YOU OR ANY MEMBER OF THE FIRM EVER BEEN REFUSED A LICENSE OR SUFFERED REVOCATION OR SUSPENSION OF A LICENSE REQUIRED BY FOOD AND AGRICULTURE CODE? NO YES

HAVE YOU OR ANY MANAGING MEMBER OF THE FIRM EVER BEEN CONVICTED OF A PUBLIC OFFENSE INVOLVING AGRICULTURAL PRODUCTS? NO YES

CALCULATE YOUR FEES HERE

1. Basic License Fee due	\$ 100.00
--------------------------	-----------

2. Acreage Fee (required for land in excess of one acre used in the production, storage or sale of nursery stock.) Schedule of acreage fee:

0.00 - 1.00 acres..... \$ 0

1.01 - 1.99 acres..... \$ 75

2.00 - 5.99 acres..... \$135

6.00 - 10.99 acres..... \$240

11.00 - 20.99 acres..... \$315

21.00 - 50.99 acres..... \$450

51.00 and up..... \$500 *TOTAL ACREAGE* (Include fraction)

3. Total Fees to be Paid (add 1 and 2) \$

SEND CHECK OR MONEY ORDER FOR AMOUNT IN #3 ABOVE (with application) to: CASHIER,
State of Timbuktu, Department of Food and Agriculture

P.O. Box 942872, Someplace, Timbuktu, 94271 1220 N Street, Someplace, Timbuktu, 95814

NOTE: *ALLOW SIX TO EIGHT WEEKS FOR LICENSE PROCESSING.*

I CERTIFY THAT THE INFORMATION SUBMITTED IN THIS APPLICATION IS TRUE AND CORRECT.

DATE: SIGNATURE OF AUTHORIZED REPRESENTATIVE: OFFICIAL TITLE:

Framework for a Systems Approach to Nursery Certification¹

“A system is an entity, which maintains its existence through the mutual interaction of its parts.”

Ludwig von Bertalanffy, Austrian Biologist (1901–1972)

INTRODUCTION: The Systems Approach to Nursery Certification (SANC) is an enhanced strategic methodology to meet the many challenges in the movement of plants within the environment of regulatory agriculture and business activities. Plant pests and pathogens are undesirable yet potential accompanists to plants that are moved in the domestic, interstate and international trade. The common business model is well suited to growing small to large numbers of desirable plants for propagation or sale and moving them from vendor to buyer over small and long distances. It is encouraging that the everyday nursery may well incorporate several elements of a systems approach to mitigating the risk and effects of nursery pests. As the challenges of escalating costs of nursery production, increasing regulatory agriculture requirements and more movement of plants come into focus, SANC will be a vital response to adequately meeting the pest challenges within a fiscally limited environment. It is becoming more evident that all the stakeholders must work together more closely to meet the expansion of the world market and yet adequately mitigate the plant pests and pathogen risks associated with plants.

DEFINITION of a CONCEPT: A systems approach strategy incorporates specific operational nursery practices that minimize the likelihood of incursion, establishment and growth of plant pests and pathogens in a nursery. A systems approach requires two or more measures that are independent of each other, and may include any number of measures that are dependent on each other. An advantage of the systems approach is flexibility in the ability to address variability and uncertainty by modifying the number and strength of measures to meet phytosanitary import requirements.

Cultural practices, crop treatment, post-harvest disinfestation, inspection and other procedures, to name a few, may be integrated in a systems approach. Risk management measures designed to prevent contamination or re-infestation are generally included in a systems approach (*e.g.*, maintaining the integrity of lots, requiring pest-proof packaging, screening packing areas). Likewise, procedures such as pest surveillance, trapping and sampling can also be components of a systems approach.

Measures that do not kill pests or reduce their prevalence, but reduce their potential for entry or establishment (safeguards) can be included in a systems approach. Examples include designated harvest or shipping periods, restrictions on the maturity, color, hardness, or other

¹ W.N. Dixon, M.E. Cooper, A. Posadas, G. Friisoe, C. P. Schulze, G. Haun, K. Rauscher

condition of the commodity, the use of resistant hosts, and limited distribution or restricted use at the destination.

Dependent and Independent Measures

A systems approach may be composed of independent and dependent measures. By definition, a systems approach must have at least two independent measures. An independent measure may be composed of several dependent measures. With dependent measures the probability of failure is approximately additive. All dependent measures are needed for the system to be effective. If one measure fails, it too fails the other measure. For example, a pest-free glasshouse where both a double-door and screening of all openings is required is an example where dependent measures are combined to form an independent measure. If the probability that the screening fails is 0.1 (1 chance in 10), and the probability that the double doors fail is 0.1 then the probability that the glasshouse will be infested is the approximate sum of the two values, 0.2 (1 chance in 5). The probability that at least one of the measures fails is the sum of both probabilities minus the probability that both fail at the same time. In this example, the probability is 0.19 ($0.1 + 0.1 - 0.01$), since both the measures could fail at the same time. The failure of either measure directly influences the success or failure of the other measure and accounts for the little change in overall probability of failure in the nursery.

Where measures are independent of each other, both measures must fail for the system to fail. With independent measures, the probability of failure is the product of all the independent measures. For example, if the inspection of a shipment has a 0.2 probability of failure and the limiting of movement to certain areas through regulations has a 0.2 probability of failure, then the probability of the system failing would be 0.04 (0.2×0.2). From these examples, it becomes evident that independent measures can provide a much preferred lower level of potential failure of a system approach to mitigate a pest problem.

Utilizing a systems approach to nursery certification is focused on better confidence in the pest-free status of a nursery plant through the lowered risk of a plant pest introduction and reproduction. For the nursery grower it also can result in lesser need for chemical controls and lower costs, fewer losses to plant pests and greater productivity. Conversely, for the buyer the risk of purchasing an infested plant and establishing new infection foci in a new area is much reduced.

Utilizing a systems approach mitigates shortcomings of end-point inspections, *e.g.*, infected plants are symptomless, pesticides may be suppressing symptoms, signs or symptoms of infestation/infection may not be recognized, detection limit is too high.

ELEMENTS of a FRAMEWORK: A SANC for any nursery requires a framework built from several elements. These key elements include:

- Risk analysis of the nursery
- Critical control points identified at the nursery
- Development and implementation of appropriate best management practices as required by pest species or group
- Monitoring and recording of pests found on plants when received in the nursery and when plants are shipped
- Recording of actions at the nursery, including IPM practices, staff training and production methods
- Documenting the source, movement and buyers of plants, for incoming and outgoing plants to allow traceability (*i.e.*, trace forward or trace back if a plant problem becomes known).

Utilizing a SANC is focused on higher confidence in the pest-free status of a nursery plant through the lowered risk of a plant pest introduction and reproduction. For the nursery grower, a SANC can result in lesser need for chemical controls and lower costs, fewer losses to plant pests and greater productivity. Conversely, for the buyer the risk of purchasing an infested plant and establishing a new infection site in a new area is much reduced.

This paper will focus on the first three elements which form the essential framework of a systems approach to nursery certification.

Hazards and Critical Control Points

Hazard is the potential to cause harm; risk on the other hand is the likelihood of harm (in defined circumstances, and usually qualified by some statement of the severity of the harm). Plant pests can cause a hazard in a nursery by damaging plants as well as lead to restriction of sales or movement of the affected plants. A risk analysis is a systematic way of gathering, evaluating, and recording information leading to recommendations for a position or action in response to an identified hazard. Risk analysis of a nursery can be achieved through use of Hazard Analysis and Critical Control Points (HACCP). This strategy is a systematic preventive approach widely used in food and pharmaceutical safety that identifies physical, allergenic, chemical and biological hazards in production processes that can cause the finished product to be unsafe, and designs measurements to reduce these risks to a safe level. In this manner, HACCP is referred as the prevention of hazards rather than finished product inspection. A critical control point (CCP) is a point, step or procedure at which controls can be applied and a nursery pest hazard can be prevented, eliminated or reduced to acceptable (critical) levels. In

food safety, the most common CCP is cooking, where food safety managers designate critical limits, *e.g.*, for poultry, minimum internal temperature is 165°F (74°C) for 15 seconds. In a nursery, it may be requiring that re-used containers must be sterilized with a specific concentration of a disinfectant between uses to ensure adequate kill of pathogens.

The application of a critical control point system for phytosanitary purposes may be useful to identify and evaluate hazards as well as the points in a pathway where risks can be reduced and monitored and adjustments made where necessary. The use of a critical control point system for phytosanitary purposes does not imply or prescribe that application of controls is necessary to all control points. However, critical control point systems only rely on specific independent procedures known as control points. These are addressed by risk management procedures whose contribution to the efficacy of the system can be measured and controlled.

Therefore, a systems approach for phytosanitary purposes may include components that do not need to be entirely consistent with the critical control point concept because they are considered to be important elements in a systems approach for phytosanitary purposes. For example, certain measures or conditions exist or are included to compensate for uncertainty. These may not be monitored as independent procedures (*e.g.*, packhouse sorting), or may be monitored, but not controlled (*e.g.*, host preference/susceptibility).

As a SANC is developed, it is useful to look at the seven principles of HACCP which form the basis of understanding and controlling the risks of pest hazards:

Principle 1: Conduct a hazard analysis. Determine the nursery pest hazards and identify the preventive measures the nursery can apply to control these pest hazards. A nursery pest hazard is any biological, chemical, or physical property that may cause a nursery plant to not remain pest-free. There may be certain types of hazards in association with specific pests or types of pests which can vary from nursery to nursery.

Principle 2: Identify critical control points. A critical control point (CCP) is a point, step, or procedure in a nursery at which an independent control measure can be applied and, as a result, a pest hazard can be prevented, eliminated or reduced to an acceptable critical limit.

Principle 3: Establish critical limits for each critical control point. A critical limit is the maximum or minimum value to which a nursery pest hazard must be controlled at a critical control point to prevent, eliminate or reduce to an acceptable level.

Principle 4: Establish critical control point monitoring requirements. Monitoring activities are necessary to ensure that the process is under control at each critical control point.

Principle 5: Establish corrective actions. These are actions to be taken when monitoring indicates a deviation from an established critical limit. Corrective actions are intended to ensure that no nursery product injurious to other plants enters commerce.

Principle 6: Establish procedures for ensuring the HACCP system is working as intended. Verification ensures that the nurseries do what they were designed to do; that is, they are successful in ensuring the production of pest-free plants. Verification ensures the HACCP plan is adequate—it is working as intended. Verification procedures may include such activities as review of HACCP plans, CCP records and critical limits. Verification also includes 'validation' – the process of finding evidence for the accuracy of the HACCP system (*e.g.*, scientific evidence for critical limitations).

Principle 7: Establish record keeping procedures. The HACCP approach requires that all nurseries maintain certain documents, including its hazard analysis and written HACCP plan, and records documenting the monitoring of critical control points, critical limits, verification activities and the handling of production deviations.

In terms of a nursery, we can refine and reduce this to a Critical Control Point System (CCPS). A critical control point system in a nursery would involve the following procedures:

1. Determine the pest hazards and the objectives for measures within a defined system
2. Identify independent procedures that can be monitored and controlled
3. Establish criteria or limits for the acceptance/failure of each independent control measure
4. Implement the system with monitoring as required for the desired level of confidence
5. Take corrective action when monitoring results indicate that criteria are not met
6. Review or test to validate system efficacy and confidence
7. Maintain adequate records and documentation.

Critical Control Points and Best Management Practices

Determining the hazards can start with a production flow chart of the nursery to form the hazard analysis. As an example, we can use *Phytophthora ramorum* as a known pest hazard. This is a pathogen moved by soil, water and infected plant material. In the case of a container nursery, procedures used in handling of potting media and containers, water, plant procurement and propagation and plant disease management are important to the survival and movement of the pathogen. Additional information would be needed on the site being used including its preparation and maintenance. Depending on the operation, greenhouse or field production areas, as well as cull piles, are where additional hazard analyses are warranted. Several critical control points and resulting independent control measures, *i.e.*, best management practices, have been identified (Table 1). From the identification of the CCPs, best management practices can be developed to constrain the hazard. A best management

practice is a method or technique found to be the most effective and practical means in achieving an objective (such as preventing or minimizing a pest infestation) while making the optimum use of the nursery resources.

Table 1. Critical control points form the basis of best management practices for *Phytophthora ramorum*.

Critical Control Point	Best Management Practice
Placement of container plants on contaminated ground	Do not place containers on contaminated ground
Use of contaminated irrigation water	Treat irrigation water before use
Use of contaminated pots	Use new pots or properly disinfest used pots
Buy-ins of infected pots	Buy only from certified suppliers; quarantine plants for 90 days
Poor drainage	Prevent standing water
Accumulation of infested leafy debris	Prevent accumulation of infested leafy debris

As another example, the armored Euonymus scale damages deciduous and evergreen euonymus (*Euonymus* spp.), pachysandra (*Pachysandra* spp.) and bittersweet (*Celastrus* spp.). Vine-type euonymus are extremely susceptible to attack by this scale. Several independent control measures or best management practices can be utilized to limit this pest hazard in a nursery (Table 2).

Table 2. Critical control points form the basis of best management practices for the Euonymus scale.

Critical Control Point	Best Management Practice
Growing nursery plants near wild host plants	Remove wild host plants a minimum distance
Buy-ins of infested plants for grow-out	Buy only from certified suppliers; inspect and segregate plants into holding areas
Disposal of newly infested plant parts	Destroy cull pile material daily
Water stress	Manage water levels for thrifty growth and group plants with similar water needs
Equipment movement of pest	Clean equipment between production areas
Cultivar or species susceptibility	Use resistant cultivars or species

As has been illustrated, conducting a hazard analysis to delineate the pest hazards, identification of critical control points and resulting use of best management practices form the essential framework to a systems approach to nursery certification. Many best management practices that would result from a critical control point system are often already utilized, in whole or part, in current nursery operations.

Depending on the plant species and associated pests or diseases, a systems approach to nursery certification would include independent and dependent measures that can be broadly categorized into three best management practice types:

1. Pre-planting: Use healthy planting material, resistant or less susceptible cultivars, pest-free areas, pest-free places of production or pest-free production sites, producer registration and training.
2. Growing: Use field management procedures (*e.g.*, inspection, pre-harvest treatments, pesticides, biological control, *etc.*), protected conditions (*e.g.*, screen houses, greenhouses), pest mating disruption, cultural controls (*e.g.*, sanitation, weed control), low pest prevalence (continuous or at specific times), testing.
3. Pre-shipment: Use plants at a specific stage of development or time of year (*e.g.*, after deciduous leaves fall, juvenile or mature), sanitation (*e.g.*, removal of leaf litter), testing, treatment (*e.g.*, pesticide application, exclusion); inspection and grading (including selection for certain maturity or quality stages); sanitation (including removal of parts of the host plant); testing; screening of storage areas.

Once the hazard analyses are conducted, critical control points are identified and best management practices are developed, the remaining elements can be formulated for the SANC. These would include implementing the system with monitoring; taking corrective actions if so identified from monitoring; validating the system on a regular basis; and maintaining records and documentation. Even these steps may be found to be wholly or partially done in many nurseries, but have not been built into a structured systems approach *per se*.

Overall, a systems approach for nursery certification requires a methodical gathering of information pertinent to the pest hazards associated with a nursery followed by development and use of best management practices that can be documented and verified to demonstrate the successful performance of the systems approach. As often the case, the first step is the hardest, but once the journey is underway, the next steps are much easier.

The SANC web link is: <http://sanc.nationalplantboard.org/>.

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Standards for Phytosanitary Certificates

Quarantine (phytosanitary) certification must accompany any shipment that contains nursery stock requiring such certification. An interstate nursery stock certificate (affirming that the shipment meets nursery stock pest freedom standards) alone is not adequate.

Acceptable phytosanitary certification is determined based on what is required in the quarantine, special permit, interstate origin inspection or preclearance program, or in any other specific directives issued by the responsible pest prevention agency of the state receiving the regulated commodity. Some states require original certificates for each shipment. Others might authorize the use of copies, printed labels, rubber stamp imprints, or other printed affirmations of compliance. Questions about acceptable declarations and formats should be directed to the agency that promulgated the quarantine.

The purpose of this standard is to help ensure that phytosanitary certificates issued by regulatory officials in the United States to affirm, declare, or verify that shipments of quarantined commodities comply with duly established foreign, federal, or state quarantine requirements are both valid and reliable. To this end, information will be provided that will foster a clear understanding of what phytosanitary certification is, why it is important, and what contributes to validity and reliability.

This standard can be used by program administrators as a tool for education and control. Administrators are encouraged to make it their agency's policy to meet this standard. Educationally, this standard can be used to train the agency's phytosanitary certification staff and to help interested and affected industry representatives to understand and appreciate the need for phytosanitary certification as well as the expectations that the agency must meet in performing its phytosanitary certification duties.

Validity and Reliability

Validity - The basic premise of phytosanitary certification is that it is performed by impartial third parties. Current phytosanitary certification systems only accept governmental agencies and their duly authorized employees as being impartial third parties for the collection of samples, performance of inspections and tests, supervision of treatments, determining compliance with quarantine requirements, and the issuance of phytosanitary certificates.

The issue of impartiality is critical because growers, packers, shippers, exporters and others involved in commercial transactions for economic or other reasons question why they are not allowed to perform certain work that is prerequisite to or which will serve as a basis for phytosanitary certification. Such industry entities must understand that officials of the importing country or state are the ones who make this determination. Agencies and their

official representatives that issue phytosanitary certificates are obligated to conduct themselves in conformance with what has become accepted to achieve impartiality.

Findings supported by evidence is the second key factor in validity. This factor requires that treatments, inspections, tests, etc. are performed by properly trained officials and that documented results give evidence that specified quarantine requirements have been met.

Reliability - Reliability has to do with accuracy and consistency over time. When phytosanitary certification is consistently accurate under many different demands and circumstances for some indefinite period of time, importing countries and states become confident and phytosanitary certificates are highly trusted. Thus, reliability is closely akin to confidence and trust which must be earned.

Initially, the degree of confidence or trust is likely to be low unless the certifying agency or its representatives are highly respected for competence in some other field of regulatory activity. As in any matter of reputation, one serious violation of confidence or trust can destroy the reliability of a phytosanitary certification program.

All required sample collection, inspections and tests, supervision of treatments and determinations of compliance with import quarantine requirements must be performed by or under the direct supervision of duly authorized phytosanitary certification officials of governmental agencies AND the evidence obtained by the conduct of activities required by the importing country's or state's quarantine must clearly show compliance with quarantine requirements.

Sampling and Inspection

Field and Commodity Inspection - Phytosanitary certification sometimes calls for field inspection during the growing season or post-harvest commodity inspection. The validity and reliability of this pest risk mitigation measure depends primarily upon having adequate equipment, competent staff, and inspection of an adequate and representative sample of the field or lot.

Adequate equipment and a competent staff are presumed, but importing countries or states may specify an inspection or sampling procedure, sample size and inspection procedure. If not, the certifying agency must use its own best professional judgment as to what procedures and sample sizes will be required to assure their certification will be valid.

Preclearance/Origin Inspection - Preclearance and origin programs differ from traditional phytosanitary measures enforced at ports of entry primarily in that the effort is to assure that pest risk is mitigated before the commodity leaves the exporting country or state. Effective

preclearance programs have the advantage of reducing losses due to rejections at arrival points and speeding up delivery of products by eliminating holding and inspection and testing delays.

Phytosanitary certification is sometimes performed based on pre-shipment inspection by quarantine officials representing the pest prevention agency in the importing country or state. Alternatively, such pre-shipment inspection may be performed by phytosanitary certification officials of the exporting country or state who have been specifically authorized to act in this capacity by the importing country or state. In either case, it is typical for the costs to be borne by the exporting country. However, costs are the highest in the first instance. Consequently, preclearance utilizing quarantine officials of the importing country or state is discouraged.

Where the exporting country or state employs competent phytosanitary officials with a good record for credible phytosanitary certification, preclearance inspection made by exporting country officials is just as effective in mitigating pest risk as inspection performed by quarantine officials of the importing country or state. Furthermore, preclearance by officials of the importing country or state does not guarantee acceptance of the precleared commodity. Typically, shipments are held and inspected again at the port of arrival or terminal in the importing country or state and frequently rejected--potentially on an arbitrary basis.

Consequently, preclearance inspection by phytosanitary certification officials of the exporting country or state is encouraged, especially when it incorporates a phytosanitary certification procedure that eliminates holding and further inspections at the port of entry or other terminal inspection points.

Closely akin to preclearance programs are origin inspection programs. Whereas preclearance programs rely most heavily on commodity inspection, origin inspection programs typically incorporate a mix of cultural, testing, treatment, and inspection measures that are designed to mitigate pest risks that are too complex in nature to be addressed by inspection procedures alone. Origin inspection programs also provide for movement into the importing country with reduced or eliminated holding and inspection at ports of arrival. Thus, they too have the additional advantages of reducing losses and delivery delays.

Sampling - The NPB guidelines' standard is that sampling plans and inspection should always be biased toward discovery. Random or grid sampling plans can be overlaid with the appropriate bias to achieve the desired level of confidence. Sampling plans must additionally consider the factors that influence:

- the presence and distribution of the targeted pest(s). Inspectors must look in the right places and the right times consistent with the biology and habits of the quarantine pest(s)

- detection of the pest [such as the selection of sampling sites, signs and symptoms, the accuracy or sensitivity of the technique(s) used, and the influence of cultural and pest management methods]
- proper identification of samples
- proper protection of samples
- proper utilization of whatever tools may be appropriate such as seed triers, soil probes, knives, hand lenses, specimen vials, *etc.*
- proper protection or preservation of pest specimens and performance of confirmatory diagnostics by professional staff
- adequate documentation of the results of sampling, inspection, and diagnostics

As standard practice, states also should optimize the use of those preclearance and origin inspection strategies encouraged in this document.

Trapping

Trapping is sometimes specified as a basis for phytosanitary certification. Many factors affect the validity of trapping as a basis for phytosanitary certification.

The NPB Standard is that:

The biology, life cycle and host range of a pest and its host(s) must always be taken into consideration. Other factors that must be considered include:

- level of confidence
- pest biology/life cycle
- pest host range
- pest colonization/establishment potential
- availability of lures and traps
- effectiveness and other factors associated with the lure
- capture effectiveness of the trap(s)
- trap density and placement
- trap servicing and relocation intervals
- trap durability
- training
- quality control
- availability of resources

Specimens collected must be properly removed from traps and protected during shipment or other handling.

Specimens should be identified by professional staff with expertise in diagnostics of the quarantine pest group.

Laboratory Testing

Validity and Reliability of Laboratory Testing - At times an importing country or state will require that a sample of a commodity be taken and that it be analyzed in a laboratory using a prescribed test or test procedure as a basis for phytosanitary certification.

Typically, such testing is required for various kinds of plant materials and true seed to determine freedom from viruses, bacteria and fungi that can cause specific diseases. An example of such a requirement is the performance of an Enzyme Linked Immunosorbent Assay (ELISA) for the seed borne lettuce mosaic virus. The generally accepted standard in terms of test results is zero infected seeds in a sample size of 30,000.

As in the case of other methods for determining compliance with quarantine requirements, many factors are involved. However, the fundamental and key factors are validity and reliability.

The validity question is related to the tests performed as well as to where the tests are performed. If an importing country or state specifies the sample size, sampling procedure and the diagnostic test procedure, sampling and testing should follow what is specified. Admittedly, some requirements are not scientifically justified and some prescribed tests may not have been subjected to standardization; but, these issues must be dealt with between the trading partners. It is not within the discretion of the phytosanitary certification official or diagnostics laboratory to change what is specified by the importing country.

On the other hand, if a sample size, sampling procedure and diagnostic test are not specified by the importing country or state, the phytosanitary certification official has some discretion; but, the goal should be to carry out sampling and testing in a scientific and professional manner. The reliability of the phytosanitary certification agency is also at issue. If the importing country's or state's requirements cannot be met by the phytosanitary certification agency, phytosanitary certificates must not be issued.

Where the diagnostic tests are performed is the second question of validity. Most state agencies operate diagnostic laboratories that provide timely and accurate professional technical support for their quarantine enforcement, pest detection, pest eradication, nursery inspection, and seed regulatory activities, as well as for the performance of tests for phytosanitary certification purposes. Some nurseries and seed companies operate testing facilities of their own. There also are private laboratories that perform diagnostics as a service for a fee.

The issue of impartiality has already been discussed in this document, but it has special implications for laboratory testing. While governmental agency laboratory diagnostics are generally accepted as being impartial, the same is not true of private laboratories. However, at

times a governmental agency's laboratory may not be proficient in the performance of a specific test or the volume of testing may exceed the laboratory's capacity to provide a timely test result. In view of these limitations, the question arises as to what role, if any, private laboratories may play in phytosanitary certification.

Private laboratories can play a complementary role provided that they are properly accredited by the U.S. Department of Agriculture (USDA) or the phytosanitary certification agency of the state. The validity and reliability of the laboratory's diagnostics are both involved. When properly accredited, private laboratories could perform those diagnostic tests the state agency is not proficient in performing or those tests that exceed the testing capacity of the state agency's diagnostic laboratory. Samples should be submitted "blind" to the private laboratory and results should be reported back to the governmental agency's diagnostics staff.

Accreditation should include consideration of the following:

- professional staffing: expertise in the disciplines relative to pest and host identification
- good laboratory practices
- adequate facilities and equipment
- access to specialists for verification where necessary
- record-keeping, curation and storage facilities for voucher specimens
- use of valid diagnostic methods

Accreditation should also include quality control monitoring. Monitoring is a question of both validity and reliability. Laboratories must provide valid diagnostics over time. They must be proficient on a consistent basis. Diagnostics monitoring can be accomplished by:

- periodic confirmation of test results by other recognized experts, or
- the submission of blind samples for diagnosis, and
- unannounced inspections to check on laboratory practices.

Accredited private laboratories also must be responsible for the proper maintenance of records and for making those records available during normal business hours for review by the USDA or state certifying agency. Data kept should be specified by the phytosanitary certification agency from among the following:

- sample identification number
- date of receipt of sample and test
- sample size
- test procedure used
- number and source of controls
- test results
- name of identifier

Laboratory Diagnostics - Laboratory diagnostics must be valid and reliable. The use of the proper tests and testing proficiency over time are involved. Private laboratories must be accredited in accord with the criteria specified in this section. Governmental agency laboratories need not be accredited but they must meet the accreditation criteria. Governmental phytosanitary certification agencies are responsible for assuring that laboratory diagnostics are valid and reliable. When specified phytosanitary requirements cannot be met, phytosanitary certification agencies must not issue a phytosanitary certificate.

Phytosanitary Certification Staff Quality Control

In addition to the quality control discussed in the previous sections, other quality control requirements must be met by the phytosanitary certification staff itself.

The NPB quality control is that each certifying agency must assure:

- Staff training in sampling methods, preservation and transportation of samples for identification and record-keeping associated with the sample.
- Proper use and maintenance of equipment and supplies.

Phytosanitary Requirements Standard

Foreign Exports - The USDA's Animal and Plant Health Inspection Service (APHIS) has the primary responsibility for foreign export phytosanitary certification functions in the United States and provides the main interface with foreign plant protection entities and regional plant protection organizations. Duly authorized state collaborators may issue federal phytosanitary certificates for foreign export shipments pursuant to APHIS policies, guidelines and directives. Periodic training is provided to keep state cooperators updated on phytosanitary issues.

Federal, state, and local officials providing phytosanitary certification for foreign export must review the current commodity phytosanitary certification requirements for the importing country. These requirements are maintained by the USDA and made available to certification agencies through the Export Certification Project (EXCERPT).

Occasionally, exporters will have in their possession an import permit issued by the importing country that specifies different phytosanitary certification requirements. In these cases, the requirements of the import permit only apply to the shipment covered by the import permit. And, the import permit requirements on the import permit supersede the country's published requirements--only for the described shipment.

Phytosanitary officers must make sure that 1) all applicable requirements are met, 2) any required additional declaration is made, and 3) the federal phytosanitary certificate is completed in conformance with all current and applicable requirements.

Copies of federal phytosanitary certificates and the information they contain may be confidential. Federal officers and state collaborators should forward all requests for copies of phytosanitary certificates and applications for inspection of domestic plants and plant products for export, *or* for information contained in them, to the USDA's Freedom of Information Act/Privacy Act Coordinator for a determination of confidentiality.

Domestic Shipments - Phytosanitary certification officials engaged in the certification of commodities shipped interstate must consult the importing state's quarantine requirements. This can be done by reviewing the NPB sponsored summary of quarantine requirements published by the AmericanHort and made available to all state agencies.

The confidentiality of state certificates will be governed by state law. So, certification officials should determine whether they are public documents and proceed accordingly if requests for copies or information from them are received.

Industry representatives regularly engaged in the interstate marketing of quarantined commodities should be encouraged to obtain a copy of the AAN published quarantine summary and to use it to make sure that they can meet quarantine requirements before they call for phytosanitary certification.

Whenever there is any question about quarantine or phytosanitary certification requirements, the quarantine state officials in the receiving state should be consulted.

Use of Seals - Phytosanitary certificates must represent the specific set of plants inspected by regulatory officials. Affixing a seal to the shipping container and noting the seal number on the phytosanitary certificate helps to prevent tampering with the shipment (swapping, adding, or removing plants).

Employing a seal is particularly beneficial for export shipments. For example, a state official often issues a state phytosanitary certificate for conversion to a federal phytosanitary certificate at the port of export. If the state official applies a seal on the tailgate of the truck container, the PPQ officer knows that the plants presented for export are indeed those same plants. Having no seal leaves open the possibility of tampering.

Alteration/Misuse - The alteration or misuse of phytosanitary certificates is illegal. States should review their law to assure that alteration and misuse are unlawful and that appropriate criminal and/or civil penalties are available to deter illegal activities. What constitutes alteration and misuse must be specified. With respect to misuse, shippers sometimes request that financial information be included on phytosanitary certificates. APHIS guidelines make it clear that certificates are not intended to serve a financial purpose.

Cooperation - All phytosanitary certification agencies and phytosanitary certification officials should keep abreast of quarantine requirements and be committed to complying with them. State quarantine officials should cooperate to keep quarantine restrictions and phytosanitary certification requirements at the lowest level possible consistent with reducing risk to an acceptable level and minimizing the cost of phytosanitary certification for the industry.

Monitoring And Reporting

Agency administrators should establish a system for reviewing the phytosanitary certificates issued by the agency's staff. The goal should be to discover certification errors and to take measures to prevent them in the future.

Quarantine officials in the importing states should promptly report certification errors and problems direct to the certifying state agency. This will assist administrators in their efforts to assure that their phytosanitary certification program is both valid and reliability.

Appeal And Dispute Settlement

Occasionally, disputes over the validity of various quarantine or nursery regulations will arise. It is recognized that it is not desirable to settle such disagreements in the courts. Increasingly, settlement is via some mutually agreed upon mediation or arbitration procedure based on accepted standards. The appeal and dispute settlement procedure presented here is one approach that might be used by individual states on a case by case basis.

Appeal - Any state governmental pest prevention agency aggrieved by the quarantine (phytosanitary) or nursery regulatory action of any other state may appeal to the National Plant Board (NPB) in writing. Appeals should be addressed to the current NPB chairperson.

Emergency – An emergency appeal should be referred for NPB review within 10 working days of the date of receipt by the NPB chairperson. The review should be completed within 30 working days from the date of receipt by the review committee. The criteria suggested for emergency appeals are:

- a) The action/requirements were imposed on an emergency basis without hearing or other opportunity for comment by those affected by the action; and
- b) The action significantly interrupts the marketing of restricted or quarantined commodities; and
- c) The appeal to the NPB chairperson is accompanied by a showing (facts and rationale) that the actions or requirements are unnecessary, biologically or

scientifically unsound; or otherwise inappropriate or inconsistent with the NPB's plant quarantine and nursery program guidelines.

Non-emergency - Non-emergency appeals should be referred for NPB review within 30 days of receipt by the NPB chairperson. Review should be completed within 120 working days of the date of receipt by the review committee. Appeals must be accompanied by a showing (facts and rationale) that the actions or requirements are unnecessary, biologically, or scientifically unsound; or are otherwise inappropriate or inconsistent with the NPB's plant quarantine and nursery program guidelines.

Review Committee

Appointment - The NPB chairperson may appoint a three-member review committee to handle each appeal. The review committee should consist of representatives of the involved/affected regional plant boards and a USDA/APHIS employee with knowledge and expertise in plant quarantine and the kind of pest involved. The latter member should serve as the chairperson.

Decisions - The review committee should collect all the facts pertinent to the appeal and analyze them for biological and scientific integrity and consistency with the NPB's plant quarantine and nursery inspection program guidelines. After review and evaluation, the committee should submit a draft written decision to the NPB chairperson and to the affected state agencies for review and comment. Comments should be received back within 14 working days. Copies of the comments made by the NPB chairperson and the state agencies should be shared among the NPB chairperson and affected states, so that all the parties will be informed of any additional input or argument being made.

The review committee should respond to the comments on the draft written decision within 14 working days. Upon receipt of the committee's comments, the NPB chairperson should submit, within 14 working days, the final report.

In the case of emergency appeals, the time periods specified will have to be shortened to meet the 30 day timeframe specified in part A.

DEFINITIONS

Words and terms used in these guidelines are listed and defined in alphabetical order in this Appendix. The North American Plant Protection Organization's (NAPPO) Basic Glossary of Phytosanitary Terms also is referenced here in that 1) international trade in North America is affected by them and 2) federal, state and local pest prevention officials responsible for the issuance of phytosanitary certificates exported from the United States to Canada or Mexico should be familiar with them.

"Acceptable level" - the probable level of harm that is so low that the imposition of phytosanitary requirements is not required; or the probable level of harm that the trade partners agree to achieve through by the imposition of pest risk mitigation measures or strategies *and* accept for continued trade when confirmed by phytosanitary certification of specified host commodities.

"Agent" - any person who on behalf of any other person receives on consignment, contracts for, or solicits for sale on commission, any plant product from a producer of such product, or who negotiates the consignment or purchase of any plant product on behalf of any other person.

"Agricultural commodities" - plant products including any horticultural product.

"Appliance" - any box, tray, container, ladder, tent vehicle, implement or other article which is, or may be, used in connection with the growing, harvesting, handling, or transportation of any agricultural commodity.

"Area" - any political division or subdivision or any officially defined area including adjacent parts of contiguous political divisions or subdivisions. [Political divisions include nations and states or provinces within them. Political subdivisions include counties, parishes or municipios (in Mexico), and cities or municipalities. Officially defined areas also may include any other clearly defined and identifiable area including a specific property or facility.]

"Biotic agent" - any living entity.

"Broker" - any person who negotiates the purchase or sale of any plant product. A broker may not, however, handle either the plant product which is involved or the proceeds of a sale.

"Certificate" - a document authorized or prepared by a duly authorized federal or state regulatory official that affirms, declares, or verifies that an article, nursery stock, plant, product, shipment or any other officially regulated thing meets phytosanitary (quarantine), nursery inspection, pest freedom, plant registration or certification, or any other set of legal requirements. Such documents are known by the purpose of their issuance: Phytosanitary

certificate [for the purpose of verifying compliance with phytosanitary (quarantine) requirements]; nursery stock certificate (for the purpose of verifying compliance with nursery inspection and pest freedom standards); registration or certification tags, seals, etc. (for the purpose of verifying compliance with registration or certification requirements); etc.

"Certification" - the act (by a duly authorized regulatory official) of affirming, declaring, or verifying compliance with phytosanitary (quarantine), nursery inspection, pest freedom, plant registration or certification, or any other set of legal requirements.

"Commission merchant" - any person, who:

- a) Receives on consignment or solicits any plant product from a licensee or producer of the product.
- b) Accepts any plant product in trust from a licensee or the producer of the product for purposes of sale.
- c) Sells any plant product on commission.
- d) Handles any plant product in any way for the account of or as an agent of the consignor of the product. Any person who accepts a plant product from the producer of such product for the purpose of sale or resale is a commission merchant, unless the person has bought, or agreed to buy, the plant product by a contract which designates the price to be paid to the seller.

"Compliance agreement" - any written agreement between a person and a regulatory agency to achieve compliance with any set of requirements being enforced by the agency.

"Consignee" - any person to whom any plant, nursery stock, horticultural product, agricultural commodity or plant product is shipped for handling, sale, or resale, or any other purpose.

"Consignor" - any person who ships or delivers to any consignee any plant, nursery stock, horticultural product, agricultural commodity or plant product for handling, planting, sale, or resale, or any other purpose.

"Consumer" - any user of any article, nursery stock, plant, plant product, regulated product, or shipment.

"Crop seed" - the seed or seedlike fruit of grain, beans, flax, beets, onions, or any other crop whether or not it is intended for planting purposes.

"Dealer" - any person who obtains title to, or possession, control, or delivery of, any plant product from a producer at a designated price for the purpose of resale, or who buys or agrees to buy any plant product from a producer of the plant product at a designated price.

"Delimitation survey" - systematic search to determine the extent of an area infested by, or free from, a target pest.

"Detection survey" - systematic search to determine the presence or absence of a target pest.

"Does not occur" - that a valid detection survey has been conducted and the pest was not found; or, that any previous incidents of the pest in the area were eradicated or otherwise eliminated. (Pests known to be widespread or cosmopolitan in areas adjacent to an endangered area are presumed to be present in the endangered area unless definitely demonstrated to be absent.)

"Free from" - that a valid detection survey has been performed showing that a specific pest is not present; or that the article, nursery stock, plant, plant product or any other regulated thing has been visually inspected or tested in accordance with specified requirements and that no live life stage of regulated pest(s) was found.

"Economic impacts" - significant damage or harm in terms of well documented: a) plant or crop destruction or injury; b) increased cultural or pest control costs; c) disruption of existing pest control strategies such as biological control, integrated pest management, sustainable agriculture or forestry, and cropping patterns or loss of a high value crop without replacement by an equally valuable and marketable crop; d) social adversities such as interference with home/urban gardening, human health, worker safety, food safety, or jobs; or e) environmental quality including added pesticide use, scenic and watershed damage, destruction of ecosystems, and food chain interference.

"Endangered area" - continent, region, country, state, county, province, municipality or any other discretely delineated political or otherwise lawfully constituted geographic area which has been officially identified for protection from injurious pests not already present.

"Endemic pest" - native (indigenous) pests or pests permanently established in a state.

"Eradication" - elimination of a pest based on absence determined by negative, mutually agreed upon, verification survey for the target pest. (Pest control is sometimes more broadly or generically defined to include all actions taken to reduce or eliminate pest populations including control, eradication, management, and suppression. See Appendix H, page 69, as an example.)

"Exotic pest" - non-native (non-indigenous) pests or pests not known to occur in a state.

"Farm product" - includes every agricultural, horticultural, viticultural, and vegetable product of the soil, and bees and apiary products, hay, dried beans, honey, and cut flowers.

"Horticultural product" - those products stated in Group 18 of the United States Department of Labor Standard Industrial Classification Manual which are grown under cover or outdoors, including bulbs, flowers, shrubbery, florist greens, fruit stock, floral products, nursery stock, ornamental plants, potted plants, roses, seed, sod, Christmas trees, fruits, food crops grown in greenhouses, vegetables, and horticultural specialties not otherwise specified.

"Hold order" - any written directive [issued by a duly authorized regulatory official to a person who owns or controls any appliance, article, nursery stock, plant, plant product or any other article that has been determined to be, or likely to be, infested with regulated pest(s)] prohibiting movement from one location to another, except as otherwise prescribed in the directive.

"Host" - any appliance, article, commodity, nursery stock, plant, plant product or any other thing which is capable of transporting a pest from one place to another. (Hosts vary considerably in the degree to which they may facilitate the movement of a pest from one place to another. These variations must be taken into consideration in pest risk analysis and mitigation.)

"Infested" - officially determined to be contaminated by a pest using prescribed methods.

"Inspector" - any person duly authorized by a regulatory agency to perform any required regulatory activity.

"License" - a document issued by a state regulatory agency authorizing any person to engage in the nursery business at a particular location under a specified business name.

"Methods other than phytosanitary measures" - include plant registration and certification programs, nursery stock and other commodity pest freedom standards, special permits, compliance agreements, etc. These methods might provide an acceptable level of phytosanitary security for moderate to low impact quarantine pests.

"Move" - to ship, offer for shipment, receive for transport, carry or, in any manner whatsoever, relocate a regulated thing from one place to another.

"Mutually agreed upon" - agreement between or among trading partners as to pest eradication criteria or requirements, phytosanitary measures, or survey methods.

"New occurrence" - a pest occurrence not previously officially reported or a subsequent occurrence of a pest previously eradicated.

"Noxious weed" - any species of plant which is, or is liable to be, troublesome, aggressive, intrusive, detrimental, or destructive to agriculture, silviculture, or important native species, is

difficult to control or eradicate, and which a plant protection agency designates by law to be a noxious weed.

"Nursery" - any location where nursery stock is grown, propagated, stored, or sold; or any location from which nursery stock is distributed direct to a customer. (See "Sales location")

"Nursery stock" - any plant for planting, propagation, or ornamentation.

"Occurrence" - current presence of an endemic or exotic pest in an area.

"Official" - authorized, implemented and directed, or performed by a governmental plant protection organization.

"Officially controlled" - the conduct, by an official public pest prevention agency, of eradication or intensive suppression activity including various treatments, quarantine and other measures with the goal of eliminating an isolated infestation or prevention of further spread within the endangered area. It does not include private general agricultural, urban forestry, or home garden pest control measures conducted by individuals against pests permanently established in an endangered area.

"Pathway" - any natural or artificial means or avenue that allows for the movement of a pest from one area to another.

"Permit" - any document issued by a duly authorized regulatory official that allows the movement of any regulated thing from one location to another in accordance with specified conditions or requirements and for a specified purpose.

"Person" - includes firm, corporation, company, limited liability company, or association.

"Pest" - any biotic agent (any living agent capable of reproducing itself) or any of the following that is known to cause damage or harm to agriculture or the environment:

- a) Any infectious, transmissible, or contagious disease of any plant; or any disorder of any plant which manifests symptoms or behavior which, after investigation and hearing, is found and determined by a duly constituted federal, state or local pest prevention agency, to be characteristic of an infectious, transmissible, or contagious disease.
- b) Any form of animal life.
- c) Any form of plant life.

"Pest control" - the reduction of pest populations to the point that economic damage, injury or loss is reduced to an economically tolerable level. (Pest control is sometimes more broadly or generically defined to include all actions taken to reduce or eliminate pest populations

including control, eradication, management, and suppression. See Appendix H, page 69, as an example.)

"Pest free area" - an area kept free from a specific pest.

"Pest management" (See "Pest control")

"Pest risk analysis" - characterizing the nature of pest hazard or harm; identifying the degree of probability or likelihood of harm; analyzing the degree to which risk mitigation measures or strategies can reduce the probability of harm to an acceptable level; and recommending pest risk mitigation measures or strategies.

"Pest risk management" - selection of pest risk mitigation measures, codification (enactment as law) of selected pest risk measures or strategies; enforcement of legal requirements; reevaluation; and revision or cancellation of requirements.

"Phytosanitary certificate" (See "Certificate")

"Phytosanitary measures" - any growing season or post-harvest treatment or any other method (tactic) or strategy (combination of methods or tactics) specified in a quarantine to reduce pest risk to an acceptable level.

"Plant" - includes any part of a plant, tree, plant product, shrub, vine, fruit, vegetable, seed, bulb, solon, tuber, corm, pip, cutting, scion, bud, graft, or fruit pit.

"Registration" - the official recording of a growing location, person, plant, sales location or any other thing or place as one that has met specified requirements and therefore eligible for a particular activity, operation or purpose.

"Regulated article" means anything the movement of which is governed by a quarantine or any other law.

"Quarantine" - a legal instrument duly imposed or enacted by a governmental agency as a means for mitigating pest risk.

"Quarantine pest" means an economically important pest that does not occur in an endangered area, or which is being officially controlled in an endangered area, and for which economic impact cannot be reduced to an acceptable level by means or methods other than phytosanitary measures.

"Sales location" - every location from which nursery stock is delivered direct to a customer.

"Sell" - includes offer for sale, expose for sale, possess for sale, exchange, barter, or trade.

"Shipment" - any article or thing which is, may be, or has been transported from one place to another.

"Significant damage or harm" - that level of adverse impact that results in economic damage, injury of loss that exceeds the cost of control for a particular crop.

"Surveillance" - combined and ongoing acts of monitoring, collecting, confirming, documenting, and reporting pest data generated via private and public activities for the purpose of establishing and maintaining a valid and reliable (accurate and current) pest distribution database for any particular area.

"Survey" - the systematic search for pests in accordance with mutually agreed upon methods designed to assure confidence in their meaning and accuracy for pest prevention purposes such as control, suppression, eradication, verification of pest free areas, identification of possible harm, evaluation of probability of harm, and taking appropriate actions to prevent predicted significant harm. Surveys may be performed for the purposes of detection, delimitation, or verification.

"Valid detection survey" - an official systematic search for a target pest that is performed using methods mutually acceptable between trading partners. (See "Detection survey" and "Survey")

"Verification survey" - a systematic, ongoing search to assure target pest freedom, determine the need for treatment, or determine the success of treatment. (This kind of survey is sometimes called a monitoring survey.)

Committee Members

Wayne Dixon (FL), Chairman

Gray Haun (TN)

Vicki Smith (CT)

David Blackburn (AR)

Dan Hilburn (OR)

Mark Taylor (MD)

Jeff Zimmer (MI)

March 30, 2015

This is a revision of the original document published in 1995. Members of the National Plant Board Quarantine and Nursery Standards Committee were: Stephen Johnson (NE) (Chairman), Tom Kowalski (GA)(Vice-Chairman), Tad Hardy (LA), Tom Sim (KS), Ann Gibbs (ME), Bill Callison (CA), Craig Regelbrugge (American Association of Nurserymen), and Ken MacLeod (AgCanada).