Introduction

The world economy is shaped by technological advances, domestic market maturation, and strategic international alliances. Borders are becoming irrelevant in the context of international travel and trade. The challenge to the United States Department of Agriculture, Animal and Health Plant Inspection Service, Plant Protection and Quarantine (USDA-APHIS-PPQ) is to define the Agency's role in this global economy. Future relevance, indeed survival, of the Agency in this operating environment is contingent upon its ability to effectively discharge three important duties. First, and foremost, is the safeguarding of America's abundant plant resources from invasive plant pests. Second, is the expeditious and secure admission of an increasing volume of goods and passengers into the United States. Third, is the facilitation of agricultural trade in compliance with international obligations and standards. Recent breaches of the APHIS-PPQ safeguarding system that allowed entry of dangerous invasive plant pests into the U.S. have raised concerns that current organizational policies and procedures are inadequate to execute these functions.

Recognizing the need to enhance the effectiveness of current safeguarding procedures, the Agency sought input from stakeholders through a formal review process. Under a cooperative agreement with APHIS-PPQ, the National Plant Board (NPB) assembled a panel of external stakeholders composed of representatives from academia, government, industry, and non-governmental organizations. The Review Panel included two Chairpersons and five Committee Chairs, as well as the Project Advisor (a former APHIS-PPQ Deputy Administrator), and a Project Specialist. The Review Panel was assisted by thirty-three external stakeholders assigned to four committees by subject matter expertise. Guidance and oversight was provided by the APHIS-PPQ Steering Committee.

Committee charges included, but were not limited to, addressing the following points. The Pest Exclusion Committee examined the effectiveness of the current system for protecting U.S. borders from unauthorized entry of invasive plant pests and how offshore activities can be employed to maximize the efficacy of this system. The Pest Detection and Response Committee investigated the adequacy of mechanisms employed for early detection of, and response to, invasive plant pests that penetrate border defenses. The International Pest Information Committee examined methods for gathering and disseminating information to maximize the efficacy of the safeguarding system, including the availability of worldwide databases for identifying and determining the potential impact of global threats to American plant resources. The Permits Committee studied the adequacy of current permit procedures by which regulated products and organisms are allowed to enter the U.S.

Review Committees, working over a three month period, acquired comprehensive background information through a broad-based approach. Site visits were made to maritime ports, airports, land border crossings, and other PPQ field and staff locations. Formal interviews conducted with plant health regulatory officials from five foreign countries and cooperating Federal agencies were supplemented by conversations with APHIS employees and representatives from academia, industry, scientific societies, the traveling public, port authorities, importers, environmental groups, and animal health groups, as well as a written survey of officials from state departments of agriculture and state forestry units. Literature searches and studies of statutes, authorities, and prior review reports provided additional documentation. Initial findings and recommendations derived from these sources were submitted to 65 external stakeholders whose comments were considered for incorporation into the final document. Resulting recommendations extend beyond narrow agendas of individual stakeholders to the overall mission of the safeguarding system. The Review Panel has broadly prioritized its recommendations (Summary of Issues, Findings and Recommendations) and will be available to APHIS-PPQ to clarify and support implementation of these recommendations (see Implementation and Accountability). Budgetary concerns and unaddressed issues, both of which are outside the scope of this Review, will be considered during the implementation phase.

The Role of Safeguarding

The American safeguarding system is composed of a complex network of programs, decisions, and actions focused on preventing the entry and establishment of invasive plant pests in the form of arthropods, pathogens, and noxious weeds. For the purposes of this discussion, plant resources are defined as agricultural food and fiber crops; horticultural crops such as fruits, vegetables, nursery and floral plants; forestry resources; and natural resources including native species and ecosystems. Historically, agriculture has been viewed as the primary beneficiary of the safeguarding system, however, the economic benefits of protecting plant resources accrue broadly. Freedom from invasive plant pests minimizes agricultural production costs while enhancing product quality and marketability. The result is an abundant and affordable supply of food, fiber, plants, and plant products for domestic and export markets. Compliance with phytosanitary standards provides a comparative advantage in many agricultural products and has secured U.S. exporters a top share in the global marketplace with exports totaling $60.4 billion in 1996. The value of agricultural trade in the U.S. economy is illustrated by a 1996 agricultural surplus of $26.8 billion during a period when the non-agricultural trade account was in deficit by $235.1 billion (U.S. Agriculture and World Trade, 1998). Agricultural industries further impact the economy through employment of approximately 17% of the U.S. workforce.

The societal benefits of safeguarding reach far beyond agricultural contributions to the economy, they ensure a healthy environment and an extensive natural resource base. North American plant resources are highly vulnerable to the impacts of invasive plant pests, resulting in dramatic economic and environmental effects. Introduced invasive plant pests result in an estimated $41 billion annually in lost production and in prevention and control expenses (GAO Report, 1997). These are costs paid either directly or indirectly by the American

taxpayer. In addition to the direct economic damage, invasive plant pests also reduce the general quality of life by stripping towns and forests of important plant species such as the stately American elm and the chestnut. Other foreign imports in the form of pesky weeds such as kudzu, crabgrass, and the ubiquitous dandelion plague the daily life in this country.

APHIS-PPQ is the primary Federal agency charged with designing, implementing, and evaluating the safeguarding system. Responsibility for preventing entry of invasive plant pests into the United States was delegated to the Agency by the United States Congress through statutory law contained in eleven separate acts passed since 1912. Administrative law contained in the Code of Federal Regulations includes quarantine and inspection requirements that provide the framework for orderly movement of agricultural products, other commodities, and passengers across U.S. borders. International obligations require that scientifically-based risk assessment support these regulatory requirements without being overly restrictive to trade. Domestic programs, administered jointly with the States, function within a similar framework to prevent or slow the spread of invasive plant pests of Federal interest within the U.S.

Although the legal mandate for safeguarding activities rests with APHIS-PPQ, the system relies on collaboration with other USDA units, as well as several Federal agencies, state and local departments of agriculture, academia, environmental organizations, and industry. The safeguarding framework extends beyond U.S. borders through Agency participation in setting plant health standards with the North American Plant Protection Organization (NAPPO) and the International Plant Protection Convention Secretariat of the United Nations' Food and Agriculture Organization and through trade negotiations with partners worldwide. The challenge faced by APHIS-PPQ is to build upon domestic and international partnerships to assume an authoritative role in phytosanitary negotiations that ensures continued market access, while simultaneously protecting both agricultural and environmental sectors of society. Processing and disseminating scientific information in a relevant and persuasive manner will enhance the ability of the Agency to retain this leadership position in a global economy that requires a broadly shared knowledge base.

The Review Panel recognizes that continued relevance and success of the American plant safeguarding system is contingent upon a comprehensive statutory framework from which a clear conceptual plan and specific goals are derived. The Agency must embrace several fundamental values in shaping an effective organizational structure. Dynamic leadership is required to envision a progressive and transparent system design, but commitment at all levels within the Agency is key to implementation of this vision. The Agency vision must create an organizational culture that facilitates efficient administration, optimal alignment, and empowerment of personnel at all levels. Leadership must maintain a transparent process for executing safeguarding mandates, a process that instills trust through effective communication with all stakeholders. Decisions must be based on scientific evaluations and consider application of relevant technological innovations. The Review Panel addresses these issues through discussions of core competencies in leadership, risk-based management, partnership development, communication, information retrieval, research and technology, and other

overarching issues. Committee reports present detailed findings and pertinent recommendations in each of four areas: pest exclusion, pest detection and response, international pest information, and permits. The interactive nature of the safeguarding system is reflected by overlapping recommendations in committee reports and overarching issue sections. This is intentional as it provides continuity.

The Agency must now strategically position itself to retain a leadership role in protecting American plant resources.

APHIS-PPQ has a unique opportunity to create its own future by defining the Agency's emerging role in regulating invasive pest risks arising from an expanding and complex world economy. Relevance of the Agency in this operating environment is contingent upon its ability to effectively discharge functions in safeguarding, importation, and trade facilitation. Societal benefits of these functions reach far beyond agriculture by insuring a healthy environment and an extensive natural resource base. All of society benefits from the exclusion of harmful invasive species and bears the consequences of introduction in the form of the added tax burden for management programs, increased food costs, or reduced recreational value of public and private lands. Recognizing the societal benefits of protecting the environment from invasive species, President Clinton issued Executive Order 13112 on February 3, 1999. The goal is to prevent the introduction and minimize the impact of invasive species in all types of ecosystems. By establishing the Invasive Species Council with oversight by the Secretaries of the Interior, Agriculture, and Commerce, the importance of USDA participation was pointedly obvious. The role of USDA, and APHIS-PPQ in particular, in executing this order as it pertains to invasive plant pests cannot be overstated. The Agency must now strategically position itself to retain a leadership role in protecting American plant resources.

Overarching Issues

1.1 Authorities and Obligations

Background: International Obligations

The World Trade Organization (WTO) Agreement on the Application of Sanitary and Phytosanitary Measures (SPS) deals with measures specifically for the protection of plant life and health. The SPS clarifies the rules and discipline guiding the development of plant quarantine (phytosanitary) measures. To prevent these measures from impeding international trade, they must be based on scientific principles and justified by risk assessment; provide a level of protection appropriate only to the risk posed; and, not unduly restrict trade. In addition member countries have agreed that quarantine actions are to be based on, and limited by, necessity, and are developed to meet the standards of harmonization, equivalence and transparency.

The International Plant Protection Convention (IPPC) is a multilateral treaty deposited with the Director-General of the Food and Agriculture Organization of the United Nations (FAO) and administered through the IPPC Secretariat located in FAO's Plant Protection Service. Currently 107 governments, including the U.S., are contracting parties to the IPPC.

The purpose of the IPPC is to secure common and effective action to prevent the spread of pests of plants and plant products and to promote measures for their control. The Convention provides a framework and forum for international cooperation, harmonization and technical exchange in collaboration with regional and national plant protection organizations. The IPPC plays a vital role in trade as it is the organization recognized by the WTO-SPS Agreement as the source for international standards for phytosanitary measures (ISPMs) affecting trade.

Following the adoption of the WTO-SPS agreement, the IPPC was revised to better enable it to fulfill its role as the body to provide guidance and disciplines for the application of the SPS. The FAO Conference unanimously adopted amendments to the IPPC in November 1997. These changes update the IPPC and reflect its role in relation to the SPS, primarily the institutional arrangements for standard setting. Changes included provisions that formalize the Secretariat and standard setting as well as establish the Commission on Phytosanitary Measures. The revised IPPC will enter into force only after ratification by two-thirds of the contracting parties.

The North American Plant Protection Organization (NAPPO) is a Regional Plant Protection Organization (RPPO) created under the authority of the IPPC. NAPPO was formalized through the signing of a Cooperative Agreement by representatives of Canada, the United States of America and Mexico to encourage cooperation in the field of plant protection.

NAPPO's objectives are to ensure that cooperative efforts are made between the member countries to prevent the entry, establishment and spread of regulated plant pests, while facilitating intraregional and interregional trade in plants, plant products and other regulated articles.

NAPPO develops and adopts regional standards to harmonize member countries' phytosanitary measures to facilitate the safe movement of regulated articles into and within the NAPPO region; to support the work of the NAFTA and the Sanitary and Phytosanitary Measures Committee; and to harmonize plant pest management programs in the NAPPO region through the coordination of pest surveys. NAPPO encourages the development of hemispheric phytosanitary standards through participation in the Interamerican Coordinating Group in Plant Protection; and collaborates with other RPPOs and other international organizations to protect the hemisphere from regulated pests; and assists in the development and delivery of training and technical assistance programs in the hemisphere.

Risk analysis is viewed as the key to evidencing effective, defensible quarantines, and therefore key to any SPS disputes.

On a global level NAPPO supports the IPPC by assisting in the development of international standards for phytosanitary measures and monitoring their application within the NAPPO region; and exchanges technical information with other RPPOs and FAO, concerning all aspects of plant protection.

As deepening integration of the world economy continued to blur the lines between what would earlier have been considered "domestic" versus "international", measures to restrict imports have logically come under the closest scrutiny. The SPS Agreement seeks the high ground between allowing protection while disallowing protectionism. As written, the SPS Agreement reflects the crafting of a careful balance of rights and obligations designed to ensure that an SPS measure is in fact intended to protect against the risk asserted, rather than to serve as a disguised trade barrier. At the same time, implementation to date makes it clear that the SPS does not require what has been termed "downward harmonization". No WTO member is required to adopt an international standard if doing so would result in a lower level of human, animal or plant health protection than that government has determined to be appropriate.

In practice, the SPS Agreement is generally viewed as a nascent legal system, with interpretation of the Agreement evolving via case law. In the short time the Agreement has been in place, decisions made by the Appellate Body (AB) have indeed supported a country's right of sovereignty, that is, its right to determine its appropriate level of protection. However, members that adopt the standards recommended by the IPPC will be considered "rebuttably presumed" to be in compliance with the Agreement (Roberts, 1998).

In any case, transparency will become more important as countries continue to complain that phytosanitary measures represent non-tariff barriers to trade. Compliance with the transparency provisions (especially the rationale for assumptions) is seen as the key to effective and justifiable implementation of the SPS Agreement. Risk analysis is viewed as the key to evidencing effective, defensible quarantines, and therefore key to any SPS

disputes. Also important is the expectation of exporting members to evidence that the current phytosanitary requirements of the importing contracting party(ies) are met.

That regulatory processes can be "captured" by interest groups with a vested interest in limiting competition is well known. If the SPS Agreement succeeds, it will be regarded as an important institutional innovation that can withstand the influences of domestic interest groups that might lobby for SPS measures for that reason alone (Roberts, 1998).

It is interesting to note that since its adoption, the Agreement has brought about a broad regulatory review among WTO members in concert with the agricultural industry. Many regulatory agencies are proactively modifying regulations to comply with the Agreement. The United States' regionalization approach to animal quarantine issues is particularly notable in this regard (Roberts, 1998).

At the conclusion of the Uruguay Round, the WTO signatories agreed to review the SPS three years after its entry into force. The review, scheduled to occur in 1999, is to focus on progress in implementing the SPS Agreement. It will evaluate provisions relating to the requirement that measures be based on science and risk assessment, transparency and notification procedures, harmonization of international sanitary and phytosanitary standards, and distinctions between the levels of sanitary and phytosanitary protection established in different situations. In particular, the U.S. will be assessing the contribution that implementation of the SPS makes to the reduction of unjustified barriers to agricultural trade, while simultaneously preserving U.S. safeguarding capabilities.

Background: Domestic Authorities

APHIS-PPQ programs are currently implemented under authorities found in 11 different statutes dating back as far as the Plant Quarantine Act of 1912. The laws were generally passed to address "crises of the day;" both overlap and gaps exist. A number of specific regulations have been promulgated under these statutes. For the purposes of the safeguarding review, those found under 7 CFR 319, such as the regulations governing importation of fruits, vegetables, propagative material, logs, lumber and unmanufactured wood, as well as noxious weed regulations (7 CFR 360) are most relevant. Because these regulations are components of pest exclusion strategies, specific discussion appears in the Pest Exclusion section of this report.

The Plant Protection Act is a legislative proposal introduced in the 106th Congress as H.R.1504 and S.910, with broad support from an array of stakeholders. It was developed over the last decade to streamline and consolidate the 11 plant-related statutes that provide APHIS its authorities. A key motivation for this revised legislation is to address the growing need for transparency in plant quarantine laws as part of the global approach to trade dispute settlement. Also compelling is the need to create enforcement provisions that serve as a deterrent to increasing illegal activities that threaten U.S. agriculture and the environment.

The Plant Protection Act would clarify APHIS authority to squarely address invasive plant pest threats to natural areas and "non-economic" plant resources as well as agriculture. It would also provide enhancements in such key areas as the regulation of biological control agents, and authorities to better identify and manage noxious weeds. The current legislation

reflects consensus-building efforts in the mid-1990's in response to changing demands on the plant protection functions of the government. Enhancements contained in the proposed Plant Protection Act are consistent with international obligations.

Executive Order 13112 on Invasive Species (EOIS) was issued by the Clinton Administration on February 3, 1999. The EOIS seeks to coordinate and enhance Federal government efforts to prevent the introduction of invasive species and to provide for their control. The EOIS calls for a council comprised of key Federal agencies, charged with coordinating activities and developing an Invasive Species Management Plan. A stakeholder advisory committee is also to be established. It is widely believed that the EOIS will sharpen the focus, and resources, devoted to Federal, state, and local invasive plant pest safeguarding and management activities.

Findings

While APHIS's statutory authorities have served the agency reasonably well over the years, the patchwork of laws has not kept pace with changing needs resulting from trends in technology, commerce and travel. The 11 statutes are poorly coordinated; at times, APHIS has been unsure which authority to apply in a given case.

The need for transparency of statutory authorities is greater than ever, given the move toward regionalization and the mandate that quarantines be risk-based. Regulatory transparency and uniformity will help to facilitate both domestic and international trade, consistent with pest safeguarding goals and international obligations.

National goals to safeguard plant resources are only achievable if adequate enforcement capabilities are provided for in the statutory framework of APHIS. A comprehensive set of penalties, investigative and enforcement tools will help deter violations and ensure that any enforcement action is consistent with the violation—thus strengthening the safeguarding system. The current enforcement and investigative authorities of APHIS are inadequate to meet the pest safeguarding challenges facing the U.S.

As the primary Federal agency responsible for safeguarding plant resources from invasive plant pests, APHIS programs should be foundational to the success of the EOIS. The APHIS has historically focused on pests of agriculture. The Review determined that the goals and operational aspects of safeguarding both agriculture and natural ecosystems are too intertwined to be parsed out and delegated to different agencies. The APHIS must step up to the plate with regard to environmental resource protection. The Review found the Plant Protection Act initiative to be supportive of and compatible with EOIS implementation.

A clear, streamlined, and modern statutory framework will facilitate the achievement of pest safeguarding goals, including effective pest exclusion, detection and emergency response, and management. Many specific proposals found within this report depend on the clarity and enhanced authorities that would become reality with the passage of the Plant Protection Act.

Recommendations

■ 1 Work with Congress and stakeholders toward enactment of the Plant Protection Act, as introduced in the 106th Congress as H.R.1504 and S.910.

■ 2 Show leadership in acceptance of

the revised text of the IPPC by encouraging official notification of acceptance to the FAO by the U.S. Department of State.

■ 3 Take a leadership role in implementing the SPS Agreement. With regard to the upcoming round of WTO negotiations, the SPS Agreement specifically should not be reopened. The existing text represents a delicate balance of rights and obligations which, as interpreted so far, is consistent with pest safeguarding goals and a science-based approach for assessing and managing pest risks.

■ 4 Set an international example through a commitment to continually improve the safeguarding system, providing a leadership precedent for other countries.

■ 5 Participate fully in the implementation of the Executive Order on Invasive Species.

1.2 Risk Based Management

One of the most important emerging roles of government has been the regulation of risk. As APHIS moves away from interdiction as its primary safeguarding strategy, predictive models will become increasingly important to target activities and resources, and to justify quarantine regulations. Continuous improvement of all predictive models will be key to future regulatory decisions in all areas of the safeguarding program.

The three components of risk analysis are risk assessment, risk mitigation, and risk communication. Pest risk analysis, as a tool, estimates as far as possible the level of risk and potential harm presented by an activity. It can be used to evaluate and predict high or low risk pests, pathways and commodities, and can estimate and chart changes in the levels of risk posed.

The APHIS has models for pest, commodity and pathway analysis that can and are continually modified and used for this purpose. These models were derived from a generic process designed to be flexible and dynamic enough to accommodate a variety of approaches to pest risk depending on need and to evolve with the state of the art. Development of this generic process leaned heavily on the National Research Council's 1993 "Ecological Paradigm" project (Orr, 1993).

A general obstacle to advancing the science of biological pest risk analysis has been the lack of research directed towards invasion biology. More to the point, a major obstacle to the evolution of the APHIS pest risk analysis process has been, and remains, the lack of reliable data. In the absence of robust data, APHIS relies on a process that analyzes potential pest introductions based largely on highly subjective and uncharacterized expert judgment in the assignment of risk values. Yet, reliable information is critical to understanding and predicting invasion threats, evidencing necessity of phytosanitary measures, and managing resources effectively and efficiently.

Tile from China with solid wood packing material infested with Cerambycid beetle larvae. Shipment arrived in containerized maritime cargo at Long Beach, CA.

Solid wood packing material under inspection for presence of Cerambycid larvae

Risk Analysis and Risk-Based Management

APHIS is working to integrate risk analysis-generated information in order to prevent the entry and establishment of invasive plant pests and expedite entry of passengers and cargo. This information is also used in budget development, resource allocation, program design, and in port operations task prioritization. An example of where this management strategy is used is the Agricultural Quarantine Monitoring (AQIM) Program. AQIM, as well as other random survey projects, gather (survey) information to estimate pest threat rates and deterrence effectiveness to target resources and staff more efficiently and effectively. Over 40 ports collect random sample data to evaluate port performance and pest risk.

Unfortunately, the effectiveness of this program is hampered by concerns over the accuracy of data collected. These concerns relate to a lack of field staff training, an institutionalized culture trained to "profile"; and, fear that the data will be used to reduce staffing. However, information developed to date can be used to establish an informational baseline. As pathways are dynamic, the risks associated with them will constantly change, and AQIM provides the means to track these changes. For this initiative to succeed, APHIS must re-communicate and re-train its staff on importance of pathway analysis and data collection, then use the data to make its operations more effective and efficient.

Risk management for inspection activities relies on an accepted tolerance (confidence level) to statistically determine the inspection level and methodology to be used. In the late 1980's, APHIS began using fixed-risk (hypergeometric) sampling systems in inspection sampling programs. This sampling system is used successfully for pear leaf blister moth and light brown apple moth for apples from France and Australia, respectively. Use of this tool should continue to be expanded.

Pending import permit requests awaiting APHIS pest risk analysis date back to 1991. This backlog was unavoidable after the unit responsible for risk analysis took a deep cut during the Agency's downsizing effort. In addition to staff augmentation, one possible method to alleviate the workload pressure would be make the process more efficient by categorizing and prioritizing import requests based on an initial pre-assessment or assumption of risk. Some movement in this direction has already occurred, with the more in-depth quantitative risk analysis reserved for use only in the case of major rulemaking. Further progress would entail the development and refinement of additional pest risk assessment models that would incorporate and standardize levels of information needed to perform the analysis. Another would be involvement of external stakeholders in the identification of issues and establishment of timeframes for completion of rule development.

Pest Risk Analyses: The Role of Information

Sound Pest Risk Analyses are essential tools for choosing appropriate policies aimed at avoiding exposure of plant resources to unacceptable pest risks. In order to obtain reliable data for conducting relevant and sound Pest Risk Analyses, the official safeguarding agency will utilize information sources and study protocols as follows:

• To import a specific commodity, compile all literature, correspondence and other documentation, and search all pest/commodity databases dealing with potentially invasive plant pest species associated with the commodity of interest. (A similar approach is employed to determine the possible pathways for entry and establishment for an invasive plant pest of concern, without a particular commodity import request.)

• Conduct a rigorous evaluation of the literature and other documents, pest/commodity databases, and create a summary database. Evaluate conflicting or incomplete reports and the expected accuracy of various reports or databases.

• Engage scientists with relevant expertise in the area of production, and/or invite interested parties to contract for studies, or have the official safeguarding agency's specialists conduct scientific studies in the export region on the commodity of interest and any invasive pest species.

• Build a knowledge base derived from detailed country surveys on indigenous and introduced pests and associated commodities that may eventually be exported to the U.S.

• Replicate studies across commodity variety, commodity maturity, source of commodity (region; cultural and pest management treatments utilized, etc.), and environmental or physical conditions present within the expected range of mitigation treatments. Find the limit(s) where mitigation measures partially fail.

• Carry out transparent Pest Risk Analyses following international standards and guidelines.

• Validate assumptions and mitigation measures with a feedback system using data generated from U.S. inspections at ports of entry, random inspections of particular loads (especially during the early years of an export program or when conditions have changed), and new sources of data from the exporting country, for example. Periodically evaluate changes in conditions and re-examine actual or proposed import plans or processes in order to optimize risk mitigation.

Risk Analysis and Rulemaking

Risk analyses are used to scientifically justify quarantine action (phytosanitary measures) as required by international standards (WTO-SPS, IPPC, NAFTA). These standards require that such actions be transparent based in necessity. To scientifically justify the need for plant quarantine regulations, risk analyses estimate the likelihood of successful invasive plant pest introductions, and potential impacts and severity.

International standards also require that phytosanitary measures employ the least restrictive measures necessary to accomplish their stated objective. The emergence and development of new information, and mitigation strategies, will continue to make pest risk estimations dynamic. Thus, it will be even more essential that pest risk analysis methodologies continuously improve to adequately, consistently, and transparently assess, mitigate, and communicate all the risk factors so that in the end regulatory decisions made are fully justified and legally defensible.

Though the risk analysis methodology used by APHIS continues to evolve and improve, the risk characterization portion of each assessment is not yet well developed. Whereas, the process is being made more transparent, the assumptions chosen for individual analyses and the characterization of uncertainty are usually absent.

It should be noted that a weediness assessment has now been added as the first filter to improve the process, but the science of weediness risk assessment is a work in progress. Therefore, any model in current use must be considered limited in its ability to characterize weediness and this uncertainty should be characterized accordingly in any assessment.

As risk analysis is essentially a tool for extrapolating and applying scientific data, it must be understood that the process is assumption- and value-laden (Carnegie Commission Report, 1993; Orr, 1993). At this time, the analysis methodology has not yet developed a means to effectively characterize and communicate uncertainty and the degree of uncertainty, nor does it provide a careful evaluation and documentation of use of expert judgment and the assumptions chosen.

Assessment questions arise in the pathway-initiated qualitative model, for example, because climate-host interaction is limited to plant hardiness zones and neither seasonality nor relative humidity is considered under this risk element or under dispersal potential. As a result pathogen risks in particular are vulnerable to mischaracterization. Host range is based on potential to cause damage to one or many hosts, but impact analysis tends to be limited to the host proposed for entry.

Movement of a potential pest to a suitable area has been based on geographical suitability and does not take into consideration demographic factors. The likelihood that a product will move to a suitable area is highly dependent on the population of an area. Further, it bases the ability to successfully colonize on introduction into a commercial production area, not on the equally or more likely initial introduction into an urban setting. Finally, there is no mechanism to evaluate the impact of aggregate risks when multiple pests are being analyzed.

Risk Communication

The APHIS' rulemaking process is viewed both internally and externally to be in a state of "paralysis of analysis". It is viewed this way for two reasons: lack of adequate communication

and understanding of risk and inadequate stakeholder outreach and collaboration.

Expansion of APHIS's risk communication efforts, particularly those targeting stakeholder collaboration prior to rulemaking, are particularly important because there are so many conflicting interpretations about the nature and significance of risks. Besides providing a bridge to knowledge gaps, collaboration facilitates an understanding of perception and values and enables informed decision-making. Collaboration enables participation. Collaboration at the beginning of the process—including information solicitation from the academic community—can deflect polarization, minimize opposition and blocking efforts, and preclude the need for a more formal time-consuming peer review process.

For as long as risk analysis has been used to evidence regulatory action, all involved parties have struggled with the characterization of risk, or risk perception—what constitutes "acceptable risk" or "appropriate level of protection". What risk assessment (and thus analysis) methodologies cannot do is determine what is acceptable or appropriate because these are value judgments characterized by variables beyond the systematic evaluation of information (Orr, 1993).

Initial assumptions that plant protection regulatory agencies could rely solely on the "hard" sciences as a basis for risk analysis was logical. But, perception of risk, thus the need for protection, is largely a value judgment. Among other factors, what is valued (or feared) in a society influences where and how its policymakers will seek appropriate protection. Several major disputes over necessity have arisen and remain unsettled because of differences in risk perception. In other cases, the supporting risk analyses have been judged inadequate.

As they already provide standardized measuring systems to assess necessity, transparency and equivalence, scientifically based strategies to estimate the importance of cultural differences may in the future offer potential for assessing the validity of a determination of equivalence in regulatory rulemaking. Information that provides some understanding of cultural values may help reduce controversy and litigation, enhance risk communication, and facilitate dispute resolution. The use of cost benefit analysis in quantitative risk analysis offers the potential to evidence economic and environmental impacts by comparing the strength of measures proposed for risk mitigation, and the cost, against a quantified estimate of the benefit.

Recommendations

■ 6 Provide the resources necessary to continuously develop a thorough and relevant knowledge base for pest risk evaluations, one that upgrades its scientific literature and its pest interception database. Make continuous improvement a core value for risk analysis throughout the Agency.

■ 7 Fund research on invasion biology.

■ 8 Prioritize and provide adequate staffing for pest risk analysis activities and upgrade the education, training and tools of the risk analysis staff to enable continuous improvement of the risk analysis models.

■ 9 Continually educate and communicate with PPQ staff on the importance and need for risk based decision-making.

■ 10 Revise funding and staffing allocation guidelines for port operations based on information developed by risk analysis and management tools.

■ 11 Incorporate stakeholder collaboration and scientific consultation into its risk assessment development process. With stakeholder consultation, identify issues and develop time frames for completion of rule development, and models for risk communication.

1.3 Leadership

Background

The Review Panel found that politics, economic pressures and changing expectations have created a profound shift in the environment in which APHIS-PPQ leaders must perform. The geometric increase in demands on APHIS from the Secretary of Agriculture, the U.S. Congress and even the White House reflects the increasing recognition of technical or scientifically-based trade barrier resolution as the key to future trade. This has come about with the global reduction in tariff barriers through the Uruguay Round of the General Agreement on Tariffs and Trade, the subsequent adoption of the Agreement on the Application of Sanitary and Phytosanitary Measures (WTO-SPS), and regional trade agreements whether including the U.S. as a signator or not.

Demands for information, which may not exist or be organized for the needs of the moment, are now made with turn-around time of hours rather than days. Some of the country's highest-visibility trade disputes in the past five years, in particular, fall in this realm of WTO-SPS issues, for which APHIS is the responsible agency regarding animal and plant resources and trade. At the same time, the U.S. Congress and numerous stakeholders are calling for accountability on apparently more frequent breaches in the safeguarding system.

Simultaneous to these pressures, conflict and dissonance appear to characterize the relationship between APHIS-PPQ and APHIS's employee union. In fact, the entire culture of hierarchical organizations in the United States has gone through a massive change in both the private and public sectors. This change is not yet complete. Models and approaches are still being developed, and many corporate employees as well continue to feel unsettled or threatened. Just one change — automation and computerization of the work place — is revolutionary for anyone without early training in these skills.

Any career personnel at the leadership level today entered the Agency when the mission was clearly focused on protecting American agriculture. Now, in addition to its primary responsibility to prevent the entry and establishment of invasive plant pests, APHIS must facilitate trade, expedite the entry of passengers and cargo, and take on other emerging issues related to the safeguarding mission, such as biotechnology oversight. These multiple roles have led to conflicting cultures, competition for attention and resources, and employee confusion regarding the Agency mission. Although core public service values, including customer service, innovation, continuous learning, creativity, and a sense of meaning and job importance still permeate the Agency, APHIS's current corporate culture can be characterized in terms of alienation rather than alignment.

The new approaches to management, the new generation work force that has no sense of job security and perhaps the loyalty that goes with it, and economic fluctuations that impact workload and funding are key

ingredients to the new environment that APHIS-PPQ leaders face. These challenges are framed by the overall governmental climate of downsizing and unfunded new mandates without the long view or strategic planning. During the government downsizing effort, the Agency lost both its knowledge base and its next generation of leadership. Anchoring and institutionalizing change will require sufficient commitment, time and effort to identify and develop new leadership and to ensure that management personifies the new approaches.

Findings

An example of good leadership was found in the creation of the Trade Support Team (APHIS-TST) during the negotiations for the NAFTA and GATT Uruguay Round Agreements. The addition of these multilateral negotiations on top of on-going bilateral negotiations and disputes put APHIS in a reactive mode on information generation and analysis and decision-making. When this was recognized, a new division was created and staffed using crosscutting expertise from within the Agency. Key to the present success of this initiative was its timely formation as an experiment and the thorough, in-depth review that took place two years after its creation. The review did lead to changes in staffing and a statement of the mission of this division: "To add analytical and strategic value to the APHIS trade mission of maintaining and expanding trade while ensuring a biologically sound and consistent trade policy."

The establishment of the New Pest Advisory Group (NPAG), and the APHIS-PPQ Center for Plant Health Science and Technology (CPHST) in Raleigh where the NPAG resides, are even more recent examples of leadership recognizing the need for strategic, preventive and preparatory work as an on-going function of APHIS in order to successfully carry out the emergency programs. The institutionalization of a strategizing resource available to the leadership is critical for an Agency that is by definition constantly charged with handling emergencies.

Despite some successes, each Review Committee identified deficiencies in leadership as hampering the safeguarding process. Each committee report points to opportunities, similar to these successful examples given above, for the formation of a strategic focal point in the Agency for functions in support of the safeguarding mission. The assignment of accountability, authority and resources seems to have become clouded in the recent years of rapid change.

APHIS's Past Visioning Efforts

In 1994 APHIS-PPQ conducted a Future Search Conference to form a vision and set the Agency's course for the future. A design team drafted the vision statement that was distributed in 1995 to all employees and a number of external stakeholders for review. Later in 1995 the PPQ Management Team identified nine component strategies that could be implemented immediately and signed a commitment paper for implementation. In 1996 PPQ's National Partnership Council established nine vision core teams to implement the listed strategies. These items have since been implemented and management is in the process of drafting a second commitment paper. These teams also identified additional vision goals in the areas of partnership and teamwork, learning, communication, accountability and the changing workforce. Other initiatives and initiative updates can be accessed by employees on APHIS's intranet visioning Web site.

Repeatedly, APHIS staff has asserted that the catalyst that led to its visioning efforts was Dr. Lonnie King, Administrator of APHIS from 1992 to 1996. While some staff still strive to implement the visioning goals, most efforts were largely abandoned when he left the Agency. The process had not been institutionalized or carried on. With the partial failure of past efforts, each new effort to work from a Agency-wide vision will confront a stronger culture of cynicism and disbelief that does not trust leadership or management.

Possibility for the Future

The Review Panel affirmed that management and leadership initiatives developed in the private sector are relevant to a government organization such as APHIS. Many of the recommendations stem from this fundamental conclusion. These new models for leadership are discussed more in the section on Management and Organizational Design.

The movement towards quality as the operating model for business and government is continuing to expand. This model, taken from the professional services industry, is founded in principles of leadership and empowerment enabled by trust (Peters, 1994). In an environment of constant change and uncertainty, this kind of model, founded on trust, will be the key to successful organizational change and survival. Though trust may be difficult to define, elements include integrity, honesty, predictability, reliability, responsibility and accountability. Without it, APHIS-PPQ employees will never be empowered to take responsibility or assume risks to continuously improve the organization. The ability of PPQ leadership to generate and institutionalize a trust culture will lie in its ability to reflect these elements along with a commitment to value and to empower its employees. Leadership trustworthiness must be the foundation. Leadership must create and obtain the structure and resources (both human and material) to carry out the work, or they cannot become "trustworthy".

New Zealand, where safeguarding efforts are now largely privatized, has a system so streamlined and transparent that Plant Protection officials can put the decision back to Parliament as to which program to cut if new demands are made without additional funding. Often when presented with such clear choices, political leaders find new sources of funding. This level of transparency may never be achieved within the byzantine funding mechanisms for APHIS, but upcoming changes in the budgeting process present an opportunity to try.

The potentially-paralyzing circumstances present APHIS-PPQ with the choice to either wear down its employees and leadership, and perform in a non-stop crisis mode, or to create its future: to rediscover, reconnect and align itself to its mission, vision and values. Based on comments received by the Panel, APHIS's role in trade facilitation is the most misunderstood Agency activity. This role must be clarified, both for employees and external stakeholders. The emergence of trade facilitation as an important mechanism to assure the continued protection of America's plant resources co-evolved with the development and implementation of the WTO-SPS and NAFTA. While it is industry's role to seek and gain market access, APHIS has a critical role in the assurance that plant quarantine actions for imports as well as exports are scientifically justified and do not represent an unnecessary barrier to trade. The integration of all areas of its safeguarding mission will hinge on a harmonization of its own import

and export strategies. Both must be brought into conformance with plant quarantine principles and international standards of necessity, harmony, transparency and equivalence.

The power of a culture unsupportive of change is currently well illustrated in USDA's Food Safety and Inspection Service's (FSIS) dilemma. FSIS and its employees are on opposite sides in court fighting over the Agency's Hazard Analysis and Critical Control Point (HACCP) program. Implementation of this program caused a culture clash within FSIS that has caused its employees, fearful of the future, to challenge and threaten what many consumers and scientists view as the future of regulatory science for food safety (Government Executive, February, 1999). This occurred because the organizational culture was not prepared for the Agency's movement towards a more innovative regulatory strategy of indirect oversight, away from its tranditional one of direct oversight. APHIS has experienced a similar cultural road block as it has sought to implement its agricultural quarantine monitoring program. As APHIS-PPQ looks to innovate, it must create an environment and a process that allows APHIS-PPQ to realign with its values and to eliminate misalignment and obstacles.

The APHIS-PPQ's vision of its future must guide assignment of staff and resources as well as align and motivate all employees to take responsibility for achieving this vision in the face of daily obstacles. Real change will take time and effort. The APHIS's past reinvention efforts in this area have been only marginally successful because the basic approach was incremental, the Agency did not measure and acknowledge its successes, and there were multiple turnovers in leadership before a vision and commitment to change was institutionalized.

To implement this very daunting process of continuous change and improvement, PPQ leadership must begin making meaningful promises to its employees that it can and will keep (Covey, 1991). This will require anticipating the organizational and individual changes necessary to be able to fulfill these commitments. With this in mind, the Review Panel and each of the four committees developed recommendations to serve as a blueprint and, in the next phase of this process, as an implementation plan for successful change. The challenge before leadership is to value, invest in, empower and trust its front line employees. The challenge before APHIS-PPQ as a whole is to become empowered, responsible, and accountable for the accomplishment of the Agency's mission to safeguard America's plant resources.

Recommendations

■ 12 Select and assemble a leadership coalition of 20 to 50 staff representing all levels of the organization that will report directly to the deputy administrator, to revise or clarify the mission, vision and then identify the values associated with the mission. Then submit their findings to all employees for approval and acceptance.

■ 13 Identify education sources and where necessary begin re-training the Agency in the development of mission, vision and value statements.

■ 14 Recognize and celebrate past efforts at mission and vision development.

■ 15 Require the coalition to identify misalignments between the Agency's mission, vision, and values, and to recommend how APHIS needs to address those misalignments.

■ 16 Identify Agency activities that directly fulfill the mission, then outsource, privatize or otherwise re-assign the remaining activities.

1.4 Management and Organizational Design

Extraordinary leadership alone will not attain and sustain high performance, in the absence of good management systems. Global integration and a surplus agricultural economy mandate an organizational design that will give the Agency the ability to move fast and add value, that is deliver quality service (Peters, 1994; Bennis and Nanus, 1997).

Moving fast means that the Agency's structures and systems must change, so that the Agency's front line can be in touch with its upper management. Management must be able to communicate closely with its front line staff, create a safe environment for participatory decision-making and, in return, employees must be able to formulate meaningful proposals. Survival in a knowledge economy (Drucker, 1998), mandates a collapsed organizational design that recognizes trust as the most critical efficiency and values the importance of learning, sharing, and using information. The professional services industry model has been universally adopted because it came into being specifically to expeditiously manage and leverage knowledge as the means to gain, effectively service, and keep its customers (Peters, 1993).

The right design can provide for the removal of layers without any loss in efficiency, improve accountability, and save money while allowing the Agency to shift personnel and funding dollars to the front line. The APHIS-PPQ has already made some strategic and successful changes in this area with the formation of the state plant health director system. This change has brought the Agency into much closer communication with the states and industry and its external collaborators have benefited.

Adding value, particularly once the Agency reconnects with its mission, will also come from its ability to capture, process, analyze, apply and communicate its unique reservoir of knowledge on sanitary and phytosanitary issues and to quickly bring it to bear as needed in close collaboration with its external stakeholders. Government, by design, is positioned to be the lynchpin that brings many different interests and cultures together to develop effective science-based safeguarding strategies. Particularly in trade negotiation and international standards development, APHIS-PPQ's ability to target and shape a message persuasively and, more important, the ability to listen and hear concerns and different viewpoints will provide the Agency a greater voice and influence in trade negotiation and issue resolution.

Government, by design, is positioned to be the lynchpin that brings many different interests and cultures together to develop effective science-based safeguarding strategies.

Development of a servant leadership paradigm to serve society at large, as well as its other stakeholders, must be a core value (Peters, 1994). The APHIS management paradigm continues to be one of control, yet the rapidly changing operational environment clearly shows that perpetuation of command and control paradigm is

inefficient and unresponsive. The APHIS's continued adherence to this paradigm has resulted in an Agency that is always in a crisis mode with no time or energy to remember, let alone be directed by, its mission.

The APHIS's historic management approach seems rooted in the belief that people cannot work without careful supervision. Such misalignments tend to occur because years of ad hoc policies and practices have become institutionalized and have obscured the Agency's underlying values. The task then is to create an environment and a process that will enable its people to safely identify and eliminate these misalignments. Successful change will likely require an Agency policy and culture shift away from dependence upon management and manuals to one that is self-organized, well integrated and interdependent. The new agency must be organized with the mindset that management will lead while lower level employees will manage.

Recognition of Employees as Primary Stakeholder and Agency Asset

An important component to the Agency's success will be the recognition that its employees are its most important stakeholder and asset, and as such deserve its highest investment. Under present conditions, with downsizing of staff, frequent reorganizations, unfilled positions, lack of direction and supervision, staff morale has deteriorated. This has led to a fragmentation of the Agency where staff are placed in positions without proper training and without proper supervision because frequent staff rotation policies do not recognize levels of expertise needed for effective program implementation.

Beginning in 1993, externally directed staff cuts of unparalleled size necessitated by funding shortfalls and reinvention initiatives were carried out with little regard for the long term impact on the ability of the Agency to carry out its mission. None of these efforts took into consideration such factors as core responsibilities and skills balance. This effort accomplished only one thing—it made the organization smaller. One of the lessons learned is that employees need more skills and technology training to handle larger workloads and changes in goals and methods.

It will be important for APHIS to develop a strategic work force plan that encompasses its vision to assure an adequate number of staff are allocated where needed. A flattened system can only work if staffed by a new kind of employee—one that is trained to broaden his/her skill sets and is motivated to take risks. Most employees are not ready to take on these kinds of jobs. Moreover, new experiences are needed to erase corrosive beliefs, and some of that can be done well with training (Kotter, 1993).

Recognizing that few know how to make an agency work better than its people, the first step will be for the APHIS to begin valuing and servicing its employees as its greatest asset and a source of institutional knowledge about what is needed to enable and fulfill the mission well. Instead of being viewed as the lower levels of the pyramid, they should be viewed as the front line that deserves the highest level of service and given freedom to make decisions, take risks, and make mistakes.

Management and Union Relations

The complaining and finger-pointing between APHIS-PPQ management and its labor union must stop in order for the very difficult job of agency reform to begin. For too long an adversarial

climate has predominated in this relationship, creating an internal climate of pessimism while feeding an external cynicism about the Agency's continued relevance. Management and labor must open new and substantive channels of communication. Management must involve its employees, including union leadership, in its decisionmaking; and in response, the union must give up its protective policies of entitlement (Winter, 1993).

1.4.3 Employee Empowerment and Development

The only way the Agency can hope to effectively rebuild itself will be by regaining the trust of its employees. This will mean that APHIS must begin treating all employees in the organization as though they can be trusted. It must, among other things, begin sharing information with everyone. As knowledge is power so sharing information is sharing power, and the result is empowerment. But, empowerment cannot be given, it must be chosen (Bennis and Nanus, 1994; Covey, 1991; Peters, 1993 and 1994), and the leadership of the Agency must enable it via organizational design, an investment in training and the removal of obstacles to leave space for people to empower themselves.

Choosing empowerment means that employees also accept responsibility and accountability for their attitudes and actions, that is, become trustworthy. While it is convenient to believe that certain external forces, or other people, are solely responsible for the quality of the work environment, the reality is that every individual is responsible for choices made, and powerlessness is an individual choice. Over time, choices become habits and eventually are institutionalized and become the environment in which work is accomplished.

One of the most powerful incentives for work performance is control over the job. For work to be fulfilling, and for risk to be worth taking, employees must be able to have some control in the decisionmaking process.

Creating a learning agency that can add value will mean that training units must review and revise their programs to include a broader range of skills, such as computer and communication skills. Professional development must emphasize broad, outcome related learning over specialization to enable fulfillment of Agency-identified competencies. As most work now needs all the skills and effort of a team, employees need to know how team building works and must be trained in goal setting and conflict resolution. These skills will be particularly useful as APHIS begins to cross-train its AQI and its domestic staff in preparedness for emergency response, port surveillance, and quarantine inspection and enforcement.

Managers must relearn their jobs too. They must develop the same skills package and change their role from one of supervision and discipline to one of coaching, listening, benchmarking, mentoring and championing that empowered employees will require. In this new role, managers will guide and help staff to gain the required skill sets, develop best practices, encourage and support employee input, and share information and knowledge.

While the need for training resonates throughout APHIS, training and education in turn require funding. The Agency must work towards developing and protecting its training and equipment budgets and view such support as part of the compensation package.

Instead of, or in addition to, funding a training center, employees could be given learning contracts with a

specified dollar amount and allowed to spend this money on training, within mission-based guidelines. This would provide both an incentive for learning and competition for training. Additionally, pay increases based at least in part on skills acquisition that supports APHIS's mission would provide both an incentive and reward, and ultimately benefit both the Agency and the employee. The greatest incentive is the opportunity to use the skills learned in a meaningful way on the job.

Performance and Succession Planning

The basic purpose of the civil service system, to hire the most talented of America's citizens into government, has been lost over time. Recognizing that a decentralized merit system can help agencies address hiring, pay, diversity, and performance, in 1996, the Office of Personnel Management (OPM) granted broad latitudes for all Federal agencies to design their own performance systems. The Agency must look towards development of a standard whereby every person's behavior is judged equitably.

The PPQ's workforce vision already includes goals to foster workforce diversity, ensure that PPQ has the right people in the right positions, discovery of leadership potential for succession planning, appropriate assignment of officers and technicians, improved hiring processes and staff assignment in lieu of overtime. The Review Panel believes that APHIS should showcase and celebrate this effort and use these goals as it redesigns the organization. The Panel also believes that partnership with the union can help achieve some of the reform necessary for high performance.

Strategic hiring and succession planning must be fully exploited. Concurrently, changing American (and world) demographics coupled with the need to understand and value other cultures in international quarantine strategy development, mandate that APHIS create a workforce that mirrors and values cultural diversity.

One strategy for staffing flexibility could be to reduce the number of job categories by grouping job titles. A simpler pay and promotion structure could allow greater flexibility in rewarding good employees and lateral movement among work units; a small number of broad pay bands and a series of steps could replace the grade and step system. This would allow managers to reward employees without having to give them a new grade or job title. At some point, performance assessment must be re-designed to include performance measures that will evaluate management as well as employee performance goals.

In successful transformations, executives lead the overall effort and leave most of the managerial work and leadership of specific activities to their front line employees. Each and every APHIS employee, from its leadership to its front line, must take responsibility and become accountable for the success of the mission. The collaboration and commitment of employees and support from external stakeholders must occur for APHIS to work more effectively and efficiently, remain relevant and accomplish its mission.

Recommendations

■ 17 Redesign the Agency structure to be self-organized, self-responsible, self-accountable. Make its structure compatible with the vision and remove unaligned structures that block needed action.

■ 18 Create a learning agency by restoring employee training and education.

■ 19 Consider the establishment of learning contracts.

■ 20 Base pay on performance and the development of mission related skill sets.

■ 21 Develop performance contracts that specify desired results, set guidelines, identify available resources, define accountability, and determine the consequences.

■ 22 Use, or expand the use of, intern programs to provide additional sources and opportunities for management to find and evaluate potential permanent employees.

■ 23 Expand the use of the Inter-Governmental Personnel Act as another staffing source.

Many external stakeholders feel estranged from government and this has forced a move towards political or legislative remedies.

1.5 Stakeholder collaboration in APHIS programs and policy development

Stakeholders are those with a "stake" in the primary mission of the organization, the protection of America's plant resources. Direct stakeholders outside the Agency include other Federal agencies, other countries' national plant protection organizations, state plant protection regulatory agencies, academia, scientists, researchers, scientific and professional societies, affected industries, and other special interest groups such as environmental organizations. Indirectly, all of society benefits from the successful exclusion of harmful invasive species, and alternatively bears consequences in the form of tax burden for management programs, increased cost of food and other plant products, or reduced recreational values of public and private lands if safeguarding efforts fail. Participation of direct stakeholders in APHIS decisions is a critical precursor to increasing understanding of and confidence in those decisions.

Many external stakeholders feel estranged from government and this has forced a move towards political or legislative remedies. Low stakeholder confidence in APHIS's decisionmaking processes and outcomes is an impediment to APHIS fulfilling its responsibilities. Increasingly, APHIS decisions are under attack from an array of stakeholders. The estrangement of stakeholders and resulting search for political remedies disrupts the normal flow of work, and may erode support for the safeguarding system. Political interference contributes to the "paralysis of analysis" noted throughout the Review.

In order for the U.S. pest safeguarding system to succeed, there must be broad support among lawmakers, policymakers and the public that invasive plant pest safeguarding is a societal priority. All stakeholders should be viewed as critically important partners if safeguarding efforts are to ultimately receive the cooperation and resources needed to ensure success.

Evolution and Role of Public Participation in Regulatory Decisions

Early in this century, regulatory decisions were made by agencies with

broad statutory powers. Agency experts were relied upon to regulate in the public interest. They wrote standards and issued permits under these broad grants of power.

Decades later, agencies had become viewed as "captive" entities under undue influence of the regulated industries. Pressure grew for government to expand its regulatory authority and move toward "interest representation" in which regulations were arrived at through the interplay of contending interest groups. [McGarity] This approach relied heavily on input from experts representing contending groups such as consumer advocates and industry representatives. Policymakers then sought middle ground among contending forces. Public participation became a staple ingredient in the policymaking process. [Stewart, 1975]

As external participation in the regulatory process evolved and regulatory decisions became more complex, a logical approach was to delegate regulatory standards development to identified experts. But the reformers who had insisted upon public participation were unwilling to place their trust in the hands of experts.

That distrust has not diminished. Vice President Gore and his reinvention team have made restoration of public trust a keystone measure of Federal management success with a recognition that this can only occur by convincing stakeholders that things have changed. A recent survey showed that 60% of Americans basically do not trust the Federal government; by contrast, in 1964, 75% did trust that the Federal government did the right thing most of the time. 24% of people who do not trust government cite poor management as the main reason. 91% of those who say the government does a poor job managing its programs think that Washington will never or only sometimes do the right thing, suggesting a direct correlation between trust and performance.

The demands for public participation in risk regulation stem from a distrust of experts, a corresponding distrust of regulatory decisionmakers, and the conviction that risk regulation issues are not resolvable solely by reference to expertise. When stakeholders are excluded from the process or do not have their interests considered, they can and do use every means available to confront the Agency, including political intervention. The APHIS has often encountered such confrontation. For example, during the 1997 negotiations leading up to a revised IPPC, several non-governmental organizations labored to block U.S. ratification of the convention because they felt APHIS—and the IPPC itself—ignored environmental resource protection concerns. In our modern society, some level of stakeholder collaboration is inevitable—and healthy. In addition to building trust and understanding, meaningful public participation may even result in better decisions. Meaningfully involving stakeholders in regulatory policy development and rulemaking presents APHIS with both a strategic challenge and a strategic opportunity.

At this time, APHIS follows a rulemaking procedure prescribed by the Administrative Procedure Act. Most commonly, APHIS develops a proposed rule, then publishes it for public review. Interested parties are welcome to submit views and the Agency is obliged to give "due consideration" to all relevant facts and arguments. Then, the Agency must explain why it chose the option it adopts. While public participation is a key feature of this model, it has the following drawbacks:

• It presumes a neutral decision maker who is swayed only by the facts;

• Since it makes no attempt to bring affected interests together to achieve a resolution, it usually yields winners and losers;
• APHIS usually takes a position in advance of the public notice, putting stakeholder groups on the defensive at the outset.
• APHIS typically relies most heavily on its internal information and analysis, a potential impediment to bringing the most robust science to bear on a decision.

McGarity concluded that the "due consideration" model is better adapted to issues that are policy dominated and for which *factual accuracy is not essential*. In addition, because stakeholders are less involved in the actual decision making process, suspicions are easily raised that the Agency is not really giving due consideration to other points of view—especially when it adopts the option that it initially proposed.

Ad hoc APHIS outreach efforts have targeted traditional stakeholders, such as state plant regulatory officials and agricultural producer groups. Such limited outreach is often "after the fact" rather than in the early policymaking stages.

For policy directions not subject to rulemaking, no routine process exists for stakeholder collaboration. For example, state agency cooperators often learn of APHIS administrative interpretations after state officials have taken an action on a plant or plant product shipment, only to discover that APHIS policy has changed. The APHIS once sent regular alerts of such changes to state cooperators, but this practice ended when the Agency changed its electronic communication system.

Closer collaboration with state plant regulatory officials is vital for APHIS program delivery. During the review, foreign officials expressed frustration that their negotiations with APHIS were undermined because states may pursue policy directions inconsistent with Federal policy. The same has been true of NAPPO's efforts to develop regional standards; the process has sometimes ground to a halt because of the lack of a clear U.S. position. The APHIS is making efforts in this area, but a more formal federal/state relationship is needed. The APHIS must act responsibly, decisively and consistently in its dealings with states on issues of Federal importance. States in turn must be accountable for contributing to and delivering consensus if they are given more voice in APHIS decisions.

Once rulemaking has been initiated APHIS staff routinely state that they cannot communicate on the status or substance of the decision at hand by invoking the *ex parte* communication requirements of the Administrative Procedure Act (APA). However, the APA does not bar substantive discussion of the rule under development; rather, it simply requires that any such discussion be reflected in the public record.

To remain effective in a climate of change and uncertainty, the success of APHIS's safeguarding system will rely on the commitment and participation of all its stakeholders. The APHIS, industry, and all society have a shared responsibility to assure that quarantine protections meet society's mandate for a safe, affordable, supply of food, plants and plant products as well as environmental protection. But, this partnership will only succeed if it is founded on trust and mutual respect. To that end, APHIS will need to learn how to exploit its own and its stakeholders' unique knowledge and information base to develop partnerships and to communicate and educate its stakeholders on the necessity

and value of the plant safeguarding system. In contrast, hiding or hoarding information will only breed continued alienation and distrust. In turn, stakeholder participation in the governing process must move from its historical representative form to a participatory form. A continuation of stakeholder involvement via countervailing lobbying is not effective and in fact is a major contributor to the current "paralysis of analysis".

As Federal agencies have begun attempting to integrate service and enforcement mandates by adopting a regulatory strategy that relies more on insight (informed compliance) than oversight, the public has raised questions of whether cooperation with industry will render regulatory agencies impotent. Integrity and transparency of decisions impacting plant safeguarding and quarantine will be critical values in partnership development. These values will only come from an agreement by government and all its stakeholders to abide by the international rules and standards for plant quarantines in both the export and import arenas.

The opportunity then is to redesign APHIS policy to facilitate partnership with its stakeholders in a relationship based on trust, mutual respect and responsibility in order to fulfill a shared mission to safeguard America's plant resources.

Findings

Many Federal agencies are working to increase stakeholder collaboration in policy and program development and implementation. Some have responded by altering their practices. The Food and Drug Administration routinely posts draft guidance documents on its Web site, and seeks comments for three months. Outreach efforts take place during this period at relevant trade and professional meetings. As the Environmental Protection Agency has proceeded with Food Quality Protection Act implementation, cries for process transparency and stakeholder collaboration grew so loud that Vice President Gore finally intervened, announcing principles for openness and sound science that have begun to reshape the process. The trend toward stakeholder collaboration is international. Other national plant protection organizations have made great progress toward stakeholder collaboration and transparency in decisionmaking processes. Australia and New Zealand are examples. Notably, Australia has published detailed guidelines on its processes for major and routine decisions. The role and timing of stakeholder collaboration are fully characterized.

Integrity and transparency of decisions impacting plant safeguarding and quarantine will be critical values in partnership development.

The need for innovation in regulatory agencies' approach toward stakeholder collaboration has been recognized at the highest levels of government. The National Performance Review stated "openness is the best way to restore credibility to the regulatory process." Executive Order 12866, "Regulatory Planning and Review," encourages agencies to consult with the public before taking any regulatory actions.

APHIS currently differentiates between "routine" (minor) and "non-routine" (major) decisions requiring risk assessments. Less complex qualitative assessments are used for routine decisions, and quantitative assessments are used for complex decisions.

Similarly, the Review identified a need for a simpler, streamlined stakeholder process for routine decisions, and a more involved collaboration process for major decisions, such as a review and realignment of Quarantine 37 or Quarantine 56.

Collaboration with other Federal agencies has been advanced through initiatives such as the Border Trade Alliance coalition. The success of the Miami reinvention lab demonstrates the value of strong relationships with other agencies such as the Customs Service. Similarly, APHIS has made some progress toward stakeholder collaboration. For example, a series of "plant roundtables" with Florida stakeholders have increased program awareness and input. The NAPPO Industry Advisory Group has also established effective lines of communication on NAPPO issues.

All stakeholders seeking a greater role in APHIS decisions must be accountable for becoming educated on the background and potential outcomes associated with pending decisions.

The National Plant Board (NPB) cooperates with APHIS-PPQ in the delivery of plant pest prevention and management programs. The NPB plays a uniquely important role as a primary APHIS-PPQ stakeholder. The cooperative relationship has worked well in recent years because of increased communication efforts. These efforts include: participation by APHIS-PPQ headquarters and field staff in regional and National Plant Board meetings and issue resolution; three formal meetings per year between the NPB Council and the APHIS-PPQ Management Team to discuss APHIS-PPQ program direction, updates and budget; weekly conference calls between the NPB President and APHIS-PPQ Deputy Administrator and staffs as necessary; participation by NPB on ad hoc APHIS-PPQ working groups; and cooperation on harmonization of domestic and international plant protection guidelines, management plans and laws. This last item is key—APHIS and the NPB must advance the development of national standards that bear scientific scrutiny.

Such efforts have also resulted in an increased workload for NPB officers whose primary responsibility remains one of plant protection at the state level. There is a need to advance the structure and format for NPB involvement in APHIS-PPQ policy and decision making to further improve program coordination and delivery.

If stakeholder collaboration is to advance, accountability must be viewed as a shared obligation. All stakeholders seeking a greater role in APHIS decisions must be accountable for becoming educated on the background and potential outcomes associated with pending decisions. Accountability speaks to the need to look beyond narrow self-interest to the broader ramifications of any pest safeguarding decision. Accountability speaks to honoring the process rather than interfering in the process through countervailing lobbying.

Recommendations

■ 24 Establish a stakeholder registry to facilitate communication with interested parties before and during critical decision making. In the case of rulemaking, collaboration should be initiated before a proposed rule is developed.

■ 25 Open the registry to any organization or interest group in the U.S. interested in participating.

■ 26 Require stakeholders to provide a brief paragraph outlining the stake-

holder organization's interest and potential role in the delivery of pest safeguarding programs.

■ 27 Establish a process and criteria for assigning "routine" or "non-routine" status to decisions subject to rulemaking, and a process for stakeholder collaboration under each, using the Australian approach as a guideline.

■ 28 Use modern technologies such as electronic notification and Internet posting to notify and seek input from stakeholder registry participants on policy options and "nonroutine" decisions, prior to initiating rulemaking.

■ 29 Encourage stakeholders to get more involved in identifying and reporting pests, and other activities that would benefit from a greater "field" presence.

■ 30 Strengthen and expand collaboration efforts with key Federal agencies with whom APHIS interacts, such as Customs Service.

■ 31 Seek opportunities to involve stakeholders in information-sharing activities such as situational briefings and cross-training.

■ 32 Establish an ongoing grant or other mechanism to support an operational structure to facilitate interaction and support between APHIS-PPQ and the National Plant Board. The resource commitment necessary to establish and maintain this structure should be shared between APHIS-PPQ and the National Plant Board under a cost-share formula. This structure would help to ensure a significant and predictable National Plant Board contribution toward mutual responsibilities associated with the detection and management of invasive pests.

■ 33 Explore mechanisms for constructive NPB involvement in key bilateral negotiations, such as with Mexico and Canada.

1.6 Budget and Resource Allocation

Background

A recurring question regarding APHIS safeguarding activities is whether the level of resources invested in those activities is adequate to address invasive plant pest threats to American agriculture, the environment, and the American public. Similarly, can the current resource base accommodate essential increases or redirections in safeguarding efforts?

Increased volume and changing patterns of international trade and travel translate to increase risk of invasive plant pest entry and establishment. This section briefly describes the history and status of APHIS-PPQ funding. Further, it considers APHIS-PPQ resource allocation in the context of priorities; opportunities for new or expanded revenue streams for operations and strategic initiatives; and potential approaches to underserved safeguarding system elements.

Historically, APHIS-PPQ relied on line item program funding that was strictly controlled by the legislative and executive branches. Almost all line item funds were annual; funds not obligated in the fiscal year lapsed and were lost to the Agency. Slight modifications began to occur in the early 1980's when the Secretary of Agriculture declared an emergency for a Mediterranean fruit fly eradication, freeing up Commodity Credit Corporation funds for eradication. Later, Congress designated certain line items, such as for grasshopper control and boll weevil eradication, as no-year funds; unobligated balances could be carried forward and remain available to the Agency until spent.

The 1990 Farm Bill authorized collection of user fees for certain Agricultural Quarantine Inspection (AQI) activities, drastically altering funding and financial processes for APHIS-PPQ. Since that time, most resources have come from fees levied against airline tickets, air carriers, vessels, etc. The user fees have had to be based on the actual cost for service provided related to exclusion activities. They are deposited into a dedicated account to be spent on the services for which they are collected. However, Congress also kept strict control over user fee spending authority by requiring that expenditures be subject to annual appropriations. This approach had problems; PPQ collected far more revenue than it was allowed to spend, and needed exclusion activities could not be provided. Unspent user fees accumulated in a no-year reserve account dedicated to AQI activities.

In the FY1994 Appropriation Bill, Congress allowed APHIS-PPQ to exceed the AQI spending limit contained in the bill by 10%. This level was increased to 20% in FY1995, and in FY1996, APHIS-PPQ was given unlimited AQI user fee reserve access, but only with OMB approval.

The 1996 Farm Bill attempted to permanently fix the AQI user fee problem. Between FY1997 through FY2002, the Agency has full, direct access to all AQI user fee collections exceeding $100 million. Unfortunately, Congress in recent years has appropriated only about $88 million for AQI user fee funding, in order to spend the difference elsewhere and still meet budget reduction goals. The $12 million shortfall has diverted APHIS-PPQ resources from other activities.

New fees that more accurately reflected true costs of exclusion activities were effective September 1, 1997. The APHIS-PPQ, with USDA and OMB approval, was given access to current and future reserve account balances. Requests must be justified and mandated by clearly-demonstrated AQI needs. After FY 2002, the Agency will have full, unlimited, direct access to all AQI user fee collections without further appropriation or approval. AQI activities, both appropriated and user-fee supported, represent approximately 74% of the overall APHIS-PPQ budget.

Beyond AQI funding, APHIS-PPQ line item funding has experienced a downward trend. This is especially true for domestic programs. Over the five-year period from FY1993 to FY1997, domestic program spending as a percentage of total APHIS-PPQ financial resources declined from 39.3% to 25.3%. Furthermore, periodic pest emergencies necessitating eradication have strained the system to the limit; no streamlined, timely process exists for committing funds to emergency eradication efforts.

Budget discussions invariably settle on how to ensure appropriate resources to address increased pressures for entry and establishment of invasive plant pests. The Review identified several significant issues related to budget and resource allocation. Some are addressed below. Specific budget and resource allocation findings and recommendations will also be found within different sections of this Report. Detailed recommendations are found in the Pest Exclusion Committee and Pest Detection and Response Committee Reports.

Findings

Dramatic improvements in resource use through improved management, and strategic pursuit of additional resources for targeted purposes, are necessary to position the safeguarding system for optimal effectiveness.

However, obtaining new funds through the traditional Federal budget process is unlikely in view of the current budget reduction framework and rigorous spending limitations for the projected budget surplus.

Each of the Committees concluded that resource allocation and investment must be tied to those programs and activities that most effectively address the most significant risks. The Review noted that various APHIS safeguarding activities have not been subjected to critical analysis regarding how they address the "greatest-risks." Therefore it was difficult to determine to what extent overall program gains could be accomplished through reallocation of existing funds to exclusion, detection, permitting, and response activities which address the highest risks. Multiple dimensions must be considered, including tradeoffs between these major elements of safeguarding as well as decisions on where geographically to invest the resources for greatest effectiveness. In the absence of such analysis, one might argue that seeking additional safeguarding resources might be premature and not yield real outcomes.

Current APHIS Safeguarding Core Activities

Port of entry activities funded by user fees are by far the most resource-intensive safeguarding activity. Traditional passenger and baggage inspection activities receive the most resources, while emerging high-risk pathways such as smuggling and commercial cargo are underaddressed. A range of staffing issues must also be addressed. These issues are discussed in detail in the Pest Exclusion Committee Report.

Beyond resource reallocation, there may be compelling opportunities to realign funding sources. Opportunities exist for expanding user fee collection. The Review identified areas where user fees are not collected or are inadequate to cover costs associated with the service provided. Reasonable expansions are warranted. Possibly, user fees could be assessed on a scale that creates an incentive to support the safeguarding system through quality preclearance inspections and "point-of-origin" risk reduction or management activities. The APHIS should pursue cost recovery for ancillary activities with identifiable beneficiaries such as some import/export facilitation activities. Finally, penalty assessments for quarantine violations may be an area where additional revenues could be generated, and applied directly to education and outreach activities. Again, specific recommendations are found in the Committee reports.

New and Underdeveloped Safeguarding Initiatives

Safeguarding is not just an APHIS-PPQ issue, but a national and international issue. The Review saw a need for consistent effort to identify and seek global resources, affiliates and solutions to increase the efficacy of U.S. safeguarding efforts. Several countries appear to be ahead of the U.S. in having risk-based resource allocation policies and practices in place. The U.S. should team with them to seek international resources and approaches to address movement of organisms across borders and between regions.

Similarly, APHIS-PPQ is not singularly responsible for invasive species control and management in the U.S. Therefore, other agencies should be encouraged to partner with APHIS-PPQ to strengthen underserved safeguarding elements, such as pest detection and emergency response (again, specific recommendations can be found in the Pest Detection and Response Committee report). Thus, capabilities, assets and experiences complementary to those residing in

APHIS could be shared rather than duplicated. Involving organizations and entities external to APHIS in discussions and actions related to safeguarding through outsourcing and partnering might naturally lead to immediate broader resource availability, as well as increased support for future budget expansion. The Executive Order on Invasive Species offers a tool for marshalling resources and coordinating efforts.

Normal discretionary spending limitations do not favor one-time strategic initiatives that may facilitate major program transformations. There is a compelling case for strategic transformation that will pay long-term dividends in safeguarding system effectiveness and sustainability. For example, emerging baggage and truck x-ray technologies may allow for more effective pest exclusion, expedited passenger and cargo movement, and reduced staff needs. Emerging truck x-ray technology could help APHIS and the Customs Service to address land border risks. In summary, strategic initiatives tied to AQI program effectiveness must be planned for and implemented accordingly. They are legitimate investments for user fee-generated funds, including any potential reserve account balance resulting from the differential collected between the appropriated amount and the $100 million trigger.

Discussions of the need for increased resources for APHIS and its partners to run safeguarding programs are inevitable. Budget expansion opportunities will be enhanced if linked with a renewed, focused sense of purpose and priority and supported by a broader constituency. But if stakeholders are expected to support new or redirected funding for safeguarding, APHIS management must be fully accountable for resource allocation and management. In short, APHIS-PPQ must have its own house in order.

Without these and other changes recommended throughout the Report, one can expect continued lack of synchrony between perceived budget needs and funding realities to meet the safeguarding challenge.

Recommendations

■ 34 Base resource allocations on risk evaluations, and focus resources to guarantee greatest impact per investment dollar.

■ 35 Expand collection of user fees to support service delivery.

■ 36 Outsource, delegate or pursue cost recovery for non-mandated activities that do not directly and measurably contribute to the safeguarding mission.

■ 37 Pursue an increase in penalties that may be assessed for quarantine violations, and the assignment of penalties collected to support activities such as outreach and education or research and technology development. This will require statutory authority.

■ 38 Plan for strategic application of the AQI User Fee revenues, including any account reserve that may become available in FY2003, to support critical program investments such as new technology implementation and offshore risk mitigation.

■ 39 Advocate establishment of a no-year fund, to be replenished year to year, to fund emergency eradication efforts. This fund would be accessed at the discretion of the Secretary of Agriculture, given sufficient scientific basis for an achievable outcome. This fund would need to be adequately capitalized, and APHIS should be provided investment authority to properly maintain it. (See specific recommendation in Pest Detection and Response report).

Truck X-ray facility, Otay Mesa, CA, used principally by U.S. Customs for drug interdiction. A detailed X-ray of an entire semi truck with cargo requires 10 minutes.

1.7 Research and Technology Development

Background

Throughout the preparation of this report it became clear that there were many issues dealing with Research and Technology Development that needed to be addressed in some cohesive manner. Each committee has defined some areas where new technology is available outside the Agency that could, and should, be adapted to the needs of APHIS-PPQ activities. The background and findings of each committee are in their respective sections. In this section, the report will define some additional findings and restate the individual needs of each committee in a comprehensive format.

Findings

APHIS and ARS have working structures that do not necessarily encourage or facilitate a comprehensive plan for safeguarding activities. There appears to be more of a competitive atmosphere for funding than a cooperative environment for achieving mutually arrived at and accepted goals. When funds are channeled to APHIS Methods Development, they (Methods) appear to set themselves up in a world all their own and cross over, in the minds of ARS, into basic science research. Conversely, APHIS management expresses frustration that ARS is sometimes unresponsive to APHIS's basic research needs. Scientists in the two organizations are viewed differently within the respective groups, are evaluated differently, and follow different systems for advancement. While some scientists and labs enjoy excellent field-level cooperation, these general views accelerate the competitive nature of the system and the agencies quit communicating effectively. There have been some very positive results from collaboration between APHIS and ARS in the area of quarantine treatments and control of exotic fruit flies. This success needs to be expanded to other research priorities.

APHIS-PPQ deserves credit for efforts to ensure full integration of the Methods labs and their contribution to the following goal areas: pest exclusion, pest detection, pest eradication, and long-term pest management (mainly biological control). For example, APHIS has established a National Center for Plant Health, Science and Technology (NCPHST) Board of Directors to provide input and guidance into project direction and funding for all APHIS Methods Development laboratories. While mainly comprised of APHIS headquarters staff and center directors, the

Board also includes a representative of the National Plant Board (NPB) and the North American Plant Protection Organization - U.S. Industry Advisory Group.

Recommendations

■ 40 Establish a mechanism for determining research priorities within APHIS that includes representatives from the regions, International Services, headquarters staff, and stakeholders that are involved with the action programs. Stakeholders should include representatives from academic research institutions and industry.

■ 41 As a component of the first Recommendation, adopt a specific project selection process that evaluates proposed research relevance to APHIS's mission and resources. This process should allow for more objective project evaluation prior to NCPHST Board funding decisions.

■ 42 Expand the NCPHST Board of Directors to include a representative of ARS and, if feasible, additional stakeholders.

■ 43 Develop cooperation between agencies within USDA, other Federal agencies, academic institutions, and industry research organizations to discuss the research priorities established by the Agency and determine the best course of action to meet the needs.

■ 44 Formulate a comprehensive plan from the two steps outlined above to execute the necessary research programs. This plan should take advantage of all available resources, including outside funding sources. APHIS should be the agency to hold the system accountable for meeting the research and technology development goals.

■ 45 Clearly define Methods Development's role in the safeguarding system to prevent the continuation of the competitive atmosphere that currently exits among USDA agencies. Many of the reviewers believe that Methods Development is a service agency function to the safeguarding system.

■ 46 Restore funding levels and resource allocations to APHIS Methods Development to concentrate on their assigned task of putting useable tools in the hands of the action agencies. Implement a strategy in line with industry standards of allocating a percentage of the budget to Research and Technology Development.

■ 47 Encourage international cooperation and information sharing through participation in international technology development programs and seminars. Become more involved in providing leadership to the international research environment to take advantage of knowledge gained in other areas of the world.

The following represent specific research and technology development needs outlined by the committees:

Pest Interception:

(a) Improve x-ray systems for passenger luggage screening and full container cargo screening.

(b) Expand and improve the use of detector dog technology. Investigate the feasibility of cross training canines currently in use by other agencies.

Quarantine technology:

(a) Expand understanding of the use of irradiation systems in quarantine programs.

(b) Continue development of new quarantine treatments as current tools are phased out.

Risk Assessment:

(a) Establish a system of studying the biology of invasiveness and incorporate this information in the development of risk analysis strategies, pest exclusion systems, and research program strategies.

(b) Develop eradication tools for potential invasive organisms based on risk analysis programs

Pest Response Programs:

(a) Improve diagnostics systems for rapid pest and disease identification.

(b) Develop new eradication tools for current programs to replace existing methods that are controversial or may be phased out through FQPA.

(c) Clearly identify the fitness of *tsl* strains of the Mediterranean fruit fly currently planned for expanded production and deployment in Sterile Insect Technique (SIT) programs to assure compatibility with the intended environment for release programs.

(d) Expand the capacity of U.S. sterile fruit fly rearing facilities and seek new collaborations with international sources.

(e) Explore the development of improved quality control tools for analysis of pest response programs such as improved QC of sterile fruit flies and improved trapping technology

Pest Detection Tools:

(a) Continue to develop improved detection tools for invasive species based on risk analysis programs.

(b) Expand and develop methods of spatial tracking of current pests and diseases through the use of GPS and GIS analytical systems.

(c) Establish specific goals for technology transfer of new discoveries for ultimate application in emergency response programs. Technology transfer is defined as the process used to move information from basic research through the analysis phase to final application.

(d) Continue to explore the use of biotechnology in improving detection and response systems.

1.8 Information Management

The central role of information in APHIS-PPQ's ability to effectively safeguard American plant resources led the NPB to establish a Committee on International Pest Information (section 4). The committee's report covers a range of issues including competencies and methods for generating or collecting information; reliability of information; information management; information technology; and the interpretation, application and analysis of information. This topic is discussed from policy level decision making through to application in field and port operations.

In addition to this focused discussion of pest information, the Review Panel discovered that the issue of information collection, analysis, and application arose in every aspect of the review. Hence, relevant recommendations appear throughout the report.

1.9 Public Information and Education

Background

The basis for pest exclusion and successful response programs involves widespread acceptance by the public of the concepts of protecting our natural resources. Most travelers are aware that requirements exist for bringing plants and foods into the country but are not aware of the risks associated with violations of those rules. Many travelers will bring fruits or plant material back from a vacation to recapture the wonderful memories of their trip or because they just like the fruits or flowers they encountered. Making the public aware of the risks associated with potential introductions of harmful pests and diseases can help in the efforts to reduce the number of food items and plant material brought through the system.

Experience in pest eradication programs has shown that the majority of the public does not understand the importance of the eradication effort or the potential impact of new pest infestations on their lives. Many have expressed concern over issues that are important to them as individuals such as exposure to chemicals or inconvenience in travel, but in their arguments, they have shown a minimal understanding of the overall problem and the risks involved. This has been evident at the public hearings and meetings held in conjunction with pest eradication programs throughout the United States. In many cases, when presented with a broader view of the risks involved, many of the dissenters actually became supporters of the pest exclusion concept and focused their energies toward solutions.

There is currently a need for more public education programs to support the pest exclusion and eradication programs. Additionally, an opportunity exists to make the public aware of permit requirements and the availability of international information systems.

Findings

APHIS has a Public Affairs effort in place to respond to emergency situations and eradication programs. This effort has been supplemented by state and industry programs in some cases but still remains a reactive program in most cases. Additional help is needed from all sectors of the stakeholders if the program is to advance and become more proactive in its message. The “Don’t Pack a Pest” message is very effective but is limited to its distribution. A wider distribution of this and other messages is required to meet the growing number of international travelers.

Emergency response programs are often met with widespread public opposition to mass eradication efforts. A proactive approach that involves stakeholder groups is necessary to inform the public of the nature of the problem and the need for eradication of the pest or disease. The message must go beyond protecting agricultural economics, which is seen as big government protecting large corporate farming organizations at the expense of the private citizens. Many agricultural and environmental organizations have experience in crafting public information messages through their efforts in various issue campaigns. This expertise can be utilized in crafting messages for APHIS safeguarding programs that will utilize all the information distribution systems. Previous efforts to establish a coalition of Federal, state, and industry public relations expertise have proven effective in targeting messages and delivering them to the appropriate audiences.

An opportunity exists with the Executive Order on Invasive Species to involve more organizations in the distribution of messages and informational packets. The public is becoming more aware of the risks associated with invasive species with the current Administration's efforts. This is a good opportunity for coalition building with non-traditional organizations to present a united message on the risks and dangers of violating the exclusion laws.

Recommendations

■ 48 Increase public information programs that focus on pest exclusion efforts such as "Don't Pack a Pest". Accomplish this by providing leadership in collaboration with state and industry organizations throughout the nation.

■ 49 Develop classroom curriculum programs for K-12 that involve the pest risk message with eradication information. Examine the Ag-in-the Classroom curriculum as a possible model. Also develop adult education programs to take the message to the traveling public and those buyers of smuggled products that do not meet quarantine standards.

■ 50 Develop public information programs to describe the detection programs throughout the nation. Focus on the positive aspects of trapping and early detection of infestations to point out the negative impacts of establishing new pest populations. This will make the trapping efforts more acceptable and encourage additional participants in the process.

■ 51 Increase efforts in Public Information support and materials available to eradication programs through cooperative efforts with state and industry organizations in areas of high risk. Provide leadership to the development of collaboration programs in areas where negative eradication programs could occur.

■ 52 Include information on the Permits System in all Public Information programs.

■ 53 Focus on the societal benefits of pest safeguarding programs by capitalizing on the Invasive Species Executive Order. Incorporate this concept into all message development activities to present a consistent message from all sectors involved in Public Information and Education.

■ 54 Develop a Public Information campaign for the international data systems with the objective of utilizing private sector scientists to assist in the gathering of data.

■ 55 Involve state organizations, industry organizations, and land grant university Cooperative Extension programs in crafting and executing the Public Information and Education messages through the development of a coalition task force. Utilize public relations firms that have experience with the development of industry messages, such as food safety campaigns, to work with the coalition task force.

■ 56 Develop a character similar to Smokey the Bear, perhaps utilizing a beagle or some other cartoon-type figure, as a national symbol for invasive plant pest exclusion.

■ 57 Pursue the allocation of fines collected from violations of the quarantine rules and passenger violations, which are currently channeled to the general fund, to provide funding for a national informational campaign. There is current case law that supports this concept as a tool for public education.

1.10 International Services

Background

The USDA-APHIS is divided into divisions and units according to the technical area or the administrative goals of the group. For example, a Veterinary Services division takes the lead on safeguarding animal and aquaculture resources by preventing the entry and establishment of exotic animal diseases or pests into U.S. production areas. Although the primary responsibility of protecting American plant resources resides entirely within PPQ, the mission is held by the overall Agency . The safeguarding system relies on cooperation with USDA-APHIS International Services and their presence in 27 countries on six continents (through six regional offices for: Mexico, Central America, Caribbean, South America, Asia/Pacific Basin and Europe/Africa /Near East, and an office in Japan) to provide valuable information and services in foreign countries. In fact, the stated mission of IS is "to provide leadership, management, and coordination of APHIS international activities, with particular emphasis on protecting American agriculture/aquaculture and enhancing U.S. exports" (APHIS Web site, 1999).

Findings

The role of IS in exclusion is quite clear. Several of the IS foreign offices expend considerable staff resources on surveillance or control programs created to meet the joint interests of the host country and USDA. This is particularly true for the Americas since pests of key concern that are established in land bordering countries or the Caribbean have historically moved with ease into the continental United States. Current programs include the eradication and surveillance of the boll weevil in Mexico, Mediterranean and Mexican fruit fly suppression and sterile-fly barriers in Mexico and Guatemala, and several animal disease control programs.

The IS staff is involved in budget preparation for exotic pest detection because of IS staff first-hand knowledge of potential needs for detection in American territory.

With all of these successes in mind, however, the Panel found a general sense of disconnect from the safeguarding aspect of the IS mission, and a heavier time commitment and recognition of the role of IS in international diplomacy and trade. Even when actively participating in pest control and surveillance programs, or commodity preclearance programs, even IS leaders did not articulate this as in support of PPQ and the safeguarding mission.

There is a need for institutionalizing collaboration on decisions ranging from pest risk analysis of a commodity coming from a country with IS representation to research needs and opportunities for the entire Agency's goals. Much of this will rely on the exchange of information. This is a two-way street, as data on port interceptions, repeat offenders, and the results of detection efforts within the U.S. should inform the work of IS officers on a timely basis. The International Pest Information Committee made several recommendations for ways to involve IS more significantly in the mission of safeguarding, through more close coordination with headquarters and PPQ in general. The Exclusion Committee also found information to be a key way in which IS could contribute to effective exclusion of invasive plant

pests that threaten the U.S. (See specific recommendations in those Committee reports).

The organizational structure of IS has recently been changed to allow direct input at the staff level to IS activities that impact the PPQ mission. This change is consistent with the vision of the Review for strengthening the international efforts necessary for pest exclusion and data gathering. It appears to be an excellent time to develop closer collaboration between PPQ and IS in particular in the face of the growing challenge to safeguarding American plant resources.

International Services plays an important role in the success of the safeguarding system. There has appeared to be some disconnect with the IS program that needs to be addressed in order to implement many of the recommendations within this review, particularly in terms of information collection and sharing. Additionally, some IS field personnel have indicated some isolation from the mission of protecting U.S. plant resources and have been more focused on the opening of trade lanes. Where the review recognizes the need to keep the trade mission in perspective with the SPS agreements and other WTO issues, there still needs to be a basic understanding of the plant protection mechanisms and a balance sought that meets both situations.

Recommendations:

■ 58 Utilize IS field personnel in strengthening the data gathering systems in foreign countries. Engage their help in identifying resources that can assist in the data gathering programs.

■ 59 Engage IS personnel in risk assessment development of commodities exported to the U.S. Utilize their input in evaluating the risk potential of new commodities with the focus on preventing invasive pests from entering the U.S. Improve dialog with IS personnel in risk assessment activities early in the process to highlight potential high-risk elements that may not be identified in the scientific literature search.

■ 60 Work with IS management to provide training of in-country IS personnel on the needs of protecting U.S. plant resources and raise their understanding of the safeguarding system.

■ 61 Open communications with IS field personnel and IS management regarding the potential sites for preclearance of passengers. Make sure IS is involved in the debate over the value of passenger pre-clearance and consider the input from the field personnel in the decision making process.

■ 62 Assure involvement with IS field personnel in evaluating and eradicating pest populations in countries that pose a high risk to the U.S. such as fruit fly populations in Mexico and Central America.

Chapter Two

Pest Exclusion Committee Report

Background

The agricultural quarantine inspection (AQI) system is straining under external pressures such as trends in trade, and internal pressures such as resource limitations, downsizings, and continual reorganizations. Several reviews have attempted to reconcile those pressures with the need to maintain an effective exclusion program. In 1993, a report by the Office of Technology Assessment concluded that policies designed to protect us from the introduction of harmful invasive species were not safeguarding our national interests. It further concluded, "the current system is piecemeal, lacking adequate rigor and comprehensiveness", and unable to keep pace with new pathways and pest introductions (OTA, 1993).

The USDA-APHIS is clearly at a crossroads where the dichotomy between its need to pursue an aggressive trade policy and its historic barrier approach to pest exclusion may be too burdensome to sustain. A 1997 Government Accounting Office Report found that the increasing flow of passengers and cargo is far outdistancing APHIS inspection capabilities despite increases in funding, staffing and use of technology.

Historically, exclusion efforts have been reactive and focused on inspection at first point of entry. If a pest organism was found infesting a commodity on arrival, measures were taken to destroy the shipment, re-export or disinfest it. As the potential harm from invasive plant pests became better understood, more preventative exclusion measures were developed and evolved into the comprehensive plant safeguarding system that is in place today. The cornerstone of the safeguarding system is exclusion. Pest exclusion relies on quarantine laws and regulations as the authority to keep harmful and invasive pest species from entering and establishing.

Non-indigenous plants and animals are those species found outside of their natural ranges. Many are beneficial; for example, most cultivated crops, livestock, and biological control organisms are of foreign origin as are many species used for ornamental plantings. Nevertheless, many non-indigenous species (NIS) cause significant economic and environmental harm. Most introduced NIS enter and establish in the U.S. via human activity such as commerce, entrepreneurship, tourism, travel or smuggling. Different kinds of NIS arrive by different pathways. Insects and disease pathogens usually hitchhike with fruits, vegetables or other plant products in commercial shipments, with equipment, baggage, or in parcels. Weeds often enter as contaminants in seed, soil and debris in cargo (OTA, 1993). Many invasive plants were first introduced intentionally for forage, cropping, forestry, conservation, or ornamental use.

As most invasive plant pests have accidentally or deliberately been introduced into the U.S. through trade, it

is reasonable to assume that trade expansion will provide NIS with new introduction opportunities. Coupled with technological advances in transportation that actually facilitate survival and successful colonization, it is likely that rates of successful NIS introduction will increase as well. For the purposes of this report invasive plant pests will be defined as any alien (not native) species that could constitute a threat to America's plant resources on agricultural and natural or wild lands. These include: any living stage of the following that can directly or indirectly injure, cause damage to, or cause disease in any plant or plant product: an animal, a protozoan, a parasitic plant, noxious weed, a bacteria, a fungus, a virus or viroid, an infectious agent or other pathogen.

The current safeguarding system is unable to cope with the increasing frequency of NIS introductions. Despite the increase in resources and staffing, the AQI program has been unable to keep pace with the increasing pressure from its workload and mission to facilitate trade. The harmful economic impacts of invasive plant pests are being experienced in increased costs of production, market access and retention, and perception of product quality (from concerns over pest damage and pesticide residues).

Clearly, a new approach to exclusion is needed, one that is oriented to the future not anchored in the past. It must foster development of strategies that will continue to prevent the entry of invasive pests in harmony with international trade obligations and opportunities while recognizing fiscal realities and the premise that a healthy agricultural system is dependent on a healthy natural resource base. Concurrently, APHIS must concentrate on adopting and using available technology as well as developing new approaches for addressing its increasing invasive plant pest threats. Reluctance to do so will only exacerbate current shortcomings.

The Pest Exclusion Committee believes that ultimately, resources invested toward preventing the introduction of potentially invasive plant pests by employing a strategy that is derived from a clear mission and vision rather than history will be returned many times over in safeguarding America's economy and environment.

2.2 Charge and Methodology

The USDA's Animal and Plant Health Inspection Service (APHIS), the Federal agency tasked with the responsibility for preventing the introduction of invasive plant pests, has found expectations of its performance being scrutinized by a variety of sources. Criticism of its past ineffectiveness by ecologists is blunt - "when the outrageous economic and ecological costs of the wanton spread of existing exotics and continued entry of new ones becomes common knowledge, there will be a public outcry to mitigate the potentially dire consequences" (Niemela & Mattson, 1996). Clearly, the current safeguarding system cannot meet the changes thrust upon it by rapidly transforming global circumstances. Exclusion is preemptory and the most crucial of safeguarding activities and APHIS's efficacy in this regard must be advanced. The Pest Exclusion Committee's mission was to positively chart a course of exclusion activities to meet these challenges.

To do so, the Committee was asked to address the following questions:

- What are the most effective activities to exclude pests?
- What is the best way that offshore activities can maximize the efficacy of the safeguarding system?

To answer these questions the committee reviewed pertinent documents and studies, Agency guidelines, policies and reports. Committee members visited APHIS headquarters and met with APHIS staff, the PPQ Executive Team and officials from Australia, Canada, Mexico, New Zealand and the United Kingdom, and U.S. Customs. While it was not possible for the committee to visit each and every port, committee members did visit with APHIS port staff at many locations and work units to review activities and gather information as follows:

- Miami, Florida (air passenger and cargo operations and the plant identification station)
- San Ysidro, California (pedestrian, private vehicle, and cargo clearance)
- Otay Mesa, California (cargo clearance and x-ray capability)
- Long Beach, California (commercial maritime cargo clearance, Chilean fruit fumigation, solid wood packing material inspections)
- Los Angeles, California (air passenger and cargo clearance, and mail inspection, smuggling interdiction)
- Oxford, North Carolina (Vivid x-ray technology)
- Raleigh, North Carolina (pest risk assessment process)
- Riverdale, Maryland (APHIS staff, PPQ Executive Team, National Association of Agricultural Employees and Manager's leadership)
- Washington, D. C. (APHIS staff, American Nursery & Landscape Association staff, and U.S. Customs)
- Detroit, Michigan (review of private vehicle clearance, smuggling interdiction efforts)
- Port Huron, Michigan (review of cargo clearance, smuggling interdiction)
- Mexico City, Mexico (Sanidad Vegetal)
- Ottawa, Canada (Canadian Food Inspection Agency)

Both APHIS headquarters and field staff were asked to provide the committee with their view of what was working, what was not working, and make recommendation to improve APHIS's agricultural quarantine inspection (AQI) program and off shore activities. The following represent the Committee's findings and recommendations.

Findings

The APHIS's mission is "to provide leadership in ensuring the health and care of animals and plants, improving agricultural productivity and competitiveness, and contributing to the nation economy and the public health." In reality, the Committee found that politics and economic pressures have created competing roles that distract from its mission. These are: to prevent the entry of invasive plant pests, facilitate trade, expedite entry of passengers cargo and address other emerging roles such as the regulation of biotechnology. This has resulted in conflicting sectors of the Agency that compete for attention and resources.

It is clear from the lessons learned by Australia, Canada and New Zealand, as well as APHIS's Agricultural Quarantine Inspection program, that port of entry (POE) inspection can no longer be considered the first and most reliable line of defense for exclusion. While visiting but a very few of these POEs the Pest Exclusion Committee members made the following observations and findings.

There are 301 POEs into the U.S. (U.S. Customs interview); existing POE operations are struggling to expand operations while new POEs are emerging each year. Between 1988 and 1993, six new POEs were established along the U.S./Mexico border; only five of the 25 POEs along the U.S./Canada border are monitored by AQI staff. At the same time, since 1990, imports and exports increased

over 30 percent while passenger traffic doubled in volume (APHIS-PPQ, 1999).

A new risk based management strategy that requires compliance and mitigation of pest risk at origin can both reduce risk and enable expedited entry.

Volumes of air cargo are doubling every five to six years and an increasing percentage of this cargo consists of perishable commodities such as cut flowers, fruits and vegetables. Seventy percent of the air cargo projected to enter Miami in 2000 will be perishable (Port of Miami Overview, 1998). The trend in all cargo movement is by way of container. Entry of containerized cargo into the Port of Long Beach, California, more than doubled between 1993 and 1997 (BHC, 1998). Rail freight corridor projects to locate railheads at POEs are underway in several locations. These rail lines will create a more efficient way to quickly distribute cargo throughout the U.S. as well as the invasive pests that may be associated with them (ACTA, 1998).

While port of entry inspection must continue to play an important role in the exclusion of invasive plant pests, the historic view that this activity can function as the focal point for exclusion must be abandoned. A new risk based management strategy that requires compliance and mitigation of pest risk at origin can both reduce risk and enable expedited entry. Adequate POE inspection will require increased and expanded use of technology. AQI must increasingly focus on identifying new pest pathways and developing appropriate interdiction strategies. AQI and domestic program staff must be cross-trained to facilitate destination inspections.

Most importantly, APHIS's organizational redevelopment must be derived from the Agency's mission, not its history. Regulatory oversight must be redesigned to incorporate strategies of cooperative compliance, consultative decision-making and shared responsibility and accountability for environmental protection.

2.3 Authority

The APHIS's ability to prevent the entry of invasive plant pests must be grounded in adequate and relevant statutory and regulatory authority. Currently, APHIS continues to rely on a variety of plant quarantine laws and regulations that date back to 1912. While these laws and regulations have served the Agency well, there is a clear need to streamline, modernize, and enhance these laws to address the new challenges and opportunities presented by international trade treaties, scientific advancements, and natural resource protection.

The APHIS's continued ability to effectively exclude invasive plant pests is contingent on the modernization of the current system of plant quarantine laws and regulations. Pursuit and implementation of the many specific Committee recommendations can only follow passage of updated plant quarantine legislation. Legislation drafted by APHIS and known as The Plant Protection Act will realign 11 different plant quarantine laws and clarify and enhance APHIS's ability to address the risk associated with the entry of invasive plant pests.

Recommendations

■ E-1 Work with Congress and stakeholders to have the Plant Protection Act passed during the current Congressional session.

2.4 Quarantine Regulations

The APHIS's plant quarantine regulations co-evolved with the enactment of its plant quarantine laws.

There is a need to update and harmonize plant quarantine regulations to assure their adequacy to effectively address current and emerging invasive plant pest introduction pressures and to assure adherence to requirements of international law. It is universally held that the risk of pest introduction and establishment posed by propagative material is greater than that posed by products destined for consumption (fruits and vegetables). Yet, the Fruits and Vegetables Quarantine (7 CFR 319.56 or Q56) is based on a "prohibited unless found safe" approach, while the Nursery Stock Quarantine (7 CFR 319.37 or Q37) is based on a "enterable unless found unsafe" approach. The Noxious Weed regulation needs to be amended to address society's concern for invasive weeds. Provisions to assess weediness may ultimately need to be incorporated into all regulations that cover propagative plant material.

Recommendations

■ E-2 Review each of its quarantines for conformance with the Plant Protection Act and adherence to international standards for quarantine regulations.

■ E-3 Develop a strategy of quarantine development tied to pest risk potential that is reasonable, enforceable, and transparent.

■ E-4 Begin its quarantine revision process with the revision of its Fruits and Vegetables (Q56) and Nursery Stock (Q37) quarantines. Target completion within five years.

2.5 Civil Penalties

The current civil penalty structure has changed little since civil penalty authority was first granted to the Agency (found in 7 USC 149 (b), 150gg, and 163). The civil penalty guidelines and penalty fee structure currently employed by APHIS are inadequate and fail to serve as an effective deterrent. The APHIS-PPQ can currently assess a maximum fine of $1000 for passengers and cargo violations. The civil penalty fee structure as proposed in the Plant Protection Act would provide more effective deterrence. U.S. Customs assesses penalties based on cargo value and loss of duty revenue; the National Marine Sanctuary laws allow for penalties based on environmental damage to living resources.

Although it is APHIS policy to substitute itself as the defendant if an employee is sued during the proper conduct of his or her duty, many employees expressed an unwillingness to assess penalties based on a fear of being held personally liable.

Recommendations

■ E-5 Develop civil penalty procedures that incorporate a tiered penalty structure based on cargo value but within the allowances found in the Plant Protection Act.

■ E-6 Review current law regarding employee liability and, if warranted, amend or develop legislation to provide adequate employee liability protection.

2.6 User Fees

In 1990, legislation was passed authorizing the Secretary of Agriculture to prescribe and collect user fees for agricultural quarantine inspection (AQI) activities. Ultimately, APHIS chose to levy user fees against

commercial air carriers, maritime vessel, trucks, railcar, air passenger baggage and cargo arriving in the U.S. from foreign origins. As the legislation was developed, language was added making expenditure of the fees subject to the appropriation process in order for the Agriculture Committee to receive credit for the budget savings achieved through the collection of fees (FR, 1993).

To address problems arising from limits placed on discretionary spending and impacting user fee appropriations, Congress adopted amendments to the user fee authority as part of the 1995 Farm Bill. These amendments made only the first $100 million of annual expenditures subject to the appropriate process. Since then, Congress has annually appropriated less than the threshold amount. The shortfall then must be covered by the available reserve, effectively reducing the amount available for program growth. In any case, the 1995 amendments also exempted the AQI program from staff year ceilings limitations established under the Federal Workforce Restructuring Act, enabling the program to establish staffing levels commensurate with program workloads (USDA-APHIS-LPA).

At this time APHIS continues to assess user fees for all types of vessels (air, maritime, rail, truck), and air passengers. There is no fee for any entry from Canada. No fees are imposed for cargo, and the truck fee is inadequate to fund the necessary inspections, particularly at the land border crossings.

Recommendations

■ E-7 Revise current user fee regulation (7 CFR 354) to adequately fund APHIS inspection and enforcement responsibilities and fully incorporate overtime needs, and to compensate for the current appropriation shortfall and any shortfalls resulting from implementation of a tiered assessment program.

■ E-8 Develop a tiered fee assessment schedule to provide for a reduced fee structure as a monetary incentive to encourage participation in pre-departure clearance initiatives, implement public awareness programs, supply amnesty bins, etc.

■ E-9 Implement user fees for agricultural inspection at ports of entry between the U.S. and Canada.

■ E-10 Implement a user fee for cargo to enable adequate inspection levels, particularly at land border crossings.

2.7 Executive Order

On February 3, 1999, President Clinton signed Executive Order 13112, Invasive Species, to prevent the introduction and minimize the impact of invasive species. This order establishes an Invasive Species Council to be co-chaired by the Secretaries of Interior, Agriculture, and Commerce. In addition, this order requires the Interior Secretary to establish an advisory committee, consisting of stakeholders, to provide information and advice for consideration by the Council and to recommend plans and actions at local, tribal, state, regional levels to achieve the management plan's goals and objectives.

Recommendations

The committee believes that APHIS should be a full participant in this effort and as such recommends that APHIS:

■ E-11 Determine its role and fully participate in the development of the Council and appoint any and all

necessary staff to assure full participation.

■ E-12 Identify areas where it will lead and partner with other agencies in implementation.

■ E-13 Take any appropriate action to ensure that APHIS stakeholders are represented on the Advisory Committee.

■ E-14 Assure that the introduction pathways for arachnids and snakes, and any other invasive plant pests not under the direct jurisdiction of APHIS, are adequately addressed and mitigated.

2.8 APHIS Employees as Primary Stakeholders

By definition, stakeholders are all those with a "stake" in the success of the mission of the organization, i.e., the protection of America's plant resources. Stakeholders in this effort include APHIS employees, state plant quarantine regulatory agencies, forestry, industry, special interest groups (environmentalists, etc.) and all of society. The exclusion of invasive plant pests benefits all members of society.

Internally, the Committee observed a disturbing disconnection between APHIS and its mission, an observation confirmed by staff at all levels of the organization. Its corporate culture can be best characterized in terms of alienation rather than alignment. Management and headquarters staff are alienated from the field; domestic programs have no connection with AQI; there is little communication from port to port; there is little technical support available for field operations.

If it is accepted that "stakeholders" are all those who have a stake in the success of the mission of an organization, APHIS employees should be considered by the organization as its primary stakeholders. As such, they should receive the same investment and service as APHIS provides to all its other stakeholders. Recommendations pertinent to this finding are itemized under the Leadership and Management and Organizational Design sections of this report.

2.9 Risk Analysis

Risk assessment is a tool for extrapolating data and is used to estimate the likelihood that an introduced organism will become established and cause economic and/or environmental harm (Carnegie Commission, 1993). The ability of an introduced organism to survive and thrive in a new environment is predicted based on a series of probabilities.

Currently, APHIS conducts risk assessments for all import permit requests without any reimbursement. Although there is a mechanism for outsourcing risk assessments, it is little known or used. These risk assessments are performed as a service to, and primarily benefit, the country or importer requesting a permit. Yet staffing levels for this function have been downsized and unprocessed fruit and vegetable import permits requests date back to 1991 while permit processing is prioritized by politics and trade negotiations (APHIS-PPD, 1999).

Models or templates needed to more accurately assess different types of organisms as well as other risk mitigation strategies need to continuously evolve. At the same time, as countries develop pest information databases for risk assessment, compatible databases and pest species information sharing programs can help expedite

risk assessment and mitigation strategy development.

International Services (IS) has the responsibility for obtaining, through local foreign networks, information on established pests that may pose a threat to U.S. plant resources. Unfortunately, APHIS has not made its informational needs known and, as a result, political agendas oftentimes make this information unavailable.

Recommendations

■ E-15 Revise and advertise its contracting guidelines for private-party risk assessment preparation.

■ E-16 Seek full cost recovery from exporting countries or exporters for the development of risk assessments needed to evaluate import permit requests or allow exporters or exporting countries to conduct pest risk assessments under APHIS guidance.

■ E-17 Continuously improve its pest risk assessment models.

■ E-18 Make existing interception data used to develop risk assessments electronically available to all Federal and state regulatory staff.

■ E-19 Share international pest risk assessment data by developing compatible systems and procedures (under IPPC and FAO).

■ E-20 Exploit use of web technology to facilitate information exchange.

■ E-21 Identify, with International Services, pest data information needs based on import permit inquiries and predicted trade flows to facilitate risk assessment needs.

2.10 Offshore Activities

Pest risk mitigation at the point of origin, i.e., offshore, is the most viable approach to pest exclusion and mitigation. Necessary and associated activities include the identification of invasive plant pest and disease threats, development of preventative and control measures, and directed research with a mutual benefit to be received by the U.S. and the country of origin. This approach also provides a means of identifying potential high risks so that appropriate preparedness and response strategies can be developed in case of, or in advance of, an invasive pest introduction.

Offshore monitoring and surveillance should initially and primarily focus on pests and pathways associated with adjacent countries and major importing countries, that is, on countries that have significant contact with the U.S. through trade and tourism. One such initiative already underway is the North American Forestry Association/Insect and Disease Study Group's work towards compilation of a list of exotic insects and pathogens with the potential to cause significant damage to North American forest reserves to facilitate international forest pest risk assessment.

The export of U.S. expertise in pest and disease diagnostics, surveillance, and suppression should be maximized and elevated in importance in trade facilitation negotiations. An offshore exclusion strategy that incorporates a commitment by the U.S. to assist countries in transition would provide an opportunity for the U.S. to use its expertise to identify and mitigate currently unquantified pest risks.

There is also an opportunity for specific monitoring of pests and diseases that could harm American species that are being raised or grown in other countries, such as New

Zealand plantations of Monterey pine. This kind of information would enable assessment of the susceptibility of native species to pests and diseases that are endemic in other countries but have not yet been found in the U.S.

The APHIS's current policy of non-acceptance of phytosanitary certification from other countries inhibits the ability to expand offshore activities. This policy is archaic and needs to be discarded. Specific problems regarding phytosanitary certification by foreign countries, such as the lack of phytosanitary certificate expiration requirements, need to be identified, isolated, and solved. Responsibility for quarantine compliance should belong to the exporting country.

Recommendation

■ E-22 Change its policy to accept phytosanitary certification from countries with valid export certification programs.

2.11 Pest and Disease Suppression

Currently, APHIS participates in a number of offshore programs (including border programs or adjacent country programs. These include programs for Mexican fruit fly, cotton boll weevil, silverleaf whitefly, the establishment of pest free areas for targeted fruit fly species, development of cold and irradiation treatment schedules, and development of biological control for suppression of pink hibiscus mealybug (PHM). The migration of PHM into the Caribbean at one time posed a serious threat for natural entry into Florida. Successful pest suppression via the development of biological control in the Caribbean has reduced population levels so significantly that artificial introduction into Florida is much less likely. If and when PHM introduction into Florida does occur, response will be supported by a reservoir of natural enemies and a base of technical knowledge on their efficacy.

APHIS and the California Department of Food and Agriculture (CDFA) currently conduct a preventative release program (PRP) of sterile Mediterranean fruit flies to create a hostile environment for establishment of introduced populations in the Los Angeles Basin. Since the inception of this program only one infestation of Mediterranean fruit fly has been detected within the PRP area. This infestation was small in size and easily eradicated by the release of increased numbers of sterile flies. Eradication efforts against Mediterranean fruit fly have been conducted outside PRP areas in southern California and Florida.

Recommendations

■ E-23 Expand the use of pest suppression efforts, sterile fly corridors and preventative release programs in areas particularly vulnerable to invasion such as those along the U.S./Canada and Mexico borders as well as southern California and Florida.

■ E-24 Work with Mexico and the U.S. border states to develop a strategy to eradicate or develop a pest-free area for Mexican fruit fly along the U.S./Mexico border.

■ E-25 Identify other pests in Canada, the Caribbean and Mexico that may migrate into the U.S. naturally and develop suppression strategies to prevent or postpone entry.

■ E-26 Expand production capacity of sterile insects to support existing and potential sterile release programs.

2.12 Preclearance

Preclearance is the inspection and clearance in the country of origin performed by persons duly authorized by the plant protection organization of the country of destination. Passengers, commodities and other regulated articles may be the subject of preclearance. The APHIS currently conducts preclearance activities in 29 countries; specific programs include Chilean stone fruit, mangos from several South American and Caribbean countries and Taiwan, bulbs from several European countries and citrus from Spain. The country of origin generally funds programs under a trust fund agreement with APHIS.

The North American Plant Protection Organization has adopted a standard for preclearance programs between member countries. These programs not only mitigate the pest risk at origin, but also provide a mechanism for expedited entry at POEs. Preclearance programs offer an opportunity for any failures in the system to be addressed at origin, rather than necessitating an eradication program at destination.

APHIS programs to preclear passengers and cargo at origin should be expanded but not substituted or prioritized over the development of other offshore programs. The use of the preclearance approach is most suitable for countries in transition that lack the technical capability to develop and implement eradication or suppression programs.

A study to determine feasibility of implementing a pilot test offshore passenger prescreening in Guatemala was developed but the program was never implemented. Regrettably, this 1996 plan could have established baseline evaluation of pest exclusion activities for passenger interceptions from high risk Central American countries. In an effort to avoid redundancy with that proposal, recommendations found below are in addition to those already suggested in the Guatemalan plan.

The Canadian Food Inspection Agency has recently announced plans to reinstate passenger preclearance at Canadian airports. The APHIS has been invited to participate in this preclearance program. The roadblock to APHIS involvement is the development of complementary enabling legislation to grant immunity to inspectors performing preclearance activities.

Recommendations

■ E-27 Work with the government of Guatemala and affected air carriers to implement a pre-departure passenger clearance program and evaluate it within two years.

■ E-28 Determine the highest-risk locations offshore and implement the most effective procedures found in the Guatemala program.

■ E-29 Pursue legislation to enable participation with CFIA in pre-departure clearance of U.S. destined passengers at Canadian ports of departure.

2.13 Regionalization

As countries continue to develop international standards on a regional basis, the need to harmonize pest exclusion strategies between countries becomes more compelling. In the context of this report, “regionalization” refers to the harmonization of quarantines, exclusion strategies, and other pest safeguarding initiatives among countries in geographic proximity to one another.

Most compelling initially for the U.S. is the case for regionalization within North America and the Caribbean. With thousands of miles of shared

borders and large areas of similar climate and flora, an invasive plant pest that enters and establishes in one North American country may quickly endanger the others. Regionalization offers the promise of greater efficiency and shared success at excluding and managing invasive species, while facilitating a lively regional economy.

The U.S. needs to pursue harmonization of its plant quarantines and other mitigation strategies with both Canada, Mexico and the Caribbean Basin and develop a regional approach to pest exclusion. The North American Plant Protection Organization (NAPPO) provides a forum for dialogue and coordination of such efforts. The U.S. has also been a leader in the development of the Free Trade Agreement of the Americas, an upcoming agreement aimed at creating a single trading block throughout all of the Americas rivaled only in size by the existing European Union.

Ultimately, and in keeping with the proposed Free Trade Area of the Americas, hemispheric regionalization should be pursued. Mexico is already a partner with other Central American countries toward this goal. Beyond NAPPO, the U.S. is already positioned to partner with the Caribbean Plant Protection Commission (CPPC), the Asian and Pacific Plant Protection Commission (APPPC) and the Pacific Plant Protection Organization.

Canada is the largest trading partner for the U.S., and the trading environment between the two countries has a history of relative openness. The North American Free Trade Agreement (NAFTA) further advanced that openness by eliminating tariffs and many non-tariff barriers to trade. Indeed, phytosanitary requirements represent the last major category of restrictions on trade between the two countries. Even from a phytosanitary viewpoint, the U.S. and Canada enjoy an open trading relationship. For example, Canada is the only country exempt from the U.S. general prohibition on plant imports established in growing media under Quarantine 37. This openness reflects a long-standing assumption that trade between the two countries represents a low risk of harmful invasive species introduction.

Unfortunately, recent experience has made that assumption obsolete. Exotic fruit fly host material has found its way into the U.S. in both commercial-volume shipments and via the traveling public. Such materials are prohibited entry into the U.S., but freely enter Canada. Canada is unconcerned because fruit flies will not permanently establish due to climate. Canada's entry requirements for a variety of other offshore-produced commodities, such as nursery stock and propagative material, are also inconsistent with those of the U.S.

A truck crossing from Canada through the Port Huron, MI, border crossing attests to emerging regional trade relationships.

It bears noting that Canada is also vulnerable to breaches in the U.S. safeguarding system. Canada reports in-transit shipments across the U.S. arriving with missing or broken seals. The APHIS should work with Canada and U.S. Customs Service to bring enforcement actions if seals are broken or missing. Progress toward harmonizing perimeter requirements will benefit both. In many respects, Canada has progressed further toward risk-based management in its plant protection programs. Canada has already initiated a review of entry requirements for offshore propagative materials.

The APHIS's response to this "partially open door to pest introduction" via Canada has involved direct negotiation, initial efforts at harmonization, increased compliance checks and smuggling interdiction efforts. While commendable and partially successful, this response has been unable to match the scope of the problem. The documented risk of pest introduction via the northern border compels APHIS to pursue one of two policy choices:

(a) Dramatically strengthen and expand pest exclusion activities at the Canadian border by placing adequate staff at Canadian border crossings, adapting work shifts to reflect trading patterns across the border, and aggressively expanding smuggling interdiction efforts; or,

(b) Vigorously pursue regionalization through U.S. and Canadian adoption of equivalent "perimeter" safeguards, with the long-term goal of deemphasizing traditional border inspection activities.

Given mutual interest, willingness and commitment by the U.S., Canada and Mexico, the Review determined that regionalization offers the most viable policy direction consistent with evolving patterns of travel and commerce, and societal expectations.

Several recommendations relevant to the goal of regional cooperation and harmonization appear above under Pest and Disease Suppression and Preclearance. Additional recommendations follow.

Recommendations

■ E-30 Vigorously pursue regionalization through U.S. and Canadian adoption of equivalent "perimeter" safeguards, with the long-term goal of deemphasizing traditional border inspection activities; or,

■ E-31 Dramatically strengthen and expand pest exclusion activities at the Canadian border by placing adequate staff at Canadian border crossings, adapting work shifts to reflect trading patterns across the border, and aggressively expanding smuggling interdiction efforts.

This approach should emphasize equivalence in quarantine regulations governing off continent imports, harmonized measures for commodity movement within North America, and cooperation on mutually beneficial pest safeguarding initiatives. The following specific recommendations offer near-term opportunities to harmonize phytosanitary requirements and pest safeguarding activities in support of a North American trading bloc:

<u>Canada, Mexico and the United States should</u>

■ E-32 Begin implementation, including intra-regional implementation of the North American Plant Protection Organization standard for solid wood packing materials. Pursue global harmonization for solid wood packing material pest mitigation.

■ E-33 Explore opportunities to share databases, using solid wood packing material interception and rejection data as a focus.

■ E-34 Cooperate to develop a strategy to reduce the risk of pest introduction associated with in-transit shipments within North America.

Canada and United States should

■ E-35 Begin developing plans for the harmonization of phytosanitary requirements that apply to other countries (the "perimeter approach") with the existing preclearance activities such as the program for flower bulbs from Holland.

■ E-36 Develop a longer-term initiative to apply the perimeter approach to pests such as exotic fruit flies.

■ E-37 Support Canada's proposed analysis of existing statutory authorities that could target and discourage movement of prohibited fruit fly host materials into the U.S.

■ E-38 Explore opportunities for collaboration with Canada to study and respond to potential pest introduction pathways into the Pacific Northwest, and pursue biological control strategies for pests that have become established in both countries.

Mexico and the United States should

■ E-39 Assist with funding and technical support the exotic fruit fly eradication initiative in Central America.

■ E-40 Eradicate, or establish a pest-free area for Mexican fruit fly on both sides of the U.S./Mexico border (see recommendation under Pest and Disease Suppression).

■ E-41 Develop and implement a plan to slow the spread of brown citrus aphid from Belize into Mexico and ultimately the U.S.

■ E-42 Continue the effort to eradicate olive fruit fly in California as a demonstration of support for Mexico, which has a substantial olive production area near the U.S. border.

The Caribbean Basin and the United States should

■ E-43 Develop a longer-term initiative that includes plans for export of exclusion and detection capabilities and specific pest and disease suppression activities, to apply the perimeter approach.

2.14 Pathways

Organisms Intentionally Introduced for Propagation

Living organisms (including plants, animals and microbes) may be imported intentionally for the purpose of further propagation. These imports are regulated loosely according to the perceived risk associated with pathogens or pests that can be associated with plant material (7 CFR 319.37), the potential for such organisms to be pests themselves (7 CFR 330.200) or the potential of plants to become noxious weeds (7 CFR 360). There are significant disparities in the rigor of APHIS's estimation of risk in these regulations, especially in contrast with other regulations, such as the importation of fruits and vegetables under 7 CFR 319.56. Propagative material is generally viewed as of greater risk because it can be a living, growing, reservoir for plant pests. Yet, under current regulations, propagative plant materials are presumed safe unless found otherwise and listed as prohibited or restricted in the regulation (what's termed a "dirty list" approach). Fruits and vegetables though presumed safer, *a priori,* are treated under the more restrictive approach of presumption of hazard, thus are prohibited, unless found to be safe (what's termed the "clean list" approach).

Both rigorous risk analysis and regulatory realignment in this area are needed. Furthermore, seed, imported in small quantities for research and breeding purposes, and in substantial commercial quantities for sale and distribution, is largely overlooked in spite of its potential to carry pests and diseases. This represents yet another area needing application of the risk assessment process.

Federal regulations (7 CFR 319.37) recognize three classes of plant importation from outside the U.S. based on risk of introduction of pests and diseases, admissible, restricted and prohibited nursery stock. Such plants or seeds arriving in the U.S. as admissible articles are, at most, inspected at one of the plant inspection station at port of entry. Admissible articles can be imported in unlimited quantities. More restrictive protocols come into play with the other classes. Some plant materials are restricted and others are prohibited from importation from certain countries or regions. Restriction or prohibition results from a determination that there is an unacceptable probability of pests of high hazard to U.S. interests accompanying the plant material. Restricted articles are allowed to enter in unlimited quantities, subject to inspection and (typically) a two-year period of post-entry quarantine and observation by state authorities. Prohibited articles are only allowed to enter in limited quantities (as specified in the permit allowing import). With a few exceptions prohibited articles are imported by and under the supervision of USDA, Agricultural Research Science (ARS) scientists or scientists in a university system recognized as experts with the crop and capable of testing for and detecting the specific pests of concern. When imported for private concerns most prohibited articles are brought in under the supervision of the National Germplasm Center and released after testing and observation are complete.

One key issue here is that risk assessment in this system is based solely on known pest and disease problems of the plants on the established lists. Everything is admissible unless specifically listed as restricted or prohibited. This assumes there is no risk associated with the unknown, an alarming assumption given the resources at stake and the quality of information available. Where information concerning pest complexes is poor (e.g. developing countries), or outdated, there may be pests and diseases that are not recognized as associated with a plant species in a particular region. When new problems in a region are identified, changes in regulations may

Inspecting cut flowers from Colombia arriving at Los Angeles International Airport. Air cargo shipments of cut flowers at Miami and Los Angeles are a high volume, daily occurrence requiring routine inspection for quarantine pests.

be extremely slow relative to the risk. Likewise, new species of plants that have not been subjected to risk assessment can enter channels of trade with no regulation. Since these are not listed, they are by default admissible and subject to the least stringent protocol regardless of their potential to carry pests or diseases, or become invasive themselves.

It is also assumed in 7 CFR 319.37 that all pests and diseases associated with admissible and restricted articles can be detected by visual inspection. Only prohibited articles are actually tested. There are diseases (e.g. those caused by phytoplasmas, Nepoviruses, and others) that have wide host ranges but have not been studied in every possible host. It is fallacious to assume they will be detected by visual inspection and that prohibition of their most important economic hosts will exclude them. This may be especially true in consideration of diseases carried in seed. Restrictions and prohibitions are listed by plant host species, with reference to the pest or disease of concern. In some cases a disease of concern is known to be associated with a wide range of plant hosts but these hosts are not regulated. Finally, some diseases (e.g. rose wilt virus), not recognized as such by the scientific community, are the bases for restriction or prohibition of certain hosts.

In none of these situations is the potential for plants to become invasive themselves considered. If a plant is not included on the lists supporting the Federal Noxious Weed Act it is considered to be safe, even if its invasiveness has not been evaluated. Passage of the Plant Protection Act would eliminate legal interpretations that have limited full, effective application of the Federal Noxious Weed Act, and facilitate broader consideration of invasiveness potential.

Furthermore, a private sector dialogue among the nursery industry, weed scientists, and public/private entities engaged in plant exploration may yield appropriate models for screening new plant introductions for invasiveness.

Recent revisions to the IPPC have created the framework for legitimate regulation of nonquarantine pests under certain circumstances (see regulated non-quarantine pest definition in the glossary). By definition, the application of this concept is limited to pests that have an undesirable economic impact and are associated with propagative material. In addition, any measures applied to imports must be no more stringent than those applied to domestic production. U.S. plant regulatory officials and export-focused segments of agriculture have expressed concerns about potential abuses of this concept in the international trade arena. Implementation of this concept will require the development of new regulations or revision of applicable regulations, as well as close collaboration with other NPPOs and industry.

Recommendations

■ E-44 Begin to work towards a goal of establishment of a global list of pests and diseases with supporting pest risk analysis to drive exclusion regulations. Apply these risk analyses to revision of 7 CFR 319.37, 7 CFR 330.200.

■ E-45 Require and initiate risk assessments for seed importation.

■ E-46 Consider adopting a modified "clean list approach" for propagative material, specifying what is permissible subsequent to risk assessment, rather than the current "dirty list" that prohibits or restricts specific articles only. To begin this process, work with subject experts to

develop a prototype assessment process upon which subsequent regulation could be based.

■ E-47 Require sampling and testing as a part of all plant importation activities. This would require research and technology development to allow rapid generalized testing, for plant viruses and phytoplasmas, for example; testing could be at point of origin or port of entry.

■ E-48 Purge lists of "phantom diseases", like the rose wilt virus, that are not recognized by the scientific community.

■ E-49 Coordinate noxious weed and invasive species initiatives with review of 7 CFR 319.37 and 330.200 based on rigorous risk assessment.

■ E-50 Work with the National Plant Board and NAPPO to lead by example in the development of regulations and implementation of the "regulated non-quarantine pests" concept for certain types of propagative material. Grapevine, deciduous fruit trees, and chrysanthemum propagative material offer potential models.

2.15 Smuggling Interdiction

APHIS is working with its Investigative and Enforcement Services (IES) and other Federal and state regulatory agencies to develop task forces to detect smuggling operations and ensure trade compliance at entry points. Trade compliance teams are being formed from PPQ, IES, Customs, state departments of agriculture, local law enforcement, and tribal authorities while ports are assigning trade compliance officers to act as liaisons. Primary interdiction activities are intensified border inspections (border blitzes) and market surveillance. Border inspections consist of unpredicted, targeted and random cargo inspections at northern and southern land borders. Market surveys consist of inspections of fruit, vegetable and plant markets. Intercepted prohibited items are traced back to origin and forwarded to destination. Alerts are placed in the Customs Automated Commercial System; identified violators are prosecuted for quarantine violation.

The CLAMP Project (Closing the Los Angeles Area Marketplace Pathway) is a multi-agency team initiative begun in May 1997 to identify entry pathways for smuggled agricultural products. Its goal is to identify smuggling pathways and develop strategies to close them using the following procedures:

- Investigate tips and alerts;
- Compile intelligence;
- Intercept infested commodities;
- Perform public outreach to facilitate compliance and provide a presence for deterrence;
- Establish a network of contact with industry and government.
- Serve as a clearinghouse to receive and distribute information and smuggling alerts;
- Complement other smuggling interdiction activities.

In 1997-8, CLAMP took quarantine enforcement action 225 times, seized 72,435 pounds of prohibited commodities with an estimated retail value of $310,594. Pests intercepted included arthropod, disease, noxious weed and CITES (plants protected under endangered species laws) species (CLAMP Annual Report, 1998).

The Florida Interdiction Smuggling Team (FIST) has identified a smuggling operation importing longans and litchis from Thailand to Florida via

Canada (Vancouver and Toronto) and New York and selling these fruits as Florida product. Trade Compliance Program teams along the Canada border have intercepted prohibited fruits, vegetables; noxious weeds and cut flowers as well as product from Thailand, Europe and Mexico mismanifested as Canadian origin (TCP Report, 1998).

Recommendations

■ E-51 Develop a strategic plan for its smuggling interdiction efforts to identify staffing and funding needs.

■ E-52 Secure an increase in Agricultural Quarantine Inspection user fees for expanded smuggling interdiction activities based on the strategic plan.

■ E-53 Investigate and identify the motives for smuggling to enable development of more effective mitigation strategies.

■ E-54 Use the information gathered to identify commercial product development opportunities.

2.16 Transshipment and Limited Distribution

Various Federal regulations authorize the entry and transportation of non-compliant prohibited and restricted agricultural product through the U.S. for foreign export (transportation and exportation or immediate movement (immediate transport) through port of entry for inspection and treatment at approved locations. The safeguarding regulation (7 CFR 352) provides APHIS-PPQ with broad authority to issue permits and prescribe safeguards at ports of entry for transit shipments of regulated products. Permits for transportation and exportation (T/E) allow the entry and movement of non-compliant agricultural products, under Customs bond to a specified export port. Movement over land is authorized via specified travel corridors. T/E permits for movement through the U.S. are issued for product entering from foreign countries destined for foreign export, but many are issued for ultimate entry into the Canadian market.

APHIS has a national safeguarding team that is charged with the formation of policy for issuance of transit permits, but there is no process in place for permit review at the national level. Guidelines for the issuance of

Illegal longans from Thailand intercepted in a passenger's personal luggage at Los Angeles International Airport.

permits and safeguards are provided in PPQ's Operational Guidelines for Transit (1995). The transit guidelines provide port staff with assistance when issuing transiting permits but APHIS staff have advised the committee that these guidelines are inadequate.

Permit issuance is time consuming at high volume POEs and there are few training opportunities available to port staff at the smaller POEs; and there is a lack of uniformity in permit issuance. In addition, there are no risk assessment guides to assist PPQ staff in assessing whether the potential pest risk to the U.S. outweighs the service transshipment provides to the exporting and importing countries. Moreover, there is no database or communication network to determine if pest population levels at any one time may be exacerbating the risk for a particular commodity or production season. There is no regulatory provision or mechanism to refuse issuance of a transit permit if the pest risk appears too high. Transit guidelines do not allow the inspection of transiting material solely because PPQ cannot disallow transiting if a shipment is pest infested. The pest risk consequences can be illustrated with the following example. An outbreak of Mediterranean fruit fly in Spain resulted in the entry and transport of heavily infested Spanish clementines between eastern U.S. ports and Canada. After an extensive investigation, the subsequent discovery of infested clementines at several eastern locations was ultimately considered to be a result of the failure of the T/E system, not the cold treatment.

Under a T/E permit, a shipment is placed under Customs bond and is issued a permit with transit directions and port of exit instructions. But, there exists no mechanism for enforcement other than a paperwork match at port of exit. This paperwork reconciliation is time consuming as ports of exit can and do change with notice to Customs, not PPQ. There is no estimated time for transit and exit required, and no means for tracking shipments to assure adherence to the corridor restrictions.

To illustrate some potential pest risks, Mexican mangoes, citrus and avocados are regularly authorized movement from Mexico to Canada through a specified transit corridor. Violation of the transit corridor is only identified when uncertified Mexican mango and avocado trucked shipments are intercepted at California agricultural inspection stations. Adding to the pest risk is the regular and routine interception of Mexican mangoes and avocados re-entering at the U.S./Canada border, at California agricultural inspections stations and during market surveys. Also problematic is mango truck contamination by fruit fly larvae and pupae. These trucks enter Canada, are offloaded, and may be reloaded with non-agricultural product that would not then be subject to agricultural inspection upon re-entry into the U.S. Only empty trucks or trucks identified as having carried Mexican mangos and found infested with fruit flies are required to be cleaned prior to re-entry into the U.S.

Immediate transport (IT) and residue cargo (RC) permits provide a means to clear commercial cargo container shipments at specified inland locations. Commercial cargo shipments entering the U.S. under an "immediate transport" permit are not inspected at the POE but immediately move to a designated location for inspection and/or treatment as necessary. Although "immediate transport" permits are used mainly to enable devanning and facilitate treatment, this permit system could be used to facilitate the entry of commercial cargo when seasonal entry peaks overwhelm the inspection capability at POEs.

Other regulations provide for limited distribution as a pest mitigation method. Currently, regulations provide for the limited distribution of citrus from Japan and Cheju Island, Korea for citrus canker mitigation, Hass avocados from Mexico and melons from Ecuador for a several insect pests. But, no enforcement mechanisms are available to ensure compliance. Limited entry citrus are regularly intercepted at California agricultural inspection stations prompting the smuggling interdiction staff to begin to monitor markets for compliance.

Recommendations

■ E-55 Prohibit the T/E entry of plants and plant products not in compliance with U.S. entry requirements until and unless the following recommendations have adequately mitigated the invasive plant pest risk associated with this pathway.

■ E-56 Revise the safeguarding regulation (7 CFR 352) to incorporate pest risk into the decision-making process for permit issuance.

■ E-57 Review and update its transit guidelines, provide headquarters staff support and develop a permit review process for port staff.

■ E-58 Develop a risk assessment process to evaluate transit permit requests.

2.17 Port of Entry Inspection

Port of entry inspection (POE) is performed by APHIS-PPQ's agricultural quarantine inspection (AQI) program. It is funded at air and maritime POEs primarily through user fees assessed to the air carriers and shipping lines. Trucks entering the U.S. from Mexico are charged user fees; trucks entering the U.S. from Canada are not. Rail and international mail inspections are also part of this inspection program. APHIS-PPQ is one of the three primary Federal Inspection Service (FIS) agencies responsible for monitoring the entry of cargo and passengers into the U.S. In addition to conducting quarantine inspections, APHIS-PPQ inspectors are responsible for reviewing and issuing certificates for agricultural exports, working temporary duty assignments away from their normal work location, and performing other duties such as smuggling interdiction and fumigation supervision. In response to government reinvention initiatives, PPQ is working with the other FIS to expedite clearance of international passengers and cargo. As target clearance times have been met, new targets have been established. For example, passenger clearance targets of 45 minutes have been reduced to 30 now 20 minutes.

The presence and availability of APHIS-PPQ staff is directly related to the level of quarantine compliance and the cooperation it receives from other FIS agencies. But, PPQ's ability to participate in port quality improvement initiatives let alone staff emerging POEs is lacking due to staff and resource constraints. As a result, cross training and work sharing opportunities for Federal inspection service (FIS) agencies are largely unexplored.

Based on the best available data from agricultural quarantine inspection monitoring (AQIM) data and other surveys, the pest introduction potential appears to move from greatest to least in the following order: smuggled products, air cargo, reefer cargo, passenger baggage, and cruise ships. Information regarding the pest risk from ballast water, private aircraft and garbage remain unassessed.

Despite additional resources, APHIS cannot hope to keep pace with the continuing increases in passenger and cargo movement.

Implementation of technology improvements can help expedite clearance. The development of "smart" x-ray equipment will provide for quicker baggage inspection. Advances in video imaging capabilities, where available, enable species identification within hours instead of days.

Recommendations

■ E-59 Work with other FIS and port authorities to assure that adequate staffing and equipment are identified and in place prior to the establishment of new ports of entry.

■ E-60 Implement the use of "smart" x-ray equipment, as it becomes commercially available.

■ E-61 Place video imaging equipment at plant inspection stations to expedite species identification.

■ E-62 Use existing agricultural quarantine inspection monitoring data to target port of entry inspection priorities, assess port of entry activities, and estimate the risk presented by new or unstaffed ports of entry.

2.18 Traveling Public

International passenger traffic is anticipated to continually increase and will further overwhelm APHIS-PPQ's program effectiveness in excluding invasive plant pests. Education to make passengers and air carriers more aware of the potential pest introduction via this pathway (informed compliance) must be considered the most effective means to mitigate this risk. Industry involvement is crucial in developing procedures that, through education and cooperation, encourage voluntary compliance by the traveling public. Increasing the efficiency of passenger inspection and shifting some responsibilities to the air carrier will permit PPQ staff to pursue other duties.

Remote surveillance capability using closed circuit television will soon

Backlog of trucks arriving from Canada at the Port Huron, MI, border crossing. Construction of an additional bridge will accommodate increased truck traffic but further challenge inspection program.

begin at Miami International Airport at Customs and Immigration and Rover Command Centers and will be available for APHIS use.

Recommendations

The Committee recommends the following to strengthen quarantine enforcement upon entry. Other related recommendations may be found under Offshore Activities and Public Education and Awareness.

■ E-63 Require all passenger baggage to be subject to examination using "smart" x-ray technology that detects quarantine material.

■ E-64 Work with Customs to place APHIS staff at preprimary roving location areas at all high traffic ports of entry.

■ E-65 Develop legislation to prohibit all unprocessed food and plant products or require phytosanitary certification in passenger baggage.

■ E-66 Explore the possibility of privatizing air passenger clearance.

Public Education and Awareness

The general public must understand that exotic pests and pathogens can be introduced accidentally via the movement of people and goods. Target audiences for a public awareness program should include schools, ethnic communities, industry, and travel and trade representatives. Programs should be developed to address each audience's particular area of concern, in the appropriate language, and reflect cultural differences.

Education of both travelers and air carriers is fundamental to assuring that plant quarantine efforts are successful. A lack of knowledge of U.S. plant quarantine regulations by foreign travelers, governments and commercial importers is not uncommon and needs to be addressed at points of contact. Ticketing is a critical feature of airline travel and a process that can be made more useful in safeguarding efforts. Agents at points of departure speak the native language and can ask travelers if they possess agricultural materials. They can then remind potential passengers of U.S. quarantine regulations and the penalties imposed if they are disregarded. Airline personnel would not prescreen travelers, only advise them of PPQ expectations.

A ticket-sized quarantine regulation insert should be prepared in the native language(s) and placed in the ticket packet by the airline. This would be much the same as the procedure employed to instruct passengers occupying exit row seats on aircraft. The desirability of this procedure is that it would be a highly visible reminder to boarding passengers, could be done economically, and is compatible with airline ticketing procedures.

A sample of illegal agricultural product intercepted in passenger luggage at Los Angeles International Airport arriving from Italy and Australia.

In conjunction with passenger education efforts, means for safe disposal should be conveniently provided and clearly marked in each departure terminal. PPQ should not expect the air carrier to maintain such bins or dispose of regulated material; PPQ should contract for such services and monitor for quality compliance.

Recommendations

■ E-67 Request that U.S. Customs amend its declaration (Customs Form 6059) to clarify plant quarantine requirements.

■ E-68 Negotiate with the U.S. Department of State to include a public education flyer in its visa applications within the coming year.

■ E-69 Negotiate with air carriers to include a public education flyer with passenger ticketing information in the language of the country of origin and to include a question regarding possession of agricultural products when ticket agents perform safety prescreening within two years.

■ E-70 Negotiate and contract with air carriers to provide amnesty bins at points of departure with two years.

■ E-71 Develop and foster close and effective working relationships with other Federal inspection service agencies.

2.20 Commercial Cargo

Agricultural quarantine inspection monitoring (AQIM) data, based on volume and pest interceptions, show that the pest introduction potential is greatest for commercial cargo shipments. AQIM, for fiscal year 1998, shows that 91 percent of the estimated pounds of prohibited material missed came from sea and air cargo, the remaining nine percent was from passenger baggage. The trend to containerize all cargo and development of container movement strategies to expedite movement from the POE to destination, such as the Alameda Corridor, and the increased sharing of vessel container space, will continue to preclude inspection at POEs. The increased sharing of vessel container space will continue to make inspection even more problematic. The future for effective pest exclusion for commercial cargo shipments must focus on the development of effective offshore mitigation and certification strategies, coupled with inspection capabilities at destination.

Timber used for dunnage and as packing for goods carried in containers, almost by definition is mostly of low grade and the risk of pest infestation is relatively high. Based on increased pest interceptions APHIS recently regulated solid wood packing materials from China and Hong Kong and has published an advanced notice of proposed rulemaking to solicit recommendations for a long-term solution to this problem.

Rail shipments are essentially unmonitored; the pest risk for this pathway is unknown. At this time, monitoring of rail shipments is by way of access to Customs shipment processing databases such as the automated commercial system (ACS), the automated manifest system (AMS) and the rail line release system. Monitoring at several Canadian land border crossings is conducted via access to Customs AMS. Two of the major southern border crossings are currently exploring the possibility of utilizing this system for compliance monitoring.

Known agriculturally regulated articles entering via rail are primarily grain and lumber. Pest pathway risk for rail entry at the Calexico crossing

is unknown for commercial cargo, as it has never been monitored.

Nevertheless, the Border Cargo Release Program, developed to expedite the entry of historically low risk product from Mexico is a good example of how pest risk data can be used to mitigate pest risk and expedite commodity entry. Currently in use to expedite truck entry, this strategy, coupled with the use of Customs line release system, should be explored for expanded use where pest risk data indicates a low risk for invasive plant pest entry and establishment.

Recommendations

■ E-72 Support and encourage training for use of and access to Customs databases.

■ E-73 Implement the North American Plant Protection Organization standard for solid wood packing materials with the long-term goal of a world wide prohibition of solid wood packing materials in cargo transport.

■ E-74 Require that all empty containers be free of all plant and animal residue prior to entry.

■ E-75 Expand the border cargo release program to all ports of entry.

■ E-76 Develop a destination inspection program for low risk cargo.

■ E-77 Develop a destination inspection program for immediate transport cargo at approved devanning facilities for high-risk cargo during seasonal peak traffic periods.

■ E-78 Conduct a pathway risk assessment for rail shipments and monitor this pathway based on the risks that are identified.

2.21 International Mail and Private parcel Carriers

APHIS-PPQ is responsible for the inspection of all foreign parcels entering the U.S. via private parcel carriers and the U.S. Postal Service. Traditionally, APHIS-PPQ has relied on labeling to select parcels for inspection. More recently, x-ray equipment and dogs have begun to be placed in facilities to enable screening parcels for agricultural material.

There may be opportunities to upgrade mail and parcel inspection when facilities are redesigned, e.g., Los Angeles international mail inspection facility.

Recommendations

The Committee recommends that APHIS-PPQ work with the USPS and private parcel carriers to:

■ E-79 Install smart x-ray equipment on international mail and private parcel belts in order to examine all foreign origin mail and parcels.

■ E-80 Use dogs to screen mail at all international mail and parcel ports of entry until x-ray equipment is installed.

2.22 Private Air and Cruise Ships

APHIS-PPQ staff monitor private aircraft and cruise ships for compliance with quarantine regulations. Costs for monitoring are partially recovered based on a set fee structure. AQI monitoring data shows the compliance approaches 98 percent and a current inspection effort of 18.4 percent. Based on inspection and interception records this pest risk pathway appears to be minimal (AQIM Report, 1998).

Recommendations

■ E-81 Conduct a specific pest pathway risk analysis to determine the invasive plant pest entry and establishment risk posed by private airplanes and cruise ships and revise its monitoring levels accordingly.

■ E-82 Use renewable compliance agreements to assure proper handling or disposition for repeat entries as a monitoring and pest mitigation strategy.

2.23 Garbage

Traditionally, AQI staff monitor air and maritime garbage disposal primarily to guard against the introduction of animal diseases. In the past, introductions of hoof and mouth disease, hog cholera and vesicular swine fever have been traced back to foreign garbage. Whereas, airport garbage handlers are under compliance agreement for garbage disposal, disposal of maritime garbage is still performed under direct supervision.

Recommendations

■ E-83 Conduct a pest pathway risk assessment for air and maritime garbage to identify and evaluate the actual pest risk.

■ E-84 If warranted, place disposal of maritime garbage under a compliance agreement.

2.24 Ballast Water

Ballast water from ships is a primary source for the introduction of aquatic nuisance species. In 1991, ballast water introduced cholera into the shellfish beds of Mobile, Alabama. Other documented introductions include: yellow fever into Alaska, zebra mussel, spiny water flea and European ruff into the Great Lakes, and Asian clam into Los Angeles and Long Beach. The Aquatic Nuisance Species Prevention and Control Act of 1990 (16 USC 4701) resulted in the establishment of regulations for ballast water management for control of non-indigenous species and placed enforcement responsibility with the U.S. Coast Guard. Its regulatory authority can be found under 33 CFR 151.1510. But, current regulations only cover Snell Lock, Massensa, New York, the Hudson River north of the George Washington Bridge, and navigation in the Great Lakes. Compliance at other U.S. ports is voluntary.

Recommendations

■ E-85 Request that the Invasive Species Council established under Executive Order 13112 coordinate further actions to mitigate ballast water risk with APHIS and the Coast Guard.

■ E-86 Request that the Invasive Species Council review the Coast Guard's regulation (33 CFR 150.1510) and suggest revisions if necessary to include other POEs based on the identified risk.

2.25 Technology Application and Research Needs

APHIS activities are supported by USDA-Agricultural Research Service (ARS) basic research, while APHIS's Methods Unit provides both basic and applied research and technology. In recent years, development of new technologies and applications has been hampered by laboratory closures and funding shortfalls. The APHIS-PPQ's ability to continue excluding pests, providing commodity treatment solutions, and developing pest-free

and pest mitigation programs to facilitate the access and retention of export markets will depend, in part, on its ability to develop new technologies and applications.

The development of the Center for Plant Health Science and Technology is a positive step toward what has been viewed as a longstanding need. While regional methods labs are designed to provide solutions for AQI needs, there is little evidence of routine interaction. Instead, basic research and publishing results appear to be a primary goal of Methods staff. Its principal function should be to provide the technological answers in support of field operations requirements. Evaluation of Methods center directors and their staff should be based on this premise. The recent diminution of support for Methods functions may be related to its perceived relevance to APHIS's mission.

Recommendations

■ E-87 Evaluate Methods staff performance according to their accomplishments in providing solutions to identified Agricultural Quarantine Inspection needs at least every three years.

■ E-88 Develop an annual list of "needs" by Agricultural Quarantine Inspection staff for submission to Methods for its consideration.

■ E-89 Provide a listing of studies and development programs to Agricultural Quarantine Inspection staff on an annual basis to inform them of supportive work that may be coming on line.

■ E-90 Have Agricultural Quarantine Inspection representatives participate in the development of Methods annual work plans to assure Agricultural Quarantine Inspection needs are incorporated and met.

■ E-91 Develop rapid generalized testing for target species

2.26 Detector Dogs

The use of dogs to detect meat and plant products is employed at a number of POEs. Dogs are used to monitor international mail, air passengers and certain cargo entries. The APHIS-PPQ plans to integrate The Beagle Brigade Program into a number of AQI operations including airport baggage clearance, international mail facilities, cargo inspection, land border surveillance, and smuggling interdiction. It also has plans to explore other areas outside AQI where use of dogs may be helpful and to explore cross-utilization possibilities.

The San Ysidro, CA, border crossing from Mexico with the normal daily volume of vehicular traffic. Note the Customs officer with a detector dog conducting a primary inspection for controlled substances.

At this time PPQ's program is constrained by a commitment to use beagles and a specific passive training technique. Customs and California's dog programs use both passive and aggressive search and alert techniques specific to the assigned task and select breeds based on the traits

desired for a specific task. As a result, APHIS is self-limited in its ability to expand its use of dog scenting.

Recommendations

■ E-92 Place detector dog teams at all high-risk ports of entry to facilitate passenger and baggage clearance.

■ E-93 Review its training and breed selection program to maximize use of different screening techniques and breed capabilities.

■ E-94 Negotiate with Customs to cross-train its dogs to screen for agricultural products at smaller ports of entry.

2.27 X-Ray Application

X-ray equipment is currently used to screen passenger baggage for pre-departure and at some ports of entry, at international mail facilities, and for cargo containers at various high volume locations and devanning sites along the U.S./Mexico border.

Truck X-ray facility, Otay Mesa, CA, used principally by U.S. Customs for drug interdiction. A detailed X-ray of an entire semi-truck with cargo requires 10 minutes.

Customs plans to install additional truck x-ray equipment at additional southern border locations and at northern border crossing locations as funding allows.

The development of tomographic x-ray equipment to facilitate inspection at POEs is currently stalled. Originally under development by the Federal Aviation Agency to facilitate explosion detection, funding by that agency was rescinded when this technology failed to detect sheet explosives at the required levels.

Vivid Technology has developed a dual energy x-ray system that will enable a high speed analysis of baggage for quarantine commodities which uses the atomic number, mass, and density of objects to discriminate targeted materials from non-targeted objects. Implementation of this x-ray technology is planned to begin at JFK's Terminal One as a pilot program and then expand to other international airports.

Other x-ray technology under development in addition to heavy pallet x-ray and improved truck x-ray capability include imaging and relocatable inspection systems (IRIS or VACIS) and a railcar inspection system that uses gamma rays to detect objects as a train moves slowly through the equipment.

Recommendations

■ E-95 Develop or abandon development of tomographic x-ray technology.

■ E-96 Acquire and begin using Vivid Technology's dual energy x-ray system, and any other identified smart x-ray equipment to expedite screening and clearance of cargo, baggage and mail.

■ E-97 Negotiate with Customs to use its truck x-ray capability to screen cargo containers.

■ E-98 Test the utility of Vivid™ x-ray equipment at high-risk ports of origin, i.e., Guatemala City, Guatemala.

2.28 Future Possibilities and Research Needed

Many commodities could be screened for pathogens more rapidly and accurately if currently available technologies for rapid biomedical pathogen identification (PCR, RAPID) were adapted by APHIS. The development of a *Bacillus thuringiensis* implanted genetically engineered organism has been successful for cotton and should be incorporated into the pink boll worm program.

The plasma arc contraband destruction system (PACDS) utilizes an alternating current plasma torch to convert 99.8 percent of the organic and "thin walled" inorganic material treated into benign gases. Treatment can be performed in the original packaging. This system will be tested at Otay Mesa, California.

Currently, the ARS is developing plum pox resistance in fruit trees. The development of disease resistant cultivars needs to be expanded for other quarantine disease organisms. The development of gamma, x-ray, and electron-beam irradiation is in its infancy. Its use against disease pathogens, e.g. citrus canker, is just beginning to be developed.

In recent years the chemical/pharmaceutical industry has identified a new class of compounds known as membrane incorporated molecules (MIMs). One of these compounds has been shown to be effective against the citrus canker causal bacterium. This discovery has also led to the idea of exploring the use of benign plant virus delivery systems to enable a plant to fend off disease organisms by means of anti-disease peptides production.

■ E-99 Develop and use genetic mapping to identify interception origins and support pathway risk models.

■ E-100 Monitor how Customs uses remote surveillance and adopt this strategy at other locations if it is determined to be a useful and effective clearance strategy.

■ E-101 Monitor and provide funding for the development of new x-ray technologies.

2.29 Business Practices/Services

Services

AQI staff, in addition to their quarantine enforcement duties, performs various services to both importers and exporters. These include post-entry quarantine, export certification, and treatment to meet entry requirements at the POE. In addition to other duties, headquarters staff pursue market access, process import permits and perform risk assessments. These various services are either fully or partially funded from the APHIS budget. The APHIS-PPQ staff, under a trust fund arrangement, performs preclearance operations in other countries as requested by the exporter. However, replacement costs of inspectors assigned temporarily to a preclearance program are absorbed by APHIS-PPQ and these positions frequently go unfilled. These services provide a direct benefit to the industry by facilitating both import and export trade opportunities and are given high priority by APHIS-PPQ to the detriment of quarantine enforcement duties.

2.29.2 Recommendations

■ E-102 Seek full cost recovery via a fee for service, or privatize service functions not mandated by law under close APHIS oversight. These services

include certain trade facilitation activities, development of export programs, export certification, post-entry quarantine, etc.

■ E-103 Require and budget for staff replacement at ports of entry when staff are on temporary duty assignments for preclearance.

2.30 Employee Development

In many of its discussions with APHIS staff, the Committee found that APHIS staff at all levels and locations are committed to pest exclusion and the protection of American agriculture and the environment. But, in many cases, staff are frustrated by the lack of training and equipment available to enable them to perform as effectively as they would like. Some of the more commonly expressed concerns included:

• An inability to perform necessary inspections due to workload and lack of sufficient resources.
• A desire to work more with industry, other FIS agencies and the public to assure compliance.
• A need for more training and additional tools such as computer equipment and training, training videos, access to training technologies to identify and target inspections.
• A need for effective communication with headquarters and other field offices for consistency and uniformity of inspections.

To facilitate uniformity of inspection and quarantine enforcement, APHIS-PPQ relies on manual guidelines. In its many discussions with APHIS-PPQ staff, the Committee observed that this manual approach, over time and absent other education and training opportunities, has fostered staff focus at all levels on process rather than accomplishment of the Agency 's mission. In other words staff tend to view the solution as more simply a need for more resources to do more of the same, i.e. the focus is on "doing things right" in lieu of "doing the right things" to exclude pests.

More problematic, staff expressed a powerlessness to make even the most minor of decisions for process improvement. As a result, it was not uncommon to see port specific and stand alone computer systems and guideline development as a coping strategy.

Recommendation

■ E-104 Provide ongoing staff training in quarantine laws and regulations, computer and equipment use, and data and risk management and education on the impacts of invasive pests.

■ E-105 Increase communication channels horizontally and vertically between headquarters and port staff by prioritizing and scheduling staff meetings, etc.

■ E-106 Allocate individual port budgets to the port directors for local level resource management.

2.31 AQI Staff Assignment

Currently, staffing is allocated based on formulas associated with the Work Accomplishment Data System. This database has come under a great deal of criticism and, in part, the AQI monitoring surveys were developed to assess this database as well as identify emerging pest introduction pathways. According to the current staffing guidelines, many POEs are greatly understaffed, but these guidelines estimate staffing needs based on quarantine material interceptions (QMIs).

A QMI is one regulated item from one country, there is no weight or priority assigned based on volume or estimated risk. To illustrate, an air passenger carrying one apple, orange, peach and pear would be considered four QMIs; a container of untreated mangos from a regulated country would consist of one QMI. Countries are assigned a high, medium, or low risk rating based on the number of intercepted QMIs.

In addition, there is no policy or guidelines to staff POEs during peak entry hours. The workload at many major POEs is continuous, that is 24 hours/day. Yet these ports are almost entirely staffed with one regular work shift (8:00 a.m. to 4:00 p.m.) and 16 hours of overtime on weekdays; and, 24 hours of overtime (at time and one half) on Saturday and Sunday (double time). At new, or emerging ports, where the need for permanent staff is indicated yet the workload primarily occurs during non-traditional work hours, it seems counterproductive to staff and fund a daytime tour of duty (with 16 hours of overtime) to address a primarily after hours work load. To date, alternate work shifts have been implemented for Miami air passenger inspection only.

The APHIS's current policy and regulation (7 CFR 354) exclude weekends from the scheduled work week assignment. This report also noted that 50 percent of the Sunday overtime charges came from five ports (Honolulu, New York, Miami, San Juan and Los Angeles) while 46 high-volume ports accounted for 93 percent of the Sunday overtime. A recommendation to make Sunday a regular workday has never been implemented. Recommendations found in APHIS's 1998 Overtime Report have not yet been developed for implementation. Suggested strategies to reduce overtime costs included recommendations to ensure that tours of duty correlate with work loads, scheduling of regular overtime in lieu of call backs where feasible. Also included in this report were recommendations to conduct a review of commuted travel time (CTT) at all ports for which CTT exceeds one hour to ensure accuracy and appropriateness and to examine the policy which grants CTT in conjunction with scheduled overtime and holidays. A draft analysis of commuted travel time at selected locations is currently under development.

A January 1999 Analysis of Upgrading Grade 9 PPQ Officers and Implementing a $30,000 Cap on Premium Pay noted that in fiscal year 1997, 284 PPQ officers earned more than $30,000 in premium (overtime) pay. In addition to the premium pay cap, it recommends an upgrade for many of the Grade 9 PPQ officers currently performing Grade 11 work and suggests an increased use of Grade 5 employees to perform routine (and overtime) inspections.

Recommendations

■ E-107 Require port staff to collect and use agricultural quarantine inspection monitoring data as it was intended and annually use it to revise the workload accomplishment data guidelines and codes accordingly.

■ E-108 Redefine quarantine material interceptions to include country of origin pest risks and commodity volume.

■ E-109 Initiate and implement work shifts to coincide with workload and where workload criteria justify a second shift (i.e., an average of two call back inspections/day) and hold management accountable for implementation.

■ E-110 Assign staff at ports of entry where evidence shows the need for permanent staff.

■ E-111 Expand the use of technical positions for activities such as passenger baggage clearance and upgrade APHIS-PPQ officers where work assignments warrant such upgrades.

■ E-112 Revise its overtime regulation and policy to provide for the establishment of scheduled weekend tours of duty.

■ E-113 Explore the feasibility of an overtime cap.

2.32 Database Management

At all POEs visited the committee found that APHIS was hindered from assessing risk due to myriad stand-alone databases it uses and the quality of the data entry. Moreover, there is no database capability to track quarantine violations/violators to target efforts towards repeat offenders. In addition, the committee learned that:

• Staff lack training in computer and database operation.
• There is no budget allotment for equipment, i.e., computers and upgrades and where funds are available purchases and contract development is highly regulated.
• The relevance of AQI Monitoring versus WADS data needs further evaluation.
• Port staff are not collecting and using the AQIM data as designed.
• Computer communication outside USDA is lacking.
• Usefulness of data collected is questionable.
• Software programs are inadequate.
• Reports are not available from port to port to assist in enforcement decisions, data analysis and risk assessment.
• There is a need to "identify the universe" to capture and quantify pest pressures at each port.
• Development of a database to enable better data use and targeting of resources is needed.
• There is no mechanism available to account or react to differential growth at individual POEs.
• Computerization/electronic access to APHIS operational manuals and training is needed.
• There is no way to query and sort pest interception network (PIN) data by field.
• Establishment of a database management team.

Moreover, electronic communication capabilities are lacking, and information-gathering efforts are hampered by database systems that are all stand-alone and cannot be queried.

Recommendations

■ E-114 Request an agricultural quarantine inspection program work plan from its information technology support staff.

■ E-115 Integrate its information technology resources and staff under the agricultural quarantine inspection program management.

■ E-116 Physically co-locate information technology staff with agricultural quarantine inspection staff at entry port locations.

■ E-117 Explore the feasibility of outsourcing data entry to reduce workload.

2.33 Civil Penalty Guidelines

There is lack of uniformity in the implementing of this authority from port to port. Also, there are no civil penalty guidelines employed for violations of APHIS-PPQ regulations in commercial cargo and detected cases of smuggling.

In addition to revision of the civil penalty guidelines, a commitment by PPQ employees and management to uniformly apply and administer civil penalties is requisite. The guidelines should state that penalties should be uniformly applied in instances when passengers have prohibited agricultural contraband and deny that they are carrying such (for example, two "no" responses in the procedure should require assessment of a fine). The ability to negotiate a penalty should be limited to the full amount or one half of that amount. There must be a commitment on behalf of PPQ employees and management to uniformly apply and administer a system of civil penalties.

The use of civil penalties should be considered when violations of rules governing the importation, entry, exportation or movement in interstate commerce of plant pests, plants, biological control organisms, noxious weeds, animal pests and articles, or any means of conveyance are detected in commercial shipments capable of harboring such. Guidelines for the application and amounts of such civil penalties should be developed using standards followed by Customs Service for fines when drugs, etc. are found in commercial shipments.

Recommendations

■ E-118 Revise its civil penalty guidelines to clarify enforcement provisions in consultation with APHIS port staff.

■ E-119 Develop a civil penalty structure to provide consistency in penalty assessment.

■ E-120 Revise its training program and provide staff ongoing refresher training for civil penalty assessment

■ E-121 Require ports to track and account for civil penalty actions taken.

2.34 Unaddressed Issues

Solely due to timeframe constraints, the committee was unable to sufficiently examine other potential and/or emerging issues and pathways as follows:

• Emerging pathways, such as bioterrorism, biotechnology (genetically modified organisms, biological control agents, etc.).
• The risk from the trend towards establishment of corporate airstrips to receive international cargo.
• The role of invasion biology.
• The role of APHIS in newly enacted Executive Order on Invasive Species.
• Long-term application of the "regulated non-quarantine pest" provisions of the IPPC.

Chapter Three

Pest Detection and Response Committee Report

Introduction

Safeguarding America's vast and important food and fiber resources from incursions of invasive plant pests requires vigilance and expeditious intervention. Central to this mission is the need for a seamless process by which pre-border, border, and post-border activities mesh to form a barrier to the establishment of invasive plant pests. Pre-border and border activities are preventative in nature, whereas post-border activities serve to detect and respond to any breach of these exclusion mechanisms. The organizational structure of the safeguarding process should achieve an effective flow of information and elicit the appropriate response to invasive plant pest threats or incursions at all levels. Program strengthening, with particular emphasis on enhancement of pre-border and post-border activities, is imperative for the Safeguarding of American Plant Resources.

Safeguarding is a responsibility that must be shared among Federal and State governments, industry, and the general public. Coordination of safeguarding activities resides with Federal agencies, although participation at all levels must be encouraged to ensure early detection of, and prompt response to, the introduction of invasive plant pests. Effective emergency response is essential to contain and eliminate such introductions with minimal financial and environmental costs. The reorganization of APHIS-PPQ to appoint State Plant Health Directors has been a positive step in providing leadership at the state level as it applies to pest detection and response activities.

The Animal and Plant Health Inspection Service (APHIS) plays an integral role in the administration of regulatory programs by the United States Department of Agriculture (USDA). The APHIS-PPQ is charged with protection of commercial crops and native ecosystems from damage caused by invasive plant pests as well as certification of export commodities. Trade is facilitated by detection and control of invasive plant pests in order to meet phytosanitary standards for export. These roles are not inherently conflicting or mutually exclusive. Indeed, proper attention to the regulatory role results in automatic fulfillment of the enhanced export function through the ability to certify products for shipment. By these actions, U.S. agricultural products may avoid trade restrictions, while producers realize reductions in the cost of post-harvest treatments to meet international quarantine requirements.

The Committee recognizes that detection and response activities contribute not only to agricultural production and enhanced marketability of U.S. agricultural products, but that these activities also benefit the community as a whole. Among the most obvious benefits are reductions in costs associated with control programs in terms of dollars spent and pesticide load, with its concomitant effects on human and environmental health.

Safeguarding of native flora and fauna, by exclusion of invasive plant pests which may adversely impact natural ecosystems, provides protection of endemic and indigenous organisms thereby maintaining native biodiversity.

The Plant Pest Detection and Response Committee carefully considered the many complex issues relative to safeguarding plant resources through post-border activities. The Committee met with members of the APHIS-PPQ management team for an open discussion of APHIS-PPQ pest detection and response activities. Plant protection officials from New Zealand, Australia, and Great Britain interviewed in Riverdale indicated that problems and concerns which the United States faces in Safeguarding American Plant Resources are in no way unique. After careful consideration, the Committee developed issue statements and recommendations to facilitate establishment of well organized, scientifically valid, and adequately funded invasive plant pest detection and response programs within APHIS-PPQ. Several committee members visited the Centers for Disease Control and Prevention (CDC) in Atlanta, Georgia to focus on the CDC information exchange and response activities for human pathogens and their potential application to post-border detection and response of invasive species threatening plant health.

The Committee solicited information on the current condition of invasive plant pest detection and response programs within the United States. A questionnaire (Appendix E) prepared by the Committee was distributed to all State Departments of Agriculture via the National Plant Board and to State Forestry officials via the U.S. Forest Service. Receipt of 51 replies, representing 42 states, is indicative of the importance that state plant protection officials assign to these activities. These responses (Appendix E) aided the Committee in identifying areas of concern and in determining the relative importance of the various issues under consideration.

3.1. Organizational Structure for Invasive Plant Pest Detection and Response Activities

3.1.1. Organization of Invasive Plant Pest Detection Activities

Background

A clearly defined, comprehensive, and coordinated invasive plant pest detection program within the United States is of utmost importance to our agricultural industries and the nation as a whole. Early detection of invasive plant pests that pass through exclusion barriers increases the likelihood of timely eradication, if feasible, or the initiation of cost effective mitigation measures. Coordinated detection initiatives at the state, regional, and national levels are essential to assure that detection objectives are properly defined and executed in a timely manner.

The Cooperative Agricultural Pest Survey (CAPS) program, administered by the APHIS-PPQ, was created to provide a national pest detection network by combining Federal and State resources for pest surveys (NAPIS, 1999). The program targets invasive plant pest surveys and response activities in three areas: invasive plant pest detection, APHIS-PPQ export certification, and cooperative domestic programs, i.e., fire ant management and biological control. CAPS detection

activities are coordinated by APHIS-PPQ through regional committees, however, there is considerable disparity in its administration.

Findings

(1) The APHIS-PPQ does not exert a leadership role in coordinating plant pest and disease detection activities on a national level. This situation has largely resulted in APHIS-PPQ abdication of pest detection activities by shifting them to the States. The States lack necessary resources, authority, and, most importantly, coordination to conduct effective detection activities on a nationwide basis. Further, Federal funding, pest priorities, and cooperative activities are inconsistent from state to state and from region to region. This disparity was evident in questionnaire responses from state plant regulatory officials (Appendix E). Thirty-eight state respondents indicated a need for better organization and coordination of pest detection at the regional and national level.

(2) The CAPS program has failed to provide a unified national pest detection system. This program is not functioning efficiently due to inadequate funding, lack of Federal coordination and oversight, and because the authority to conduct surveys may not necessarily reside with agencies which are responsible for their execution at the regional and state levels.

(3) The CAPS program has been effective in some participating States by providing a framework and funding mechanism for pest survey or detection efforts. Unfortunately, states which lack matching funds, technical staff, and management, or which encounter stakeholder sanctions do not participate in CAPS activities.

(4) Politics, not scientific validation, determines much of the CAPS program focus in some States. Incentives for scientific surveillance have been eliminated and information dissemination does not occur.

(5) A critical need exists for a comprehensive invasive plant pest detection system in the United States. An effective State and Federal partnership is needed to establish pest detection priorities and clearly defined action plans for coordination of pest detection activities at the state, regional, and national levels. This need is underscored by the concerns surrounding the entry and establishment of invasive plant pests.

(6) The Centers for Disease Control and Prevention (CDC) has developed a nationwide surveillance program for human illnesses that identifies organisms and areas of the United States that are considered to be high risk (Hutwagner et al. 1997; United States Department of Health and Human Services, Centers for Disease Control and Prevention, 1998 a & b). A nationwide surveillance program for invasive plant pests is crucial to the implementation of pest detection and response activities.

Recommendations

■ D-1 Restructure the existing Cooperative Agricultural Pest Survey program to create a Federal and State Cooperative Invasive Plant Pest Survey Program (CIPPS) under the supervision of the National Invasive Plant Pest Coordinator. Empower this Coordinator to set invasive plant pest detection and response priorities and implement survey and detection activities in the United States. Designate the position of the Coordinator to report directly to the APHIS-PPQ Deputy Administrator. The Coordinator will be a permanent member of the Standing Committee on the Collection and Use of Intelligence on Exotic Pests (see I-38).

■ D-2 Institute a three-tiered committee system to assist the National Coordinator in identifying and prioritizing plant pest and disease detection and response activities in the United States.

■ D-2a. State committees, composed of key stakeholders in pest detection activities, should be identified by the lead State and Federal plant protection officials in each state.

■ D-2b. Regional committees should include the State and Federal plant protection officials and Regional Plant Board members from each state in the region.

■ D-2c. The National Committee should include representatives from each of the Regional committees. The National Committee should be chaired by the National Coordinator.

■ D-3 Develop and endorse a conceptual design for the Cooperative Invasive Plant Pest Survey Program (CIPPS) that will:

■ D-3a. Establish a nationwide surveillance program to identify potential pest organisms and high risk, sentinel areas for introductions,

■ D-3b. Standardize invasive plant pest detection activities at the state, regional, and national levels, and

■ D3-c. Support export certification requirements and domestic program duties.

3.1.2 Organization of Invasive Plant Pest Response Activities

Background

Agricultural productivity forms a cornerstone in the foundation of America's prosperity. Crop diversity and abundance allows the United States to feed not only its citizens, but also to export agricultural products worldwide. Clearly, United States plant resources are of paramount importance in maintaining the rich and abundant agricultural base, which is vital to national security. The high standard of living results, in large part, from the quality and abundance of agricultural production in the United States. This creates a focal point for tourism and agricultural trade. With these attributes comes the risk of invasive plant pest introductions. Such introductions in California, Florida, Hawaii, and New York over the last decade dramatically illustrate this problem. Indeed, incursions in the past two years show an alarming increase in invasive plant pest introductions. Improvements in exclusion barriers as well as detection systems and response mechanisms for exotic agricultural pests that breach these barriers are of utmost importance. The impact of invasive plant pests entering the United States extends beyond agriculture to public health and disruption of natural ecosystems wherein native flora and fauna may be adversely affected. Finally, the threat of bio-terrorism, the intentional introduction of agricultural pests, cannot be ignored. Considered in their entirety, these issues underscore the absolute necessity of strengthening United States invasive plant pest response activities.

The APHIS-PPQ Emergency Programs Manual (USDA-APHIS-PPQ, 1996a)

provides an outline of general procedures for initiating response activities. Guidelines for exotic fruit fly incursions, the best example of cohesive strategic planning and comprehensive protocols, exist because frequent introductions require them. Emergency response guidelines are available for only fifteen other pests. This means that most response plans must be formulated after new introductions are detected. Valuable response time is lost while a literature search and a pest risk assessment (PRA) are conducted (USDA-APHIS-PPQ, 1997a). Concurrently, additional detection activities are initiated to determine the extent of the pest incursion. The response activities are carried out through establishment of a New Pest Advisory Group (NPAG) by the APHIS-PPQ Center for Plant Health Science and Technology (CPHST). The NPAG, comprised of a core group of APHIS-PPQ technical specialists and operations managers, supplemented by representatives from States, Universities, Industry, and applicable International and Domestic Agencies, must formulate an action plan for containment and control. The NPAG mechanism, recently assigned to CPHST, requires prompt implementation and is most effective when stakeholder involvement occurs at the early stages of planning.

Trained individuals with experience in emergency programs are essential in the initial stages of emergency responses. Unfortunately, preparedness activities have received low priority and very limited resources are available for this purpose. Regions responsible for maintaining rapid response teams are the primary sites for training. In the past, personnel acquired these essential survey, regulatory and control skills through participation in domestic programs, programs which have been reduced significantly, or are no longer in place. Emergency response team members assigned to collateral duties in the ports could gain practical training by participating in survey and regulatory activities in early detection programs around ports.

Several factors impede prompt implementation of emergency programs. National plant protection laws often do not provide authority to implement important regulatory activities essential to emergency invasive plant pest response activities. Delays occur because APHIS-PPQ personnel with management duties in emergency response programs have limited authority for procurement and personnel decisions. Program managers themselves are hesitant to expend funds in emergency programs because allocations for such programs are often delayed.

APHIS-PPQ has initiated a plant safeguarding system that involves, not only emergency eradication protocols, but also long-term management of plant pests (USDA-APHIS-PPQ, 1996b). The principal approach for APHIS-PPQ management programs is to develop and apply tools to mitigate the effects of introduced exotic pests, particularly invasive plant pests. Although any number of Federal agencies (e.g., U.S. Forest Service, USDA-ARS, Department of Interior, and Bureau of Reclamation) can address non-eradication responses, only

APHIS-PPQ has the mandate to conduct surveillance activities. This mandate, taken together with the statutory authority, infrastructure, and technical expertise of APHIS-PPQ imparts the Agency with a unique capability to carry out management activities. Management programs are targeted at Invasive plant pest that threaten plant resources and ecosystems, i.e., the boll weevil, grasshopper, pink bollworm, as well as general programs for biological control and noxious weeds. The APHIS-PPQ has defined its mission in the Biological Control Program to be that of a cooperator, with State and other Federal agencies, in the implementation of biological control techniques (USDA-APHIS-PPQ, 1995).

Findings

(1) The APHIS-PPQ does not have a well coordinated invasive plant pest response plan to involve State and Federal plant regulatory agencies and industry stakeholders.

(2) Emergency response guidelines are available for only a small number of potential pests. This results in delays in the initiation of response to detection of other pests.

(3) APHIS-PPQ emergency response activities are often delayed due to limited authority for implementation, procurement, and personnel decisions.

(4) There is a critical need for coordinated management of invasive plant pests, including noxious weeds, plant pathogens and invertebrates, which have become established in the United States. Lack of a coordinated response has lead to confusion on the part of States seeking Federal assistance in controlling invasive plant pests.

(5) APHIS-PPQ pest management programs are inadequately funded to meet the goal of controlling established invasive species in the United States.

Recommendations

■ D-4. Review and revise the APHIS-PPQ Emergency Programs Manual on an annual basis to ensure that it meets pest response needs.

■ D-5. Revise available emergency response guidelines to reflect current response technology and biological data.

■ D-6. Prepare emergency response guidelines for plant pests which pose an eminent threat to American plant resources. The comprehensive exotic pest list currently under development by the Entomological Society of America, the American Phytopathological Society and the Weed Science Society of America under contract by APHIS-PPQ will assist in the determination of species with the highest potential risk. These are the species for which emergency guidelines are most urgently needed.

■ D-7. Establish a nationally coordinated pest response plan that is administered under supervision of the National Invasive Plant Pest Coordinator (D-1). Use the three-tiered committee system (D-2) to review response guidelines and set response priorities, and in cooperation with the Director of the Methods Development Unit, recommend response development priorities.

■ D-8. Coordinate, and augment when appropriate, the development and implementation of response tools to mitigate impacts from established invasive plant pests, i.e., biological control methodology.

■ D-9. Secure funding to expand and establish the infrastructure required

to develop and implement effective plant pest management programs when eradication is not deemed feasible.

■ D-10. Identify United States Department of Agriculture organizational and procedural deficiencies which hinder rapid response to invasive plant pest detection. Develop and implement procedural enhancements to expedite the most efficient and effective emergency response mechanisms. Empower personnel for immediate response in all program areas, including procurement of essential resources.

3.1.3 Comprehensive Laws and Regulations for Invasive Plant Pest Response Activities

Background

Efficient invasive plant pest response systems in the United States must be backed by a system of laws and regulations which are comprehensive, while providing opportunities for individual states to enact complementary statutes and regulations. Regulations need to be reviewed on a regular basis to ensure relevance and adoption of the latest technology. The Office of General Counsel (OGC) must agree to support, without reservation, the consolidated statute under development by APHIS. Statutory authority must be backed by legal counsel that will enforce the statute without fear of litigation. A tentative agency is an ineffective agency.

Findings

(1) Currently APHIS-PPQ enjoys broad, sound legislative authority for its programs and agencies. However legislative authority is fragmented into various statutes, many of which are unrelated, and defensible authority to take swift unequivocal action to halt the introduction or spread of invasive plant pests is sorely lacking.
(2) Many regulations are outdated and in need of review to determine their relevance. Regulations are inflexible regarding the application and use of new technology.
(3) APHIS-PPQ relies heavily on state authority to conduct basic inspection programs and implement mitigation measures when deemed necessary.

Recommendations

■ D-11. Work with Congress and stakeholders to have the Plant Protection Act passed during the current Congressional session (AUTHORITY).

■ D-12. Review all regulations pertaining to invasive plant pest response activities (AUTHORITY) to determine relevance and ability to adapt to new technology or management systems.

■ D-13. Meet pest management needs, in part, through compliance agreements which provide an opportunity for involvement of growers, dealers, and other stakeholders. Allow stakeholders to provide needed services subject to inspection and monitoring for compliance by official agencies.

3.2 Funding Mechanisms for Invasive Plant Pest Detection and Response Activities

3.2.1 Funding Mechanisms for Invasive Plant Pest Detection Activities

Background

Funding invasive plant pest detection activities in the United States is accomplished by several mechanisms. Federal appropriations expended through cooperative agreements with States and/or direct expenditure for Plant Protection and Quarantine (PPQ) staff time and costs are the primary sources. The PPQ received $19.5 million as 1999 appropriations to Fruit Fly Detection, Miscellaneous Plant Diseases, and Pest Detection. Of this amount approximately $12 million is dedicated to invasive plant pest detection activities. Although not clearly defined at this time, additional responsibilities resulting from the Invasive Alien Species Executive Order are expected to augment current funding levels.

The Exotic Pest Detection budget line item request prepared within PPQ and International Services (IS) is subject to approval by the United States Department of Agriculture (USDA), Office of Budget and Program Analysis (OBPA) and United States Office of Management and Budget (OMB) prior to Congressional consideration. Directive language from the House and/or Senate is typically part of the appropriations process. Fixed USDA and Animal and Plant Health Inspection Service (APHIS) overhead costs of 30% are deducted from the Exotic Pest Detection appropriation prior to allocation of the net funds by APHIS-PPQ and IS. The APHIS-PPQ management then allocates funds to locations, projects, agreements, or purchases based on plant pest or disease priorities. Priority listings are driven by any of the offices that prepare, approve, consider or enact the budgetary item. In many cases, objective science-based decision making is lacking in determining priorities for funding of invasive plant pest detection activities.

The Pest Detection Line-Item spending for FY1998 was $6,302,000 and, of this amount, $939,000 was allocated to the Cooperative Agricultural Pest Survey program for survey activities and data entry into the National Agricultural Pest Information System (NAPIS). The Western Region received $325,000, followed by the Northeastern with $262,000, the Southeastern with $224,000, and the Central Region with $128,000. Cooperative agreements with the States supported survey activities for: noxious weeds, Tropical Soda Apple, Flag Smut, Stewart Wilt, Golden Nematode, Soybean Cyst Nematode, greenhouse pests, Brown Citrus Aphid, Bark Beetle, Cereal Leaf Beetle, Japanese Beetle, Khapra Beetle, Pine-shoot Beetle, Sweet Potato Weevil, Asiatic Rice Borer, False Coddling Moth, Gypsy Moth, Apple Tortrix, Cherry Bark Tortrix, Cherry Ermine Moth, Hessian Fly, and other invasive plant pests.

In general, Cooperative Agricultural Pest Survey funds received by the States for each target pest were relatively small amounts of less than $10,000. These funds were typically used for salary and travel costs associated with specific survey activities. Funds in the amount of $589,000 were allocated for Karnal bunt national survey activities and program operations were supported by

$1,103,000. The APHIS-PPQ expenses used to conduct specific and invasive plant pest surveys as well as to monitor cooperative agreements totaled $2,165,000. These APHIS-PPQ detection funds were divided between the regions: Northeastern, $766,000; Central, $629,000; Southeastern, $492,000; and Western, $278,000.

Exotic pest detection contributions by State Departments of Agriculture are variable. Allocation of State funds is limited by availability, which in turn determines the commitment level of individual states to invasive plant pest detection activities. Similarly, agricultural industry contributions are dependent upon their cost-benefit perceptions, commitment level, and the size and complexity of the interest group.

Agricultural Quarantine Inspection (AQI) user fees currently cannot be used for invasive plant pest detection outside of ports of entry environs. In many cases the threat of invasive plant pest introductions extends well beyond the initial entry point. This is especially true in the case of cargo containers that are devanned at remote final destinations. There is no AQI user fee on cargo containers and no authority to apply such a fee to invasive plant pest detection.

Findings

(1) There is a pressing need to institute an efficient and equitable allocation procedure for invasive plant pest detection funds within the United States. The funding mechanism for the Cooperative Agricultural Pest Survey (CAPS) program may serve as a starting point to achieve this goal.

(2) New and innovative funding mechanisms for invasive plant pest detection are needed. Possible mechanisms include expanding authority and expenditure of user fees, State cost-sharing, and greater industry involvement.

(3) Importance of the detection and mitigation of Invasive Alien Species has been reinforced by Executive Order #13112 (AUTHORITY, E-11, E-12, E-13).

(4) Improved technology is an essential component of invasive plant pest detection activities. Effective mechanisms to provide an adequate funding base for research and development is critical.

Recommendations

■ D-14. Appoint and empower the National Invasive Plant Pest Coordinator (NIPPC) (D-1) to manage, with guidance from the three-tiered committee system (D-2), allocation of invasive plant pest detection funds. This is inclusive of funding for research and development needs (I-38).

■ D-15. Establish, through the National Plant Board, criteria for a State and Federal cost sharing formula for Exotic Pest Detection activities. Include incentives for State and industry participation.

■ D-16. Revise and expand the user fee authority and structure to impose a fee for imported cargo and containers as these increase the risk of introducing invasive plant pests. Allocate a portion of cargo user fees for Exotic Pest Detection activities throughout the nation, with emphasis on high risk areas where cargo containers are devanned (E-10).

■ D-17. Aggressively seek a just, proportional share of the funding made available by Congress to address the Invasive Alien Species issue in order to establish and maintain viable pest detection and early response activities (AUTHORITY, E-11, E-12, E-13).

3.2.2 Funding Mechanisms for Invasive Plant Pest Response Activities

Background

Adequate baseline funding is critical for the implementation of an effective response to invasive plant pest incursions. It is impossible to predict the number, location and time of detection events, so that availability of Federal contingency funds is necessary to ensure an immediate response to invasive plant pest incursions.

Funding mechanisms for response to invasive plant pest introductions are from three primary sources depending on the size and scope of the emergency. Response to small outbreaks is funded in amounts of $50,000 or less from annual Regional allocations. The APHIS-PPQ miscellaneous plant pest detection funds, a $10 million appropriation, provide higher level funding for emergencies and other unforeseen events. This fund typically supports several activities throughout APHIS-PPQ Action Units. Large-scale emergency programs require redirection or transfer of funds by the U.S. Department of Agriculture. Authority for declaration of emergency status and transfer of funds from other Department programs is held by the Secretary of Agriculture. Funding requests to the Commodity Credit Corporation (CCC) are reviewed and modified by OMB. Other sources for emergency funds include redirection within the unit or Agency and supplemental appropriations by Congress. There are obstacles to securing emergency funds especially in sentinel areas with a high risk of invasive plant pest introductions.

Agricultural Quarantine Inspection (AQI) user fees cannot be expended for invasive plant pest response activities outside the scope of the port of entry. In many cases invasive plant pest introduction at remote locations result from the movement of cargo or people from the ports of entry. This is, therefore, strong justification to expand the use of AQI user fees to address emergency invasive plant pest response activities.

Response activities require collaboration between Federal and State governments. Cooperative documentation that clearly defines the shared responsibilities in allocation of funds and resources are of two types, Memoranda of Understanding (MOU) and cooperative agreements (USDA-APHIS-PPQ 1996a). Memorandum of Understanding, as signed by all states, permit the Agency to initiate immediate emergency response to plant pest introductions. Cooperative agreements and MOUs both define the duties and responsibilities of the Federal and State participants, however, only cooperative agreements allow the transfer of funds. The development of the financial plan for cooperative agreement is not standardized and cost sharing ratios vary according to the availability of funds at the Federal and State level. Cooperative agreements must be approved before the project begins if cooperators are to be fully reimbursed for their expenditures. Preagreement costs can be authorized by the APHIS-PPQ Regional Director and an Authorized Departmental Officer.

Findings

(1) Adequate base level funding is not available to respond to the increasing number of pest incursions occurring throughout the United States.

(2) There is presently no standardized formula in place to identify the funding responsibilities or partnerships between the Agency and

its cooperators (Federal, State, and Industry) with respect to pest response activities and their resulting financial obligations.

(3) There is no mechanism for transfer of financial obligation from the Federal government to States or stakeholders when emergency status is no longer in effect. The multi-state pest insurance fund, Interstate Pest Control Compact (IPCC), is available for invasive plant pest response on a limited scale, but is inadequate to fund major programs.

(4) Identifying and determining the role of stakeholders or primary beneficiaries of response activities is difficult.

(5) AQI user fee authority does not allow utilization of fees for response to invasive plant pests.

Recommendations

■ D-18. Estimate the baseline funding level necessary to permit the Agency to cover start-up costs to eensure a rapid response to invasive plant pest incursions.

■ D-19. Amend existing Federal and State cooperative agreements to include a standardized cost sharing agreement with State cooperators for pest response activities.

■ D-20. Identify and justify the role of stakeholders in invasive plant pest response activities, during both initial emergency programs and long-term control strategies, i.e., in-kind contribution of personnel for trapping and participation on technical advisory panels.

■ D-21. Continue to explore appropriate methods, including the use of Agricultural Quarantine Inspection user fees, to develop a $50 million, no-year, contingency account for emergency invasive plant pest response activities. This fund should be administered in a manner similar to the Interstate Pest Control Compact.

■ D-22. Expand the scope of Agricultural Quarantine Inspection user fees to include cargo containers and provide a mechanism for use of these fees for invasive plant pest response activities beyond the ports (E-10).

3.2.3 Methods Development for Detection and Response Activities

Funding for the Methods Development Unit comes from three primary sources: the Federal budget line item, emergency funds, and transfers from other APHIS line items. The major funding base, the Federal budget line item, shows a steady decline in monetary support over the last decade. The highest net funding from the Plant Methods line item was $4.212 million in 1993 and the lowest was $3.789 million in 1999. This funding base has been further eroded by salaries and other permanent project costs that have steadily increased to consume an ever larger percentage of the budget. The number of programs supported by the Methods Laboratories has increased at least 2.5 fold during this same period. The result is that the Methods Development Unit is expected to do more with fewer resources. Supplemental monies from emergency funds and transfers from other line items are made available specifically for response to crisis situations. However, these funds are regularly used to maintain the laboratory infrastructure.

3.3 Invasive Plant Pest Detection and Response Activities

3.3.1 Invasive Plant Pest Detection Activities

Background

Myriad international travel and commerce opportunities expose U.S. borders to the world. Invasive species respect no political boundaries and would flow into the U.S. over extensive shared borders with Canada and Mexico if not for regulatory exclusion barriers. Detection activities pose a second line of defense in the safeguarding process by identifying any breach of the exclusion barriers so that a rapid response can be mounted to the incursion.

Detection of invasive plant pest incursions may occur by two disparate means, passive detection and active surveillance. Passive detection of invasive plant pests occurs during other scientific field work, such as crop surveys, population studies, faunal or biodiversity surveys, endemic species inventories, incidental reports from the general public, and other such activities. Active surveillance documents the presence or absence of pest species, generates information that assists international trade, and provides input into the risk analysis process. The Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) stipulates that scientific means must be employed to establish pest-free status. Only active surveillance using scientifically valid methods produces results that can be used to statistically infer the absence

Active surveillance is target-specific and requires basic knowledge of invasive plant pest threats, pathways, and effective detection methodology

of an invasive plant pest, that is, to document pest-free zones. Passive surveys establish presence only.

Active surveillance is target-specific and requires basic knowledge of invasive plant pest threats, pathways, and effective detection methodology. The Exotic Pest Detection Manual (USDA-APHIS-PPQ, 1991a) provides detection survey guidelines for sixteen species of insects. This includes information on the basic biology of each pest and general trapping guidelines. Detection survey guidelines are also available in the National Exotic Fruit Fly Trapping Protocol (USDA-APHIS-PPQ, 1991b) for several species in the genera *Anastrepha*, *Bactrocera*, *Ceratitis*, *Dacus*, and *Rhagoletis*. The National Karnal Bunt Monitoring Program (USDA-APHIS-PPQ, 1999) and the Golden Nematode Plan are available in draft form (USDA-APHIS-PPQ, 1998a) and guidelines for Asian longhorned beetle are under development (USDA-APHIS-PPQ, 1998b).

Detection methodology is critical to successful surveillance activities. Target pests are unique and traps for one species cannot, with a few exceptions, be used for active surveillance of other pest species. Biological parameters dictate the species-specific nature of detection methods. This means that proactive measures must be employed in order to develop and implement appropriate detection strategies. An invasive plant pest cannot be detected in a timely manner if no one is looking for it. The first step in a proactive detection strategy is identification of potential invasive plant pests associated with high risk pathways into the United States. Biological data can be collected and used in the development of the tools, trapping protocols and effective traps and lures, which are necessary to look for the invasive plant pest. An excellent example of a proactive APHIS-PPQ program is the Pink Hibiscus Mealybug in the Caribbean (USDA-APHIS-PPQ, 1997b). Detection methodologies are developed by the APHIS-PPQ Methods Development Unit. This Unit has sixteen facilities which include ten Plant Protection Centers (Beltsville, Bozeman, Hawaii, Mission, Niles, Otis, Oxford, Gulfport, Phoenix, and Raleigh), four Methods Stations (Brawley, Gainesville, Guatemala, and Starkville), the National Plant Germplasm Center, and the National Biological Control Institute. Personnel in these facilities are responsible for application of new technology or research results for development of detection and response methodology.

Findings

(1) Invasive plant pests respect no political boundaries. Management of plant pest and disease incursions is inherently difficult due to extensive common international borders and rapidly expanding international travel and trade.

(2) Active surveillance is better suited to regulatory issues than is passive survey documentation of invasive plant pests. Active surveys require adequate funding support, a knowledge base, and appropriate species-specific detection methods.
(3) The efficiency of active surveillance is enhanced by targeting high-risk sentinel areas.

(4) Exotic Pest Detection Survey Guidelines (USDA-APHIS-PPQ, 1991a,b) are available for only a few of the hundreds of potential invasive plant pests which threaten American plant resources. Detection methodologies are an absolute necessity in order to conduct effective surveillance activities.

(5) The availability of new or enhanced detection methods is severely hampered by inadequate and declining Federal and state funding.

Recommendations

■ D-23. Provide a level of funding for the Methods Development Unit that allows this unit to provide the best available detection tools. The Methods Development Unit must maintain a staffing structure which not only allows the Unit to respond to the current needs for pest detection, but also to expand its work to meet demands for new technology. Unit staff should be encouraged to consult experts outside APHIS-PPQ when appropriate.

■ D-24. Assign to the Regional Committees (Section) the task of identifying survey needs, coordinating involvement by states, and allocating funds subject to approval of the National Invasive Plant Pest Coordinator. Regional Committees will make broad recommendations on survey methods after conferring with the Methods Development Unit.

■ D-25. Identify potential invasive plant pests and corresponding sentinel areas at high risk for their entry. Utilize comprehensive invasive plant pest lists currently being compiled by several professional societies (i.e., the Entomological Society of America and the American Phytopathological Society) and international databases (see International Information Systems) to facilitate this process.

■ D-26. Establish and periodically revise Exotic Pest Detection Guidelines, including trapping methodology, for potential invasive exotic pests. Detection guidelines are necessary for all species identified as potential invasive plant pests (see D-25) which pose an eminent threat of entry into the United States.

3.3.2 Invasive Plant Pest Response Activities

Background

Effective control and containment of invasive plant pests require efficient application of control technology. Appropriate technology must be readily available or developed within a short time period for integration into pest management strategies. Given this premise, APHIS-PPQ must provide these methodologies either through resident expertise or through collaborative efforts. Development of pest control tools requires a strong scientific and technical staff in the APHIS-PPQ Methods Development Unit. While it is not the responsibility of APHIS-PPQ to conduct basic research, the Agency does have the responsibility of recognizing and applying technological advances. The Agency has the responsibility to coordinate technological needs and collaborative efforts to provide necessary pest response methodologies. This is especially important because it is difficult to predict specific pest response needs beyond generic terms. Practicality dictates the need to possess expertise for critical review of scientific literature and application of technology to solve real problems. The housing of this expertise within APHIS-PPQ, perhaps together with an alliance of Federal, State, and academic technical resources under contract to APHIS-PPQ, would be beneficial to both the Agency and State cooperators. The APHIS-PPQ does have a mandate to safeguard American agricultural and environmental resources from Invasive plant pest incursions.

New Pest Response Guidelines (NPRG) outlined in the APHIS-PPQ Emergency Programs Manual (USDA-APHIS-PPQ, 1996a) form the foundation for emergency eradication program

implementation. Of the 23 NPRG available, specific protocols and plans for exotic fruit fly incursions are the most current and complete because they occur so frequently. Response guidelines for other pests provide minimal information and have not been updated within the past five years (USDA-APHIS-PPQ, 1998a). The APHIS-PPQ has prepared a strategy for responding to the Asian longhorned beetle which remains under development pending new control methodology (USDA-APHIS-PPQ, 1998b).

Findings

(1) The APHIS-PPQ Methods Development Unit is highly regarded by the Federal and State plant protection community. Staffing of the Methods Development Unit has traditionally had a high level of professionalism which permitted peer exchange with scientists of academic institutions, private industry and other government agencies. However, staffing levels have fallen in recent years.

(2) The identification and development of methods applied in invasive plant pest response activities has become seriously jeopardized through reductions in financial support for the Agency's Methods Development Unit. For example, in FY1999 the budget was reduced by $355,000.

(3) Federal and State cooperative programs initiated in response to incursions of invasive plant pests are often conducted without the benefit, application and use of optimal control technologies (Appendix E).

(4) Methods development expertise resident in USDA Agricultural Research Service (USDA-ARS), and previously housed at APHIS-PPQ locations, has been withdrawn or reassigned to the detriment of new -technology development and cooperation between APHIS-PPQ and USDA-ARS.

(5) Federal agencies with parallel interests and responsibilities, i.e., USDA-ARS and the Forest Service, have not modified their research priorities to address the loss of expertise in APHIS-PPQ Methods Development. Coordination of methods development is unlikely to occur without distribution of funds by APHIS-PPQ to encourage other entities to align themselves with the applied research initiatives identified by APHIS-PPQ.

Recommendations

D-27. Increase funding to the APHIS-PPQ Methods Development Unit and its collaborating technical researchers for development of novel methods for invasive plant pest response activities. A 40-50% increase over the FY1999 allocation is necessary for Methods to maintain a minimal level of activity for development of detection and response methodologies. Further funding increases are necessary to expand Methods activities to adequately meet the technical needs of APHIS-PPQ and the States.

■ D-28. Prioritize invasive plant pest response methods needs under direction of the Methods Development Director and the National Coordinator.

■ D-29. Fill key managerial and research positions in the Methods Development Unit with highly trained, well-qualified scientists, i.e., insect pathologists and plant pathologists.

■ D-30. Form stronger partnerships with external research agencies such as USDA-ARS and other Federal, State, and research institutions for methods development.

■ D-30a. Encourage USDA-ARS, through administrative channels, to conduct research that meets the practical needs of APHIS-PPQ.

■ D-30b. Combine relevant response activity research expertise in USDA-ARS or the Forest Service with APHIS-PPQ through relocation of work stations or inter-agency transfers.

■ D-30c. Award contracts to outside entities, when appropriate, to secure needed expertise.

■ D-31. Establish a liaison position within APHIS-PPQ to facilitate communication between APHIS-PPQ and USDA-ARS.

■ D-31a. Reassign an existing employee with research experience and an understanding of regulatory needs to provide required expertise.

■ D-31b. Provide funds to establish cooperative arrangements with USDA-ARS staff to conduct the required research.

3.3.3 Effectiveness and Relevance of Control Technology

Background

Selection and application of effective pest control technology is essential to the success of pest management programs. Once selected, mitigation measures must be subjected to quality control and assurance. These processes are integral components of all control programs as ineffective control technology or misapplication of effective methods can result in program failure. In some instances, quality control parameters do not exist or require re-evaluation, i.e., quality control parameters of mass-reared Mediterranean fruit flies.

Findings

(1) APHIS-PPQ reviews control program effectiveness on an informal basis. This review is provided by staff reaction and cooperator input.
(2) The existence and quality of pest management programs is often determined by the budget process.

Recommendations

■ D-32. Institute a formal peer review process for evaluation of invasive plant pest management programs. A scientific review panel composed of relevant experts from academia, industry and regulatory agencies, would provide a systematic and critical evaluation of pest management programs. For long term programs, this scientific review should be conducted at least every three years.

■ D-33. Provide adequate funding (see D-27) for the Methods Development Unit to enhance the Unit's ability to conduct thorough quality control and assurance evaluation of mitigation methodologies.

3.3.4 Loss of Pesticides as Pest Response Tools

Background

Residue tolerance review by the Environmental Protection Agency (EPA) as mandated by the Food Quality Protection Act of 1996, is anticipated to result in the loss of most organophosphate, carbamate, and B-2 pesticides between August 1999 and August 2000. These categories of pesticides represent approximately 90% of the chemicals currently used to meet regulatory and interstate shipping requirements, including such important pesticides as malathion,

azinphos methyl, and chlorpyriphos. In addition, methyl bromide, the major fumigant option for food and fiber quarantine pest treatments, is scheduled to be phased out by the year 2005. Reassessment of tolerance levels of important pesticides such as malathion, guthion, and chlorpyrophos may signal future loss of these pest management tools as well. Many other pesticides may be lost as manufacturers voluntarily withdraw labels to meet the "risk cup" requirements of EPA. Some pesticides may be available through the Section 18 registration process on an emergency basis only. Research and development for registration of new pesticides continues to decline because of the high costs, including those associated with meeting EPA standards prior to registration. This is especially evident for compounds with minor uses including fruits, vegetables, nursery and floral crops.

Findings

(1) Pesticide recommendations for quarantine purposes often do not recognize current label requirements or product availability.

(2) The need to manage potential impacts of FQPA will require APHIS-PPQ staff with expertise in pesticide issues.

(3) EPA is not fully responsive to the needs of USDA or agriculture in general, i.e., the continued availability of critical pesticides for use in eradication and management programs, such as exotic fruit fly control in Florida.

Recommendations

■ D-34. Dedicate a position to coordinate pesticide needs with EPA, particularly as it relates to pesticide registration and the impact of Food Quality Protection Act of 1996 (FQPA). This should be facilitated through USDA Office of Pesticide Management.

■ D-35. Institute an Assistant Director level employee exchange program between the APHIS-PPQ and EPA to facilitate communication between these agencies relative to the use of pesticides in plant pest and noxious weed quarantine, eradication and management. Through this exchange, EPA would gain knowledge of the pest management challenges faced by APHIS-PPQ and APHIS-PPQ would benefit from knowledge of the pesticide registration process, labeling requirements and tolerance reviews. The agencies should work closely in the registration of "softer" pesticides and biological control organisms.

3.4 Information Systems:

National Invasive Plant Pest Information Center, including the National Invasive Plant Pest Laboratory and National Invasive Plant Pest Database

Background

APHIS-PPQ currently has a system to find and identify invasive plant pests detected at the ports of entry into the United States. The system employs 1500 APHIS-PPQ officers as trained identifiers at the ports who screen for commonly encountered species which include spiders, scales, and aphids among others. There are 50 local identification specialists who are trained to identify commonly encountered organisms. The extant system exists to support the regulatory efforts at the ports. It is not designed, and never was intended

to, support detection programs other than border activities. All identification activities reflect the regulatory mandate. Thus identifications are taken to the level necessary to make a regulatory decision.

Local identifiers send unusual or unknown species to designated specialists. Some ports are equipped with video capacity that allows immediate identification without physical transfer of the specimen. The APHIS-PPQ maintains a small staff of specialists in a number of fields including entomology, botany, and plant pathology. Upon receipt, specimens are either identified by APHIS-PPQ personnel or sent to an appropriate specialist. Organisms found by the states, by USDA outside the ports of entry, by university scientists, or other agencies can be submitted to APHIS-PPQ or the Systematic Entomology Laboratory for identification or sent directly to an appropriate specialist. The APHIS-PPQ maintains a computerized system for reporting of specimens identified at ports of entry. However, the format of the database does not allow for ready analysis. Identifications done by individual specialists are computerized at the discretion of that individual.

Findings

(1) Pest identification functions are necessary to facilitate rapid response to introduction of invasive plant pests into the United States.

(2) APHIS-PPQ does not have a system for collection of data on all invasive plant pests discovered in the United States.

(3) APHIS-PPQ does not have a database covering all invasive plant pests discovered in the United States.

(4) The development and use of the video identification system at the ports is an excellent example of APHIS-PPQ finding and employing new technology to improve its effectiveness.

Recommendations

■ D-36. Establish a National Invasive Plant Pest Information Center (NIPP CEN) with two functional entities, the National Invasive Plant Pest Laboratory (NIPP LAB) and the National Invasive Plant Pest Database (NIPP BASE).

■ D-37. Establish the National Invasive Plant Pest Laboratory (NIPP LAB) as a "virtual" clearinghouse for specimens to be identified. Assign NIPP LAB staff primary responsibility in obtaining confirmatory identification of invasive plant pests submitted by port personnel or other agencies. Perform identifications at APHIS-PPQ or send them to external cooperators when necessary (e.g., the Systematic Entomology Laboratory, the Smithsonian Institution, university personnel). By acting as a national clearinghouse, the NIPP LAB will maintain control of, and have access to, information on all invasive plant pests incursions through its final identifications role (see International Information Issue 1.).

■ D-38. Staff the National Invasive Plant Pest Laboratory with a relatively small group of professionals with expertise in entomology, botany, plant pathology, mycology, and molecular biology. Include molecular diagnostics capabilities for insects, weeds and pathogens.

■ D-39. Expand the video identification of invasive plant pests to cover all ports. It is imperative that this be instituted as soon as possible to improve the efficiency of APHIS-PPQ in meeting its regulatory role.

■ D-40. Contract with external specialists through cooperative agreements to provide their services in confirming identification of species which are not readily categorized by National Invasive Plant Pest Laboratory staff (see International Information report).

■ D-41. Deposit all intercepted specimens in a permanent collection within the National Invasive Plant Pest Laboratory. Preserve specimens in a manner that facilitates DNA analyses of strain differences and identification of sibling species.

■ D-42. Develop molecular diagnostic tools for frequently introduced or difficult to identify species groups via partnerships with USDA-ARS or external researchers.

■ D-43. Establish the National Invasive Plant Pest Database (NIPP BASE) as an integral function of the National Invasive Plant Pest Information Center. The NIPP BASE will function as an information hub. The NIPP BASE will coordinate data on all invasive plant pests identified by the National Invasive Plant Pest Laboratory, port of entry staff, cooperators on retainer, and external experts. The NIPP BASE will include links to databases of the National Agricultural Pest Information System (NAPIS) (1999), USDA Systematic Entomology Laboratory (1999), the Smithsonian Institution, U.S. Forest Service (1999), Federal Noxious Weeds Database, among others. The goal of the NIPP BASE is to provide a comprehensive and timely reporting mechanism for invasive plant pests in the United States.

■ D-44. List all pertinent information on the invasive plant pests in the National Invasive Plant Pest Database. This includes, but is not limited to: scientific and common names, identifying characteristics with supporting graphics, point of interception and related pathway information, reproductive status, global distribution including distribution within the United States, point of origin, pest status, biology, and known detection and control methodology.

■ D-45. Provide access to the National Invasive Plant Pest Database via the Internet. Include in this database a secured input function that will allow specialists to enter identifications. Screen submitted information prior to final database entry to ensure compliance with database guidelines. Guidelines will ensure that only validated information is entered into the database. Provide public access to the database as a read only Web site.

■ D-46. Institute a computerized system, perhaps in the form of a simple e-mail group list, to notify regulatory officials and stakeholders of new invasive plant pest introductions in their regions.

Chapter Four

International Pest Information Committee Report

A broad range of highly reliable information on international pests is needed to enable APHIS-PPQ to effectively safeguard America's plant resources. The critical information includes, but is not limited to, identification of pest threats; analysis of pest risks; development of pest risk management strategies; promulgation of quarantine and other regulations; development of pest detection and eradication strategies; allocation of resources; provision of staff, stakeholder, and public training; and trade facilitation.

Specific information needs include pest biology, spread potential, distribution; host and environmental requirements; damage and economic importance; control, suppression and eradication methodology; pathways; diagnostics including identification; etc. The determination and development of vital business information sources; efficient and effective capture, storage, access and transfer; and sharing of information are essential functions. Information technology hardware and software can be combined to create powerful and valuable tools for the performance of all of the Agency 's essential business functions.

4.1 Current PPQ Information Management System

Information Technology Coordination

There are 202 information technology (IT) personnel in APHIS, nine of whom are in the Information Technology Coordination Unit. Seven are on a Project Leadership Team, 95 in Customer Services, 35 in Technology Resources Management, 44 in Applications and Information Management and 12 in Forecasting and Planning.

A small Information Technology Coordination Unit comprised of a chief information officer (CIO), four functional area coaches, a "Trail Boss", a Y2K program manager, and two administrative staff members. The CIO reports to the APHIS Administrator. The IT Coordinating Unit works towards accomplishment of the Agency 's mission and vision with two advisory groups: the APHIS Integrated Planning Team (AIP) and the Customer Council.

The AIP has identified 14 IT projects. IT managers, sponsors, AIP members, and planning liaison persons are assigned to each project. In addition, there are three mandated projects, making a total of 17 IT projects. These projects can be characterized as

access, compliance, financial/ management, networking, system conversion or upgrade, technical infrastructure, and tracking. The most urgent project at the time of the NPB Review was Y2K compliance.

Thus, there is a considerable infrastructure and resources within APHIS that can be used to meet the business needs of the PPQ's safeguarding system.

Web Site

The United States Department of Agriculture maintains a home page with links to the Animal and Plant Health Inspection Services (USDA-APHIS), Plant Protection and Quarantine (USDA-APHIS-PPQ), International Services (USDA-APHIS-IS), Forest Service (USDA-FS),.and Agricultural Research Service (USDA-ARS). The PPQ home page presents information relevant to "Scientific Services". The USDA-APHIS-PPQ web site serves public and education and regulated community functions. The Committee found the Biotechnology Permits link to be well developed and useful.

Diagnostics

The PPQ's diagnostics needs are satisfied variously by identifiers at air, land and sea foreign ports of arrival, the various ARS systematic laboratories, and other specialists. Port Identifiers are granted identification authority or "discard authority" for particular identifications when their competence has been demonstrated to the satisfaction of the Agency . The Miami port is equipped with an electronic system which enables identifiers to place specimens under a microscope and digital camera for electronic image transfer and identification by specialists at the ARS laboratories and elsewhere. This system allows quick identification of certain specimens for which Port Identifiers do not have identification authority. It appears to work well and serves as a good example of the Agency 's efforts to employ new technology to meet its business needs.

Databases

The PPQ has developed and maintained several databases for specific business functions and purposes. At ports there is Port Information Network (PIN - 309) which is a database for insect and plant pathogen interceptions. The information in this database is potentially quite useful for analysis of pest risk, including that associated with various pest pathways, origins where there is high pest risk, etc. However, interviews with port personnel suggest that it is not extensively used by inspectors and identifiers, apparently due to a combination of time available, slow connections, a difficult query interface, and a lack of built-in analytical tools (such as alerts for unusual occurrences). PIN-309 is also useful for evaluating program and employee performance. In fact, the Work Accomplishment Data System (WADS) database has been developed for those same purposes.

The APHIS Library subscribes to and frequently uses the DIALOG (over 500 databases) and Lexis/Nexis databases. They also have the AGRICOLA and CAB international CD-ROM products available on the APHIS network for desktop access. These are the most frequently used bibliographic databases. Supplemental information not desktop available is derived from BIOSIS Previews, Biological and Agricultural Index, Life Sciences Collection, AGRIS International, Zoological Record, Pesticide Fact File, CRIS (Current Research Information System)-USDA-ARS. Accordingly, PPQ has access to a wealth of published information.

A list of other databases currently used by PPQ staff housed in the Riverdale, Maryland, headquarters appears as an Appendix F.

Automated Information Systems

In addition to the PIN - 309 and WADS systems already mentioned in connection with foreign ports of arrival, PPQ employs a number of automated information systems including the Port Information Network-Operations (PIN-OPS), *Automated Broker Interface* (a module of U.S. Customs' Automated Commercial System in which brokers and filers submit import entries and entry summaries to Customs), *Automated Commercial Environment* (A Customs upgrade of its ACS system which includes the Customs' Automated Targeting System—also used by PPQ), *Automated Manifest System*, *Advance Passenger Information System, Agricultural Quarantine Inspection Monitoring, Vessel Garbage Violation Database, Interagency Border Inspection System, Harmonized Tariff Schedule, International Trade Data System, Plant Quarantine 280 Tracking System* for imports, *Selectivity* (A U.S. Customs system for targeting inspections), Violations databases to track predeparture and other violations, and *Treasury Enforcement Communication System.*

The use of these systems further demonstrates PPQ's responsiveness to new technology and its collaboration with sister Federal agencies to meet its safeguarding needs.

Pest Surveillance and Survey

The PPQ administers the Cooperative Agricultural Pest Survey (CAPS). This is a cooperative effort with the state departments of agriculture whereby special surveys are conducted as needed and general pest detection, field survey and laboratory diagnostics data is fed into the Agency routinely. The data is entered into the National Agricultural Pest Information System (NAPIS). The CAPS program provides for electronic information exchange and strong interagency and interpersonal networks.

United States Commodity Export Support

The PPQ plays a key role in facilitating global trade in agricultural products. The PPQ officers participate in bilateral trade negotiations and issue phytosanitary certificates affirming compliance with the quarantine requirements of trading partners. The validity and reliability of the phytosanitary certification system is highly dependent on EXCERPT, a database containing the phytosanitary requirements for most countries to which the United States exports agricultural products. State collaborators, who issue the vast majority of the Federal phytosanitary certificates, can access this database and determine what requirements must be met, make the appropriate inspections or tests or apply specified treatments, and issue certificates containing agreed upon declarations of compliance.

This system is maintained by Purdue University. It illustrates the Agency's collaboration with the states and universities and serves as an example of appropriate outsourcing of an IT function.

Some major deficiencies of the current APHIS information structure in meeting PPQ's needs

The issues of accountability and transparency have become critical concerns in the development,

maintenance and use of data management systems. In government, as in industry, the amount and type of *ad hoc* information flow is a measure of the organization's *lack* of process transparency and of its inefficiency. This is particularly true for agencies with regulatory responsibilities, given the inherent desirability of protocols, standards and consistency. While APHIS-PPQ holds a wide variety of useful information, as described above, much appears to have been developed *ad* hoc in response to particular analysis or reporting mandates, rather than as a result of a comprehensive review of overall information needs and priorities. It is not clear that the existing database content reflects the range of priority issues faced by APHIS-PPQ, or that they may be used interoperatively to address cross-reaching issues not contemplated by their designers.

The Review recognizes that much of the ad hoc flavor of APHIS information management arises out of a history of an overburdened programming staff. As a result, current data products represent an accumulation of incremental tactical decisions made under conditions of crisis management rather than a program, which is consistent and integrated. The International Pest Information Committee believes that development of consistent and integrated and data-standard-compliant registries, vocabularies, and reusable data structures will in the long run save resources as well as increase effectiveness.

However, a substantial up-front investment in user needs assessment, standardized protocols, and interoperable designs is needed. Data managers need the time to evaluate business process throughout the organization, participate in interagency standards and data interoperability groups, and to develop data access tools, "front ends" and secondary applications for internal data. There is a fundamental need to capture electronically and share widely data from the core competencies of programs - detection, risk assessment, off-shore surveillance, pathway analysis, control and eradication strategies, measures of effectiveness and efficiency, etc. These core program activities must be directed by programmatic experts but strongly supported and facilitated by information technologists. Further essential legacy data (lists of pests intercepted, pathway analyses, outcomes of off-shore surveillance and domestic detection, analyses of eradication campaigns, pest risk assessments, etc.) should be digitized (to at least an image file) and catalogued, and standards for standardized electronic submission of new data should be developed. These capabilities will not arise as add-ons to existing workloads.

Optimally, PPQ's data management system should be designed by a cooperative partnership of the non-information technology PPQ personnel whose work both requires and produces information, private stakeholders impacted by the Agency 's regulations, other agencies with overlapping or complementary mandates, and university cooperators with the biological and computer/telecommunications expertise required to actually develop the system economically. Cost-effective applications throughout the organization certainly will require USDA-APHIS to make full use of Internet technology.

A comprehensive information strategy involves at least six components: (1) cataloguing, assessing, and documenting current data holdings; (2) adequate access, (3) protocols for appropriate information flow, (4) databases to house and archive the information, (5) tools for data discovery and visualization, pattern analysis

and invasiveness prediction, and (6) interactive database searching and linking for both in-house and external information.

Cataloguing, assessing, and documenting current data holdings

It appears that relatively few people within APHIS-PPQ have a **comprehensive overview** of the data holding and relations among data sets on plant diseases, invasive species, and safeguarding protocols within the Agency , much less among cooperating organizations. In particular, many field officers' knowledge and use of shared data seem quite limited. Consequently, a critical first step is to systematically inventory and classify useful data products, develop a comprehensive on-line catalog of data holdings, and to develop systematic metadata useful for locating and assessing the usefulness of data sets. Without a synoptic overview of data holdings, it is difficult to assess gaps in data coverage and priorities for new initiatives.

At the most basic level, the PPQ needs an **on-line data registry** giving content, contact, and access information for all major data resources developed and used by PPQ analysts and field personnel. The Government (or Global) Information Locator (GILS) protocol (*http://www.gils.org*) provides the most basic elements, has become fairly standard within the Federal government (see, for example, *http://www.whitehouse.gov*) and a number of states (for example, California, *http://ceres.ca.gov)*, and is covered by executive orders in the U.S. and agreements among the G7 states. GILS is also a profile of Z39.50, a specification for data description that encompasses the Library of Congress's USMARC bibliographic database and the Federal Geographic Data Committee (FGDC) metadata standard (discussion follows). As a result, server software exists to permit straightforward distributed access to GILS and other Z39.50 data, maintained on multiple servers; and therefore simplifies data discovery in a spatially fragmented organization. It seems appropriate that PPQ institute a data holdings registry modeled on GILS (or one of several closely related approaches, such as the "Dublin Core").

Implementation of more detailed **metadata** within APHIS/PPQ also needs attention. Among the mainframe Oracle databases held centrally, traditional internal documentation (data dictionaries, commented code, etc.) appears good. User level descriptions of methods, suitability for various uses, QA/QC measures, etc. (the electronic equivalent of a "Materials and Methods" section in a technical publication) is much weaker, and does not, as a whole, correspond to the approaches to biological metadata pioneered by the Federal Geographic Data Committee and used by most other Federal agencies for biological data. (See the National Biological Information Infrastructure, *http://www.nbii.gov,* and the Global Change Master Directory, *http://gcmd.gsfc.nasa.gov/*). The FGDC specification is currently mandated by Executive Order for geospatial (mapped) information held by Federal agencies. The PPQ should certainly develop FGDC-compliant metadata for all of its GIS coverages. As a consistent format for electronically documenting other biological data, it would be worth examining the USGS proposal for a Biological Metadata Profile (a variant of FGDC) and the recent AIBS review of that proposal.

Other documentation strategies

Other documentation strategies such as those advocated by the Ecological

Society of America's FLED (long term ecological data) initiative (*http://esa.sdsc.edu/FLED/FLED.html*) may also be fruitful, and the choice of detailed formulations should be delegated to program experts and stakeholders. However, the current lack of even a data catalog, much less consistent electronic documentation, appears to have confused both APHIS personnel and outside users as to the nature, availability, and usefulness of APHIS data holdings.

Adequate access

With available technology, all PPQ personnel should have high-speed access to the Internet (TCP/IP specifically), with dial-up access available for telecommuting where necessary. Every PPQ station should have at least the equivalent of a 56K line per individual and computers capable of connecting at those speeds and operating the latest generation of access software (e.g., Netscape). Less than this level of access is simply inadequate for PPQ personnel to do their jobs. For most locations, 56K per person currently requires either a Frame Relay or fractional T1 line, but other high-bandwidth technologies, including Digital Subscriber Lines, cable modems, and wireless or satellite links should become widely available (at much lower costs) over the next several years. The fact that different high-bandwidth technologies are being rolled out in different regions is in itself an argument for decentralized control of Internet access strategies (discussed later). The dynamic nature of communications technology implies that minimums must be periodically upgraded to industry standards.

Protocols

Although some protocols exist, they do not deal with information flow and storage. There must be clearly defined protocols for all statutory decision processes and other information flows. These protocols should be in the public domain and should include the types of information to be used, the decision process itself, and the methods of information transmittal and storage. These protocols should make full use of Internet and secure Intranet technologies for information creation, sharing and archiving. This includes not only PPQ directly, but also interactions with other units within APHIS (e.g., reporting of new pests by International Services) and external to APHIS (e.g., bills of lading from Customs, aquatic nuisance species from USGS, detection activities by states). These protocols must assure the availability of information and its appropriate use.

Databases

Databases are the key to information storage and efficient retrieval of information. Internet technologies have changed our concepts and definitions of databases. In addition to traditional databases (e.g., Oracle and other SQL servers, Access or FoxPro PC database software), "indexes" of large numbers of documents can now be created, making them fully searchable online.

In particular, extensible markup language (XML) is beginning to be supported by most major database and Internet software vendors as a solution to indexing and cross-referencing documents (and other non-tabular "data objects" such as images and audio-visual data) in searchable data warehouses. XML "parsers" (viewers) are expected to be integrated into the next major releases of Netscape and Microsoft Web browsers, making XML-based data repositories accessible to field personnel with minimum equipment and computer training, or low-level Internet access. The APHIS should explore XML and related "document-centric" Internet technologies for such data types as risk assessment reports, images and instructions for pest identification, and educational materials.

In addition to the present in-house databases (e.g., PIN-309, NAPIS, Regulated Plant Pests, Permits, WADS, etc.), there are key databases not yet developed. Foremost among these are:

(a) "International Services Warning" database consisting of "pest alerts" from outside the U.S. The APHIS-IS should have direct web access to securely enter information into this database via a web browser and the database should be available internally to all PPQ;

(b) "Risk Analyses" database consisting of all risk analyses made by PPQ. This database may have to have a start date, as entering all previous Risk Analyses may not be feasible. The database should include key assessment criteria, authors, references, and basic biological and taxonomic information (see the Exotic Forest Pest database as an example - http://www.ExoticForestPests.org);

(c) "Invasive Species" databases which provide information on the most "dangerous" exotic pests with potential to invade the U.S. This effort is already underway, but there is no clear-cut design. Databases of this kind are being explored by other organizations, such as the National Biological Information Infrastructure (see http://www.nbii.gov/iabin/), and it is likely that this capability is best developed as a cooperative effort with organizations monitoring a wider range of non-indigenous species;

(d) "Training" database(s) designed to help educate new PPQ employees and to keep current employees up-to-date on current issues including new regulations, threats or pest pathways;

(e) A field projects database, documenting participating organizations, locations, contacts, pests treated, methods, and outcomes. A useful prototype is underway for noxious weeds in California (*http://endeavor.des.ucdavis.edu/weeds/);* and

(f) "Public Awareness" databases of key and potential invaders detailing both the importance of, and instructions for identifying, "least wanted" species. This database must have a highly attractive "front end" to capture public attention and provide a high profile to these pests. The latter databases could be a portion of other databases (see Database Access and Interaction below).

Analysis and modeling tools

In addition to data archiving, there needs to be much more consistent use of information collected by PPQ and others in understanding and predicting threats to American agriculture. Decision support tools, which analyze patterns in the PIN-309 database and the "International Services Warning" database previously suggested, need to be developed and used. Are there bioterrorism efforts presently underway? Do spatial analyses of known data indicate useful patterns? This could involve not only human and animal diseases, but noxious weeds, severe plant diseases or explosive insect pests. The interception records and foreign warnings could be analyzed to target origins and/or organizations for investigation.

As PPQ moves away from interdiction (as it must), the role of predictive models becomes increasingly important. Such modeling requires information from PPQ and external databases. Results of these predictive efforts need to be available to PPQ in the same form as the "International Services Warnings" and the "Invasive Species" databases described earlier.

An example of an effort to combine range and population records, out-

break data, and modeling of potential future spread is the INVADERS database for invasive plants in the Northwest (*http://invader.dbs.umt.edu).* The USGS (*http://nas.er.usgs.gov*) performs comparable analyses for non-indigenous aquatic plants, fish, and molluscs. Predictive models, combined with observational information, are the keys to regulatory decisions and defense actions by PPQ.

Database access and interaction

As database development and maintenance costs can exceed the benefits if user needs are not considered up-front, a careful analysis of information needs and report content must be made for each major user group. One major advance provided by the Internet is that databases originally developed for narrow purposes can now be shared. Not only can databases be shared, but different parts of the same database can be provided to different groups. For example, the PIN-309 database could be analyzed for the most frequent interceptions during the past month. This "hit list" could be linked to the "Invasive Species" database and/or the "Risk Assessment" database to provide detailed warnings to port officers daily, using a secure connection.

Likewise, using only non-sensitive information in the databases, "Training" databases could be linked to "Invasive Species", "Risk Assessment" and external databases to produce a constantly changing and updated "America's Most Unwanted Hit List" home page for public consumption. Public school classes could link in order to find out about PPQ and invasive species, with full color pictures and details of biology and transport.

All linked databases, internal and external, must share the same terminology (vocabulary). For concurrent access to diverse databases, the development of dictionaries (or more formally "thesauri" or "controlled vocabularies"), which define allowable usages and cross-reference terms, is an absolute requirement. With the inclusion of external databases, the need to cooperate with national and international efforts to develop taxonomically based dictionaries and "metadata" is a primary consideration for any information management system that PPQ may develop.

4.2 INFORMATION SYSTEM VISION FOR PPQ/IS SAFEGUARDING PROGRAMS

National Plant Board's vision of the information system for the safeguarding programs of the Plant Protection and Quarantine and International Services Units is:

"Optimal use of current information technology in the performance of all of the Agency's business functions."

Efficient and effective capture, storage, access and search, transfer, and sharing of information must be a core competency.

Bruce Rosenstein, in the March 8, 1999 issue of USA TODAY newspaper, quotes Charles Wang, CEO of Computer Associates, on the role of information technology in business:

"I cannot be clearer than this: Give up any idea you may have about how information technology can support your business. Your business is information, and information is your business."

General Strategy and Strategic Thrusts

The **general PPQ/IS strategy** must be collaboration and cooperation with internal and external clients/stakeholders to design an information system that:

(1) efficiently, effectively and economically employs current technologies to meet the Agency 's current business needs, and (2) is flexible and responsive enough to adopt new technologies as appropriate to meet future changes and challenges.

Internal and external clients/stakeholders at least will include PPQ personnel whose work both requires and produces information, private stakeholders affected by the Agency's actions, other agencies with overlapping or complementary mandates, and collaborating university personnel who possess biological and computer/telecommunications expertise.

The primary strategic thrust of the general strategy must be:

Leadership via an "Information Management Team" headed by a non-IT person (1) highly knowledgeable about the mission, vision and core values relevant business needs of PPQ and its collaborators, and (2) possessing excellent analytical, integrative, leadership (including direction, listening and communications, support, feedback, etc.), organization, partnering, strategic thinking, and other administrative and managerial skills. The members of this team should be composed of PPQ and IS programmatic personnel.

This team should concentrate efforts on core competencies of content rather than technology. Among others to be determined, responsibilities in no particular order would include:

- Collaborative and cooperative strategic thinking and planning
- Business process evaluation
- Organization of IT responsibilities and personnel by programmatic area with management by end-users
- Collaboration with data managers in the development of interagency standards and inter-operability groups, data access tools, "front ends", and secondary applications for internal data
- Priority setting for stepwise resolution of key protocol, database, and database connectivity projects
- Development of consistent and integrated and data-standard-compliant registries, vocabularies, and reusable data structures
- Facilitating use of Internet technologies for office and employee access and connectivity
- Determining which legacy data (pest risk assessments as an example) should be digitized, catalogued, and stored
- Standardization of electronic submissions of new data
- Cost-effectiveness analyses to determine which purely technological functions/services could be met best by outsourcing
- Encouraging external client/stakeholder participation in IT processes and making effective use of external expertise

4.3 PPQ Information System Issues, Findings and Recommendations

4.3.1 Information Technology in APHIS

A fundamental and overriding consideration for the PPQ is determining whether IT is better treated as a stand-alone department

or incorporated within programmatic divisions. Similarly, it is becoming increasingly efficient and cost-effective to outsource information services, particularly in areas of rapidly changing technology (such as the Internet) and to concentrate efforts on core competencies of content rather than technology.

Findings

The PPQ needs to re-evaluate whether a freestanding IT program meets it current needs. There appears to be little evidence that the APHIS-IT group is meeting its responsibilities to PPQ or is capable of doing so within the current organizational and funding structure. The need for access and good connectivity using Internet technologies is the single greatest information need for PPQ today. This need cannot be met with the present IT structure and personnel. From computer repair, to providing access for networking, there appears to be a consensus that APHIS-IT is not responding to the needs of PPQ. Users report significant delays in repairing hardware, with long downtimes for both PCs and servers, causing major losses in PPQ employee efficiency and productivity.

A major component of the problem is that the IT group is responsible to APHIS in general and not to PPQ. The belief is common within PPQ (and documented by numerous complaints and specific examples from PPQ staff), that APHIS-IT, in fact, is not meeting PPQ needs and cannot do so as long as there is no IT command structure within PPQ (and from outside the IT group itself).

More generally, there is little evidence of the existence of cooperative planning and mutual respect that is necessary within any information management effort. There appears to be almost independent efforts by IT and non-IT staff to provide solutions. Local support is essential to productivity, although cost effectiveness is a consideration for offices with a very small staff. There are companies that provide tech support for a reasonable fee, and PPQ should at least consider outsourcing technical services outside of its core competencies in information content and analysis.

In this time of powerful yet inexpensive servers, distributed computing, and an increasingly sophisticated user base, there is little justification, *at the expense of local infrastructure and control* for the maintenance of a national or regional IT structure, as is now the situation within APHIS. The establishment of local office IT staff, working with and for the local/regional PPQ staff and local ISPs could easily establish a network of secure servers maintaining and linking the diverse databases and information flow critical to PPQ's missions. This might be accomplished for less than PPQ's present contribution to the IT budget.

Recommendation

■ I-1 APHIS should decentralize the IT organizational responsibilities and personnel to programmatic areas, with management by the end-user groups.

4.3.2 Leadership/Management Continuity

Consistent leadership/management is necessary to provide a vision and the planning necessary to bring that vision into fruition. When absent, the results are fragmented programs, low morale, and a reaction mentality.

Findings

There appears to be widespread agreement that PPQ has lacked consistent leadership and visions for

managing information. There are and have been numerous "interim" personnel actions and empty positions. Responsibilities and assignments of individuals are changed without warning, due to "unplanned emergencies" which occur frequently and incessantly. The "Solid Wood Packing Assessment" is a current example.

Recommendations

■ I-2 Based on the content of this Report the Office of the Deputy Administrator of PPQ should determine what knowledge, expertise, skills, and abilities are needed to lead and manage IT processes and activities.

■ I-3 Based on this determination of needed IT knowledge, skills and abilities, recruit and hire people who possess these qualities for IT leadership, development, and maintenance positions.

■ I-4 Fill vacant positions requiring IT expertise at appropriate GS and SES levels.

■ I-5 Assemble and develop an "IT Crisis Management Team" whose job would be to respond to the always present "unexpected". Thus PPQ would be able to minimize the disruption of responsibilities of staff.

4.3.3 Ad Hoc Nature of Information Flow

Much information can be lost or not delivered to all parties in need if consistent protocols (e.g., surveillance warnings from International Services) are not developed and followed — particularly protocols specifying formats and vocabularies for information transfer and archiving.

Findings

There appear to be no set procedures for APHIS personnel to report potential outbreaks or new pests internationally nor for the distribution, handling, and storage of risk assessments.

Recommendations

■ I-6 Develop protocols for reporting key information (such as risk assessments, in standardized electronic formats and for the dissemination and archiving of information). Development to be accomplished by teams that include all of the information stakeholders, including those outside APHIS-PPQ.

■ I-7 Take measures to assure that the needs dictate the protocols.

■ I-8 Give high priority to adopting web-based information technologies in developing a system for managing the acquisition, analysis, dissemination, archiving and retrieval of information relevant to exotic pests.

■ I-9 To the maximum extent practicable, exchange information with pest, disease, and invasive species data initiatives in other agencies, including the Forest Service, the Department of the Interior (U.S. Geological Survey, the Park Service, the Bureau of Land Management), the National Biological Information Infrastructure, and some state and NGO efforts.

4.3.4 Access to Useable Information (Databases)

Consistent and standardized information resources, such as digital data warehouses for key documents, relational databases for detection and risk data, and geographic information systems for mapping and modeling, are

needed for training, risk assessments, public awareness, forecasting, and other critical aspects of PPQ's mission.

Findings

The PPQ has suffered from pervasive "reinventing the wheel." Important information frequently has not been preserved, cannot be found, or is not in a usable format available to most people in the organization. Risk assessments, when available, are found in boxes after *ad hoc* phone calls and the vagaries of individual's memories. There is rarely an electronic version and no electronically searchable recovery system.

There is no system to extract information developed for one purpose to serve another, such as using PIN-309 records to warn other ports of new threats, or modifying training information to educate the public, except on an individual and *ad hoc* basis. Many APHIS personnel appear either unaware of useful APHIS data applicable to their assignments, or unsure of how to access it. A mechanism to discover and find out how to access relevant data sets is sorely needed.

Recommendations

■ I-10 Develop archival databases of key information in a prioritized sequence, that are available and searchable through web-based technology.

■ I-11 Maintain sensitive information on an Intranet, internal to APHIS/PPQ, but much information should be "repackaged" for use by stakeholders, for public awareness and for international dialog.

■ I-12 Assure that each database has an independent reason for existing.

■ I-13 Assure that a strong effort is made by teams of all the stakeholders, to develop multiple and combined uses for the various databases.

■ I-14 As a critical first step, catalog data resources important to PPQ's mission in a systematic fashion, using a standard vocabulary and a web-searchable format. Thus records should, at a minimum, contain the "metadata" information assembled in the clearinghouse mechanisms for other U.S. government environmental and natural resource programs.

■ I-15 Assure that the content of the catalog of data resources would at least include descriptions, lead agencies, contacts, subject, geographical and methodological keywords, access instructions, and guidelines/restrictions on use. This requirement could be met in part by emulating aspects of the National Biological Information Infrastructure (http://www.nbii.gov), the Global Change Master Directory (http://gcmd.gsfc.nasa.gov/), the Government (Global) Information Locator Service (GILS — http://www.gils.net), and the California Environmental Resource Evaluation System (CERES - http://www.ceres.ca.gov/catalog).

4.3.5 Access to the Internet and Connectivity (bandwidth)

PPQ personnel from border inspectors to risk assessment experts are increasingly dependent upon rapid access to field data, graphical decision support materials, and remote consultations. Effective use of knowledge requires near instantaneous access, through reliable Internet connections with sufficient bandwidth, to required information.

Findings

Extremely poor Internet connectivity exists throughout the PPQ system.

Part of the problem is that critical information resources are not connected to the Internet. In particular, many of the existing databases are available/searchable only on centralized mainframes, limiting their use off of the LAN, and others are standalone PC applications, which are next to impossible to keep updated systematically throughout a large organization.

End-user connection to the Internet is also inadequate. Many PPQ locations, including major sites such as the Raleigh Center for Plant Health, Science and Technology (CPHST), have totally inadequate electronic communications capabilities. The setting of 64K lines to be shared by 20+ individuals in many locations represents far less access than is available in third world countries via dial-up networks. The problem is compounded by the IT requirement that these lines go through a national PPQ server, which is itself often out of service, precluding *any* Internet access, including even email.

A high degree of connectivity also is required so that PPQ computer/Internet systems can communicate readily with a variety of other systems used by organizations throughout the world with safeguarding responsibilities. The interconnection of systems involves stringent technical requirements with respect to cabling, connectors, interfaces, protocols, etc.

Recommendations

■ I-16 Appoint an *"Information Management Team"* headed by a non-IT person in order to lead and manage the IT functions in PPQ.

■ I-17 Allow individual locations to deal with local Internet Service Providers and allow individual programs to justify their connectivity levels, based upon identifiable needs.

■ I-18 Station IT personnel at PPQ locations to meet local needs. IT specialists should be responsible to the local program leader.

4.3.6 Surveillance and Analyses of Risks Posed by Exotic Pests

Countries such as Australia and New Zealand, in carrying out successful safeguarding programs, have made major systematic efforts to identify and analyze the risks posed by pests associated with a given commodity with respect to all countries where the latter is produced. For example, New Zealand has developed comprehensive Pest Lists for 600 of its most important imported commodities. Moreover, New Zealand placed each exotic pest in one of three Quarantine Risk Groups and has defined an algorithm for determining the appropriate defensive response against pests in each risk group.

Australia conducts a systematic and continuous program of monitoring, surveillance and public awareness across northern Australia and in neighboring areas of Papua New Guinea and Indonesia.
It is questionable whether countries that fail to operate an effective early warning system, or that have not conducted a comprehensive study of exotic pests, can adequately justify their phytosanitary requirements, critically evaluate alternative preventative approaches, or quantitatively predict actual invasive pathways for specific types of invaders.

Findings

In spite of major advances in quantitative areas such as population dynamics and crop modeling, GIS, economic analyses, and weather

modeling, PPQ has made scant effort to comprehensively assemble the existing information on exotic pests and to quantitatively predict invasiveness or population management of invaders. Likewise there has been scant effort to link the large amount of information which PPQ collects in PIN-309 and other databases to any type of pattern analysis for detection of pathways of entry or for potential bioterrorism attempts.

Recommendations

■ I-19 Make a concerted effort to assemble and organize all available information on pests not known to occur in the United States. The first step in this process should be to develop a plan to accomplish this task and to estimate the level of effort that would be required to substantially complete this task within five years.

■ I-20 Concurrently acquire and assemble readily available information such as the CABI database and the commodity-related pest lists including the corresponding bibliographic and taxonomic information which Australia, New Zealand and the United Kingdom seem willing to share.

■ I-21 Develop and implement a process of placing each pest not known to occur in the United States into a Quarantine Risk Group, perhaps using the New Zealand procedure modified to meet U.S. needs. This process should result in the identification of those species that are most dangerous and that warrant special attention, and the first iteration of the process should be completed within six years.

■ I-22 PPQ and IS should undertake a significant effort in geo-referenced modeling of invasive species in general, with concurrent pattern analysis of present and future databases, particularly those with distributional and interception information. This will require an increase in dedicated personnel, with cooperation among the various Federal and state agencies responsible for the data collection and archiving. A recently developed technology, Internet Map Server, could be used to spatially represent the geographic and severity of outbreaks over the Internet.

4.3.7 Coordination with Other Agencies and Expertise

Half a dozen Federal agencies, many states, and a wide variety of private and international organizations have major initiatives to develop information on detection and management of exotic species relevant to PPQ's safeguarding mission. It is important that PPQ understand the goals, data holdings, and technical protocols and standards used by those organizations, and that its experts participate to the extent required to assure interoperability in data products.

Findings

There is little interaction among APHIS groups themselves, except in an *ad hoc* manner. There appears to be even less cooperation with agencies and organizations outside USDA, including other Federal agencies with interest in and responsibilities for invasive species data (specifically USGS and EPA). There has been some cooperation with land grant universities for data access, but this has been primarily with the universities in a service role, rather than a cooperative mode. There appears to be even less cooperation internationally except where dictated by export restrictions or political considerations.

Recommendations

■ I-23 The PPQ and IS should develop and implement a coordinated plan to integrate the various database efforts on pests not known to occur in the United States with those of other organizations, both nationally and internationally. Thus PPQ and IS should seek out mutually beneficial arrangements with USGS, EPA, U.S. universities, and international organizations (FAO, IPPC, etc.).

■ I-24 Assign or hire IT personnel to participate in interagency standard setting groups and long term planning exercises. Particular efforts should be made to adopt standardized vocabularies (e.g. ITIS nomenclature) and data structures (for example GILS/FGCD/Z39.50 metadata specifications) as they become widely used within the Federal government or among important collaborators. If existing personnel are assigned technical liaison and standard-setting tasks, they must be provided with matching release from other responsibilities.

■ I-25 The PPQ and IS should take advantage of opportunities to connect to international databases on species distributions. These include a number of national programs, for example, Environment Australia, http://www.biodiversity.environment.gov.au/; Base de Dados Tropical, *http://www.bdt.org.br/bdt/*, in Brazil; INBIO, http://www.inbio.ac.cr , in Costa Rica; and CONABIO, http://www.inbio.ac., in Mexico; and several emerging international biodiversity networks, including BIN21 http://www.bdt.org.br/bin21/bin21.hmtl, , the Biodiversity Conservation Information System (http://biodiversity.org/), and MABNetAmericas (*http://www.mabnetamericas.org/mabnet/home.html*). All of these efforts have major emphases on non-indigenous species, and are especially important in assessing threats from invasive species that already have erupted elsewhere. A particular opportunity to develop more foreign database links and standardization is in the proposal to the Inter-America Biodiversity Information Network (IABIN) to develop information sharing on invasive species (initially fish and vascular plants) among participants in the Summit of the Americas (see http://www.nbii.gov/iabin/torpilot.htm). These initiatives all share a goal of using the protocols developed under the Clearinghouse Mechanism of the Convention on Biodiversity, and are working toward common uses of biological nomenclature (see the Integrated Taxonomic Information System, *http://www.itis.usda.gov/plantproj/itis/index.html*.) Unless there are overwhelming reasons to do otherwise, APHIS-PPQ should participate in these efforts and adopt their clearinghouse standards and vocabulary uses for international species data.

■ I-26 Strive to play a leading role in shaping invasive species policy, since the stake in this policy of American plant resources is immense. The PPQ can play a leading policy role only if its information systems are inter-operable with the increasingly standardized approaches being adopted by standard-setting organizations and other agencies.

4.3.8 Taxonomic Services

The Committee found deficiencies in information support, identification/diagnostic tools, and work space and need for greater involvement of the wider taxonomic community.

Importance of taxonomic services

Correct taxonomic identification of organisms is critically important to the work of PPQ. The consequences of misidentification of a pest or its

natural enemies and lack of understanding of its biology can have severe consequences in decision-making (Rosen 1978). The existence of cryptic species and those, which cannot be cultured greatly complicates the tasks of identifiers. It is probably safe to say that the complexity of identification is not well understood except by taxonomists or systematists. Correct identification or diagnosis is the first step in gaining knowledge of a pest species including its bionomics, life history, pest management strategies, and economic importance. This task is daunting because (1) the number of estimated number of world species (the spectrum including arthropods, mollusks, animal and plant pathogens, vascular plants, and vertebrates) is approximately 32 million, yet only two million have been described (Klassen 1986), and (2) within many known taxa there are life forms or developmental stages which have not yet bee described (Batra, 1978; Rosen 1978).

The ability of scientific staff (identifiers, specialists) to provide accurate identifications presupposes a comprehensive knowledge of the world's fauna and flora. But this supposition is far from having been realized because of the vast number of life forms and the diversity of developmental stages.

Significantly Batra et al (1978) noted that "Systematics is the synthesizer of information from all fields of biology—organizing the data into a classification that groups related species. A classification is most useful if specialists can predict with a satisfactory degree of probability relatedness among taxa on the basis of previously uninvestigated character systems, and if a few diagnostic characteristics of a newly discovered taxon enable us to relate it to previously known taxa (Cronquist 1969)."

Taxonomic competency

PPQ has a long tradition of relying on certain Federal, State and private taxonomy/systematics laboratories or groups for urgent identifications as a basis for actions to be taken when an exotic pest is encountered at a port of entry that cannot be reliably identified by a PPQ "Area Identifier." Since the scientific name of an organism is the key to searching the literature, the expert taxonomist has routinely provided not only the scientific and common names, but also basic information on hosts, distribution, pest status, diagnostic characters, biology, natural enemies, and other critically important biological data.

Each PPQ Area Identifier is required to develop a level of proficiency in correctly identifying a certain number of exotic pest species. This level of proficiency is variously referred to as "identification authority" or "discard authority." Identification authority is earned in part by demonstrating to a taxonomic authority on three separate occasions that a given exotic pest has been correctly identified. In the past "discard authority" had to be renewed every fifth year. Regulatory decisions of great moment are based on identifications/diagnoses. Therefore the highest standards should exist for this first step of many in a regulatory decision. The importance of the ability to make scientifically competent taxonomic identifications/diagnoses as well as interpret other available biological information cannot be over emphasized.

Taxonomic resource support for Area Identifiers

Efficient and effective work performance of the identifiers and specialists employed by USDA-APHIS-PPQ is dependent on a motivated work force provided with adequate resources such as work space, identification/diagnostic tools, and information support.

Table 1. Roles of Taxonomists and Systematists in Safeguarding Programs of APHIS and Cooperators

Program	Extent of Problem	Information Needed	Who Needs Information	Best Source of Information	Extent to which Taxonomic Services are Needed
Domestic Surveys and Pest Management					
Program Pests	< 20 of major importance	Extent of spread and damage, and effectiveness of control	Pest management personnel	Survey personnel, field records, data bases, publications	Verification of identifications or diagnoses
Surveys	All pests	Type and extent of damage, seasonal fluctuations	Survey and pest management personnel	Survey personnel and records	Very precise (pathovars, subspecies) to genus level
Cooperative Plant Pest Survey	Several thousands	Type and extent of damage, seasonal fluctuation	Survey and pest management personnel	Survey personnel and records	Very precise (pathovars, subspecies) to genus level
Quarantines					
Interceptions at Ports of Entry	Exotic pests worldwide	Point of origin, economic importance and biology at point of Information	Customs and PPQ	Literature; previous records of importation; specimen data	As precise as possible, especially if pest is important at the source
New Pest Detection	Exotic pests worldwide	Home range; economic importance and biology in home range	Customs and PPQ	Literature; previous records of importation; specimen data	As precise as possible, especially if pest is important at the source, and indication of closely related species
Pests Not Known to Occur in United States Pest Risk Assessments	Several thousand pests worldwide	Home range; economic importance and biology (all aspects) in home range; means for identification	Customs and PPQ	Literature; specimen data	To species level or more precise; indication of related species

Modified from Foote (1978)

Involvement of the wider taxonomic community and the New Pest Advisory Group

In past decades, USDA-APHIS- PPQ has used "Status of Potential Pests Not Known to Occur in USA Committees" or "New Pest/Disease Detection Evaluation Committees" as mechanisms to assess potentially dangerous intercepted organisms. The PPQ would significantly involve ARS and university taxonomic/systematic scientists on these committees depending on their expertise. Currently, USDA-APHIS-PPQ uses the New Pest Advisory Group (NPAG), which consults university and ARS scientists. However in many instances the specialists who identified the organisms in question are no longer included in follow up discussions as in previous years. Indeed, it appears that many of the specialists who do authoritative identifications have not been involved in such deliberations in recent years. Nevertheless, the New Pest Advisory Group seeks counsel of university and ARS specialists, but largely on a last resort basis. The result is that the specialist who identified a dangerous pest rarely learns what is being done to mitigate the risk.

The New Pest Advisory Group (NPAG) was established in the PPQ Center for Plant Health Science and Technology in Raleigh on January 1, 1998. The NPAG function previously resided at PPQ Riverdale headquarters on the Domestic and Emergency Operations staff. NPAG assesses exotic pest detections in the USA and systematically prospects for reports of new infestations from a network of contacts and information sources. NPAG recommends to the Deputy Administrator the most appropriate response for PPQ. New detections often are first noted outside of PPQ channels. Many of the reported detections require no action by PPQ due to widespread distribution, minimal economic or environmental impact, etc. However at least two dozen new pest situations per year warrant some follow up action by NPAG such as preparing a data sheet, convening a meeting, or writing a report with recommendations. NPAG does not treat those exotic pests having emergency guidelines in place such as medfly or citrus canker.

The chair of NPAG designs the composition of the new pest assessment meetings and teleconferences to best address the specific pest. Participants include appropriate scientific authorities and regulatory officials who can help the group reach consensus on scientifically valid, operationally sound recommendations. Typically meetings are conducted by conference call and convene about 10 participating stations.

During 1998 NPAG operated in a reactive mode. In 1999, NPAG has placed emphasis on also being proactive, and is attempting to recruit staff with data management skills in addition to knowledge of the biological sciences to conduct trend and pathway analysis and help predict potential pest invaders. NPAG is engaging scientific societies (Entomological Society of America, American Phytopathology Society, and Weed Science Society of America) to construct prioritized lists of exotic pests of concern. NPAG plans to eventually produce various lists useful for key commodities or environmental/ geographical areas. The lists should help PPQ to more effectively produce regulations, issue permits, and utilize resources for training, exclusion, and survey activity.

The NPAG has been engaging specialists in the APHIS Professional Development Center, Frederick, MD in the preparation of exotic pest data sheets.

Findings

At least in some instances, PPQ appears to have granted identification authority to some Area Identifiers who have not been trained and tested by professional taxonomists, and has waived the requirement that discard authority be renewed periodically. In addition, PPQ has elevated some of its Area Identifiers to "specialist" status for particular taxonomic groups. There is concern that adequate taxonomic standards may not be in place to accurately assess the competencies of identifiers and specialists, and that reviews of competency may no longer be conducted on a regular basis.

Currently, there are deficiencies in the resources provided to many identifiers and specialists. Too often work space is cramped, inappropriate for slide making and other operations and lacks adequate ventilation removal of noxious chemicals used to prepare pest samples. Many microscopes have substandard optics. Hard copy literature (especially books) and other types of reference literature available vary but tend to be grossly inadequate. The work load for some identifiers requires that many hours each day must be devoted to preparing samples for identification (e.g., preparing microscope slides), and this leaves insufficient time for actual taxonomic identification. Routine preparatory work could be delegated to assistants.

The amount of time allowed for training of new identifiers and for maintaining taxonomic competency has declined considerably in recent times. Some new identifiers are receiving inadequate introductory training. Factors influencing this shortfall include the ongoing decline in numbers and availability of outside expert taxonomists and experienced Agency Identifiers. Less training, and therefore less working-knowledge, seems to be resulting in an increasing number of identification/diagnostic reports with "nr. species" or "prob. species." Certainly, not in all cases is a binomial species diagnosis required for a regulatory decision; however, the lack of ability to do so when needed can and will result in poor regulatory decisions. The economic, environmental, and political impact from an inaccurate identification can be severe. Also, the amount of time has declined significantly for identifiers to attend and participate in identification/diagnostic workshops and for general or specialty training with taxonomic experts.

Retention of experienced identifiers is much less than desirable, in part, due to few opportunities to increase salary levels and yet remain as an Area Identifier. Two immediate costs are incurred: loss of experience and cost of training a new Area Identifier. From time to time, some APHIS administrators, in their well-intentioned quest for cost savings, have expressed the view that the maximum possible percentage of pest identifications should be done by PPQ Area Identifiers and that the services of Federal, State and private taxonomy/systematics laboratories or groups should be reduced to a bare minimum. In recent years PPQ appears to have substantially reduced the involvement of extramural taxonomic specialists, and this minimal use has continued since the formation of the NPAG. The many advantages of substantial involvement of extramural taxonomists and systematists in a variety of institutions appears no to be appreciated by PPQ management. The APHIS, in its self-interest, needs to urge universities and research organizations to maintain and strengthen their commitments to taxonomy and systematics.

Recommendations

■ I-27 Make greater substantial use of highly competent taxonomists and

systematists in a variety of institutions.

■ I-28 Take measures to assure that the extramural specialists engaged by PPQ for making identifications are involved as appropriate in the work of the New Pest Advisory Group and are kept informed of any actions taken against those dangerous exotic pests that come under the purview of the extramural specialist.

■ I-29. Assure that each Area Identifier is trained and tested by one or more taxonomists/systematists who are recognized authorities on the taxa assigned to the Area Identifier.

■ I-30.. Assure that the identification authority of all identifiers is renewed at appropriate intervals (normally every 3rd year and never less frequently than at 5 year intervals).

■ I-31. Take concrete measures to foster a strong sense of collegiality between and among Area Identifiers and taxonomists/systematists in other organizations.

■ I-32. Examine all the workspaces assigned to Area Identifiers and specialists and correct deficiencies with respect to safety, ergonomics and the special requirements of the assignment.

■ I-33. Examine the needs of Area Identifiers and specialists with respect to instrumentation and equipment and correct all deficiencies.

■ I-34. Examine the needs of Area Identifiers and specialists with respect to technical literature, information on CD-ROMS or available on the Internet and correct all deficiencies.

■ I-35. Examine the needs of Area Identifiers and specialists with respect to professional development, advancement and retention and devise a system of continuing education and earned promotion to assure that capable identifiers are advanced and rewarded to the same extent as are those who take other career pathways in PPQ.

4.3.9 Seed Identification Problems at Inspection Points

Background

Many listed and potential noxious weed species enter the United States as seed. The seed may be a contaminant of imported seed, mislabeled imported seed, or introduced through another means. Identifers are sometimes given as little as 2 hours of training in very general seed biology and are expected to be able to identify species from that. Each inspector is given a book with devitalized seeds but there is very little formal training. Inspectors may add to the book if they are motivated, but that is up to the individual. Unidentified seeds may be sent to the single National Identifier who identifies “Urgent” seed immediately. If the inspector does not mark the seed as “urgent” it joins a backlog of unconfirmed or unidentified seeds that is currently at 6,735 samples. It is impossible to hold up so many shipments and they are generally approved for entry. Visiting scientists may be asked to identify problem seeds from their countries, but only opportunistically, not routinely.

Findings

Training in seed biology for inspectors and even Area Specialists is inadequate and there is insufficient support. Many weed species are very likely entering the United States because of this. Seed biology is a technical field and experts are distributed throughout the world. International expertise is currently being little used.

Recommendations

■ I-36. As prerequisites to serving as a seed inspector, give each prospective inspector several hours of seed biology training, and should test the prospect with respect to reliability of ability to identify important weed taxa in the seed stage. Subsequently PPQ should require each inspector to take advantage of periodic retraining opportunities.

■ I-37. Hire additional National Weed Seed Identifiers to decrease the backlog of current plant seed samples and to process the taxonomic identification of samples of plant seeds in a more timely manner in the future.

■ I-38. Engage the assistance of international plant taxonomists with weed seed expertise more often. With remote imaging technology a system could be implemented that would allow foreign biologists to quickly identify the taxa of seeds of their native species, with U.S. seed biologists reciprocating when needed.

4.3.10 Development and Assembly of New Information on Exotic Pests

Background

The capacity to cope with exotic pest threats to the United States requires highly reliable and adequate knowledge of (1) the identity of exotic organisms which are likely to be serious pests if introduced into the United States, (2) exotic pest biology, ecology, host range, (3) pathways that may permit entry of the pest, (4) likelihood of survival in each pathway, (4) ways of tracing a pest population back to its origin, (6) effective and efficient methods of detection and survey and (7) effective methods for managing or eradicating the pest. This information and technology are needed for (a) reducing the likelihood that the pest will penetrate into the United States and (b) for coping with the pest in the event that it does gain a foot-hold in the United States.

Gaps in information on exotic pests can render worthless pest risk assessments. Not all knowledge of destructive exotics resides in scientific literature. For example the avocado thrips, *Scirtothrips perseae*, was undescribed in the scientific literature when the pest risk assessment for importing the Hass avocado from Mexico was conducted. Subsequently the pest has caused tremendous damage in California's avocado groves. In interviews with the California Avocado Commission, Mexican growers readily disclosed that they had long known that this pest existed (see 20 April 1999 letter from Tom Bellamore to T. A. Batkin and C. Regelbrugge).

Approaches to conducting research and development on exotic pests have been described for arthropods by Calkins (1983), for plant pathogens by Pusey and Wilson (1983) and for weeds by Patterson (1983). In large measure the acquisition of high quality data requires well planned surveys and taxonomic or diagnostic tools that in many cases are inadequate or not available. Not all reports in the scientific literature can be taken at face value. Scientists everywhere vary greatly in their taxonomic and diagnostic skills and in their understanding of the biologies of various pests.

In order to better gauge the potential destructiveness and invasiveness of an exotic pest species, every opportunity should be taken to study any of its populations that has been displaced from the species' center of origin to new localities. The potential destructiveness of many plant pests is not apparent in their centers of origin probably because their hosts have

evolved significant tolerance or resistance and/or a cohort of natural enemies has been assembled which provides substantial suppression. However when such pests are transported to new habitats where the host plants are not resistant or where the natural enemies do not exist, the full destructiveness of the pest may be revealed (Kim 1983; Myerdirk, personal communication; Polston and Anderson, 1997; Schuster et al. 1990).

Highly destructive pests become widespread throughout the Caribbean region usually in 3 to 5 years after arrival, because the phytosanitary capacities of the island nations are too weak, first to prevent the pests from gaining a foot-hold, and then from rapidly spreading from island to island. Because of the extensive travel that has developed between the Caribbean and the rest of the world during the past two decades, the Caribbean has become one of the important staging areas for invasion of the U.S. mainland. Similarly northern Mexico and southern Canada are areas where exotic pests assemble before invading the United States. These situations seem analogous to the threat to Northern Australia posed by pests which assemble in neighboring areas of Papua New Guinea and Indonesia (Stynes 1999).

The likelihood of invasion increases sharply when invasive pests assemble in areas proximate to the border of the United States because of natural spread and because of the tremendous volume of pedestrian, automobile, boat and small aircraft traffic. During the 1920s Stakman demonstrated that during late summer spores of wheat stem rust from the Canadian prairies were blown southward too infect newly emerged winter wheat on the plains of the southern U.S., and in the spring spores from the southern Grat Plains were blown northward to infect newly emerging wheat as far north as Canada. Karnal bunt and the Russian wheat aphid may have been carried by wind from Mexico into the United States. The seeds of many species of plants are adapted for wind transport, and certain microbial spores and insects are know to be transported hundreds of miles by weather systems with strong storm cells or jet streams. Asian citrus canker spores in Florida is spread on moist warm winds, and in 1997 a tornado spread this disease from Miami well into Broward County to the north. The pattern of distribution of the Black Sigatoka pathogen in south Florida suggests that it was not carried from Cuba into Florida by wind but that it arrived through human transport. Each year the Mexican fruit fly expand its range in Mexico by flying into the Rio Grande Valley. Indeed many species of insects which depend on transient host resources have developed remarkable of powers of dispersal and migration as part of their survival strategies.

The paramount necessity of tracking the movements of exotic pests outside the USA borders was strongly emphasized by Kim (1983). He stated: “Port inspection is a necessary part of regulatory plant protection. However emphasis should be given to the worldwide movement of …a number of high-risk pests, since no quarantine and regulatory control program can provide complete protection against the entry and establishment of exotic pests. As discussed earlier, ecological factors of the habitat or agroecosystem relating to climate, physical condition, and biotic resistance are more important barriers to colonization than are port inspection and quarantine activities.”

Findings

There is neither an individual nor one unit in APHIS that is responsible and accountable for the collection and use

of all of the intelligence collected and developed on exotic pests either at ports of entry or abroad. Thus collection and use of intelligence are haphazard. The importance of up-to-date, accurate biological information for successful regulatory decision-making of USDA-APHIS-PPQ can not be overestimated. The timely acquisition, analysis, and reporting of biological information (including taxonomy, bionomics, life history, pest management strategies, and such) and the timely development of effective pest detection and suppression technologies are cornerstones to the success of the many program functions of USDA-APHIS-PPQ.

Currently, biological data are collected from many sources and entered into a multitude of databases. Data analyses and reporting are regularly done for specific goals and objectives. However, it appears that inadequate effort is expended to (a) periodically reviewing the needs and procedures of data acquisition, analysis, and reporting, (b) ensure that data collected for one use are actually used to serve multiple purposes, and (c) assuring that technology is on hand when a new pest emergency arises.

APHIS-IS has a far-flung global infrastructure, and has occasional spectacular successes in collecting information and organizing effective cooperative programs on exotic pests abroad. However, IS does not have a comprehensive and systematic program for collecting intelligence pertaining to exotic plant pests or for disseminating/archiving/analyzing that information in other than an ad hoc manner. International Services (IS) does not receive a regular allocation for pest surveillance abroad, and does not treat exotic plant pest survey as a regular program. Thus IS fails to systematically plan and coordinate this activity. Moreover no durable mechanism has been created whereby (a) PPQ and IS would work together to determine what pest species should be surveyed for and in what countries, and (b) PPQ could provide adequate training for IS personnel in the field on how to set up the specific survey desired.

International Services has officers in 27 countries on 6 continents and coordinates field operations from seven offices, six of which are regional: Mexico, Central America, Caribbean, South America, Asia/Pacific Basin and Europe/Africa/Near East. International Services participates in pest surveillance and control programs abroad, and some of these have proven to be highly effective in protecting American agriculture. The cooperative MOSCAMED program in Mexico and Guatemala was initiated in 1976 to halt the northward movement of the Mediterranean fruit fly. This program continues to serve both Mexico and the USA very well, but the benefit to Guatemala is less since funding to eradicate the medfly and other tropical fruit flies from Guatemala and Central America has not materialized.

Similarly APHIS is involved with surveillance and control/quarantine programs against the carambola fruit fly in Suriname, Brazil and Guyana, Mexican fruit fly in Mexico, surveillance/control/eradication of the boll weevil in Mexico, and surveillance/control of hydrilla with triploid carp in Mexico. In addition APHIS provides some worldwide technical assistance for cooperative surveys for pests of concern to the United States. The APHIS has conducted smaller scale tropical fruit fly surveys in Costa Rica, Panama, Colombia, Venezuela, Ecuador, Kenya and South Africa.

APHIS has conducted and sponsored a great deal of excellent R&D on technology to detect, suppress and

eradicate exotic tropical fruit flies. Thus APHIS working through the FAO/IAEA has been involved in studies on improving traps and lures in countries surrounding the Mediterranean Sea, Latin America and Southeast Asia. In Guatemala, APHIS and the Government of Guatemala are conducting pioneering work on the rearing and handling of male-only strains of the Mediterranean fruit fly.

In past decades USDA sponsored a great deal of research on the taxonomy, biology and control of foreign pests in Asia and in Europe (Batra et al. 1978; Pusey and Wilson, 1983; Spaulding, 1958, 1961; Watson 1971). In some instances U.S. plant materials were planted abroad to observe pest attack. Much R&D was conducted very effectively through the P. L. 480 Foreign Currency Program and through offshore laboratories of ARS. In addition significant studies on invasive and introduced pests have been sponsored or conducted by CSREES and ERS. As a result of a series of reorganizations the responsibility in USDA for R&D in foreign countries has become fragmented and now falls under ARS, FAS and APHIS. ARS conducts research on a variety of exotic insects, plant pathogens and weeds in its European Parasite Laboratory, Montpellier, France, in its Asian Parasite Laboratory, Seoul, Korea and at the Foreign Disease and Weed Science Research laboratory, Frederick, MD and at facilities on St. Croix Is. And Puerto Rico. Also ARS administers the very effective and well-endowed U.S.-Israel Bi-national Agricultural Research and Development Fund (BARD) whereby all projects are conducted cooperatively by U.S. and Israeli scientists.

The FAS R&D programs come under the Deputy Administrator for International Cooperation and Development of USDA Foreign Agricultural Service. This Service has a Research and Scientific Exchange Division. The latter conducts a Scientific Exchange Program, a Bi-national Research Program, a Foreign Currency Research Program and a Reimbursable Research Program. On the whole there appears to be inadequate coordination between and among the ARS, CSREES, ERS, FAS and APHIS programs on exotic pest R&D. Also there appear to be no firm agreements between and among APHIS, ARS, CSREES, ERS and FAS on the minimum level of effort that each agency will devote to the exotic pest R&D needed to support the PPQ safeguarding mission. In addition ARS conducts research on a small number of exotic and dangerous plant pathogens, insects and weeds at the Foreign Disease & Weed Science Research Laboratory, Frederick, MD. A major program on exotic animal diseases is conducted by USDA in a high security facility at Plum Island, NY. Screwworm research requiring sophisticated laboratory approaches has been conducted for about two decades in a high security facility first at Fargo, ND and now at Lincoln, NE.

Frequently invasive organisms new to science but of potential regulatory significance are reported in foreign countries. Often the taxonomic or diagnostic tools are lacking to identify quickly and reliably such organisms. Also needed are (1) information on the likely degree of destructiveness of such organisms in U.S. environments, (2) means to readily detect and monitor their populations of the organisms, and (3) means to strongly suppress them. A great deal of anticipatory research is needed. In addition, some reports in scientific journals require validation by independent investigations. USAID has sponsored very significant programs against exotic pests. The APHIS-PPQ could benefit from this effort by maintaining liaison with USAID. The CGIAR system has conducted a great

deal of research on exotic pests. This system consists of a network of sixteen international agricultural research centers funded by the World Bank, the FAO, the United Nations Development Programme (UNDP), and the United Nations Environment Programme (UNEP). Since the CGIAR is headquartered in Washington, DC, APHIS should have little difficulty in establishing an effective liaison.

The North American Plant Protection Organization (NAPPO) is in process of establishing a Working Group on Emerging Pests. Recently PPQ has assigned the chair of its New Pest Advisory Group to serve on the Working Group. Similar liaisons have not been established with EPPO and the other Regional Plant Protection Organizations.

Many university faculty members and other scientists who work for the private sector and for the Federal or state governments have substantial involvement in international programs and they discover and obtain much valuable information on exotic pests. However PPQ has no mechanism to systematically obtain such information on a timely basis.

The Committee also found that no systematic evaluations of the effectiveness of the safeguarding system are being made and released to the public. The PPQ lacks the resources needed to identify dangerous exotic pathogens, which may accompany lots of seed imported for planting. The National Seed Health System being developed by PPQ and the American Seed Trade Association will focus on identifying seed-borne pathogens in seed lots intended for export from but not importation into the USA.

Recommendations

■ I-39 Appoint an International Pest Information Officer whose primary responsibility would be to develop and lead a program on the systematic collection and discovery of intelligence on pests not known to occur in the United States. This officer should report to both the Deputy Administrator for International Services and the Deputy Administrator for PPQ.

■ I-40 The PPQ and IS should appoint a Standing Committee on the Collection and Use of Intelligence on Exotic Pests. The National Plant Pest Coordinator will be a permanent member of this Standing Committee. This Committee should report to the International Pest Information Officer whenever appropriate but no less than two times per year. Specifically the Committee should do the following:

First year

• Develop a description of current programmatic uses of biological information.
• Consult with a representative subset of biological information users to determine their desired or optimum day-to-day information needs.
• Identify and describe additional resources needed to achieve optimal biological information that can be acquired, analyzed, and reported in an effective manner.
• Identify mechanisms to provide analyses of data and subsequent means to disseminate to targeted information users. Designated scientists or experts must have the responsibility to provide both general and specific views of the exotic pest issue and construct short- to long-range radar for anticipated exotic pests.
• Present a written recommendation to a larger review group of biological information users to ensure an accurate capture of the biological information needs.
• Deliver a report containing recommendations to program applicators and policy-makers for implementation.

Second year and thereafter

• Review status of recommendations made previously.

• Re-survey biological information users to determine current needs and future needs.

• Prepare and deliver a report containing findings and recommendations to program applicators and policy-makers for implementation.

■ I-41 The Standing Committee shall include one representative each from (a) Office of Deputy Administrator for PPQ, (b) Office of Deputy Administrator for International Services, (c) Center for Plant Health Science and Technology (d) NPAG (e) Biotechnology and Biological Analysis (f) National Identifiers, (g) APHIS Library (h) Phytosanitary Issues Management, (i) National Biological Control Institute, (j) Port Information Network, (k) one liaison officer from the North American Biodiversity Information Network (l) one liaison officer each from ARS, FS, CSREES and FAS and (m) others as deemed necessary by the Deputy Administrator of PPQ.

■ I-42 The APHIS should create a mechanism whereby IS and PPQ will work together with the Standing Committee on the Collection and Use of Intelligence on Exotic Pests in setting priorities, defining protocols, providing training, etc. for such a global exotic pest surveillance program.

■ I-43 The IS and PPQ should develop a global program to monitor the movements of especially dangerous pests. The APHIS should develop comprehensive systematic programs of pest-intelligence gathering especially—but not exclusively—for the Caribbean, Mexico and Central America and Canada with defined protocols and an accessible database for storage, sharing, and analysis of the information collected.

■ I-44 Update the various lists of classes of exotic plant pests (arthropods, plant pathogens, molluscs, weeds, etc.). The taxa in each list should be placed in a rank order from most threatening to least threatening. Such rankings should be done at 3 to 5 year intervals in cooperation with representatives of professional societies, Agricultural Research Service, State Departments of Agriculture, CICP, FAO, etc. These ranked lists of exotic pests should be used to identify those taxa that should be targeted for (a) special exclusion efforts and (b) special surveillance abroad and (c) R&D.

■ I-45 The PPQ and IS should engage statisticians to construct improved sampling schemes for detecting and monitoring targeted pest species. Detection rates are likely to be a function of the pest population densities in the areas from which commodities are exported to the U.S.A., the opportunities for the pest to follow a pathway into the USA, etc. Statisticians should be able to generate detection probability functions based on various sampling schemes.

■ I-46 The APHIS should also employ ancillary approaches to obtaining data on exotic pests by working cooperatively with international organizations. One approach would be to provide small grants to foreign scientists who are appropriately located to conduct surveys and studies. In addition small grants could be made to university faculty, and other U.S. scientists who are already engaged in international programs. In any case the latter should be queried periodically concerning new observations on exotic pests.

■ I-47 The IS or PPQ should negotiate with each Regional Plant Protection Organization on the possibility of assigning a representative or liaison officer to each RPPO's working group on emerging pests or its equivalent.

■ I-48 The PPQ and IS should develop mechanisms to glean information on exotic pests from programs of USAID, CGIAR, FAO, IAEA, UNDP, UNEP and other international organizations and bodies.

■ I-49 Glean information on the capacity of various taxa to penetrate the U.S. safeguarding system. A good basis for such analysis is the review of annual interceptions of specific invasive species at ports of entry. An indicator of capacity of a given taxon to penetrate the safeguards is the length of time elapsed from the first interception to the time that the pest was first documented to occur in the United States.

■ I-50 Each year PPQ and IS should develop a list of research needs on invasive organisms not known to occur in the U.S., and which may have the potential to be significantly destructive if they were to gain entry and become established. This list of needs should be formally transmitted to ARS, CSREES, ERS and FAS, as appropriate. Similarly those research needs pertaining to invasive pests that have gained footholds in the U.S. and which may be candidates for eradication or other regulatory action should be communicated to the appropriate sister research agencies.

■ I-51 In order to leverage the resources of sister USDA research agencies, APHIS during the course of annual budget development should identify the need for a dedicated extramural research fund of no less than $2,000,000 recurring annually. These funds should be allocated and managed based on guidance from the Standing Committee on the Collection and Use of Intelligence on Exotic Pests (See Recommendation I-38).

■ I-52 At the beginning of each fiscal year APHIS should submit a comprehensive report to the National Plant Board and to other stakeholders on (1) the research projects being conducted on invasive pests in relation to the needs defined by APHIS, (2)the most important needs on which little or no research is being conducted, and (3)a summary of communications that APHIS has had with its sister USDA agencies concerning research needs relevant to invasive plant pests.

4.3.11 Surveillance of Genetically Modified Organisms

Background

The genetic improvement of crops through “genetic engineering” is being pursued vigorously in the United States, Canada, China, Australia and several other countries. Genetic engineering has greatly strengthened the capacity of molecular biologists to take useful genes from one species and insert them into other species. For example, genes that determine the production of herbicide -metabolizing enzymes have been moved from bacteria into soybeans. The scientific community in the United States has adopted elaborate precautions to guard against unauthorized releases of recombinant DNA to the environment. In spite of this, fears are prevalent, especially in European countries, that (1) the release into the environment of genetically engineered organisms will result in some unintended, grievous and permanent damage or loss to people, plants, animals or the environment and that (2) genetically engineered crops may themselves become intractable weeds and/or that genetically engineered crops will transfer genes to wild weedy relatives that enhance the weediness of the latter.

Just as the U.S. is the world leader in agricultural biotechnology, so is USDA-APHIS the world leader in regulatory oversight of genetically modified or engineered plants (GMOs),

especially for commercialization. Using risk analysis and performance-based standards for evaluation, APHIS has developed and implemented protocols that assess whether the plant in question is likely to become a plant pest or contains some plant pest properties. Largely at APHIS's own initiative, regulations have been modified over the last decade, as data have accumulated on the performance of plants in U.S. field trials. If field trials show no untoward effects towards other plant species, or to the environment over several different seasons and locations, plants are released for potential commercialization, unless the plants also fall under the jurisdiction of the Environmental Protection Agency.

If genetically modified plants have changes in quality traits, such as changes in oil composition and herbicide resistance, then their release requires only USDA approval. On the other hand if pesticidal properties have been imparted to the genetically engineered plants, e.g. the gene for the Bacillus thuringiensis toxin engineered into plants and efficacious against certain insects, then EPA approval is also needed.

GMOs, i.e. organisms manipulated by newer biotechnological techniques, may pose new problems in environments in which the organisms were neither tested nor produced. Some of these problems can be anticipated; others cannot. GMOs of microorganisms, insects, plants and animals introduced into new habitats may present risks, which for the purpose of APHIS are in two categories. One is that of transgenic transfer of one or more introduced traits into either desirable or undesirable species, with the potential for displacement of the indigenous species beyond that of a newly introduced wild-type organism, i.e. non-GMO. For sterile insects, plants and animals, transgenic transfer may be moot. Techniques, such as the "terminator technology" for plants may prevent transgenic transfer. The second issue is the potential for GMOs to demonstrate different degrees of susceptibility to a pest or pathogen, which may or may not be previously known. Such susceptibility is known to occur with conventionally bred or newly introduced organisms. With GMOs, these areas of concern are not likely to be a potential problem until large areas or numbers are produced for varying lengths of time. In the U.S., thousands to millions of acres of genetically engineered crops are now being grown. Some of these crops are now being grown in other countries including countries with minimal scientific infrastructures. Therefore the time frame for potential problems to arise is approaching.

Findings

APHIS has assumed that if genetically-modified plants pass the test of field trials, that the plants and any associated pests and pathogens will behave in the same manner as unmodified plants except for the specific traits(s) imparted to the plants. Unfortunately, the release by USDA from being a plant pest risk for commercial production does not guarantee that other problems cannot occur. No monitoring or surveillance of GMOs is being done by APHIS, nor is any required of the sellers of GMO seed and other propagules, except for that mandated by EPA with respect to surveillance of the development of Bt resistance in target pest populations.

Recommendations

■ I-53 As a prudent measure, conduct - or require others to conduct - monitoring and surveillance of genetically modified organisms for gene transfer to crops and weeds, and new pests

and pathogens not previously detected to affect the parent plant. These actions can be taken in conjunction and cooperation with states, crop consultants, university personnel domestically and in other countries.

■ I-54 Assemble a database that specifically includes categories for GMOs. Such a database is likely to be helpful in formulating policy, dealing with trading partners, and instilling confidence in consumers and buyers, whether domestic or foreign. A sunset clause in such a database may be appropriate if no problems are forthcoming, e.g. over the next decade, beyond those seen with non-GMOs.

Chapter Five

Permit Committee Report

Does the present permit system function as an efficient and effective tool to help ensure that the safeguarding system protects the United States from the introduction of plant pests and diseases, and if not, what changes can be made for improvement?

5.1 Background

The current system

Under the authorities of the Plant Quarantine Act of 1912, the Federal Plant Pest Act of 1957 and the Federal Noxious Weed Act of 1974, the United States Department of Agriculture (USDA) prevents the introduction and dissemination of crop and environmental pests through its agricultural quarantine and regulatory inspection programs. Regulations were adopted in 1986 to apply this authority to genetically engineered organisms modified by recombinant DNA techniques (7CFR340), if there is reason to believe they pose a plant pest risk. The programs are based on the premise that, if allowed free entry, invasive species, pest invertebrates, pathogens, or noxious weeds might establish, spread, and cause serious economic damage to crops and the environment, which may result in the increased use of pesticides and loss of export markets. Native flora and fauna, including endangered species, as well as the environment, may also be harmed. Permits issued by USDA enable the purposeful importation, interstate movement, and environmental release of certain species for educational, research, and commercial purposes.

The Plant Protection and Quarantine (PPQ) Scientific Services (Permit Unit) has responsibility for assessing risks and benefits when evaluating permit applications, and is charged to consider the interests of U.S. agriculture, the environment, and the consumer in their decisions to issue permits or if making a determination that no permit is required. They also have the responsibility to coordinate with the state departments of agriculture in regard to these efforts.

Any person, including individuals, and those employed by companies, academic institutions, and governmental agencies, desiring to import a live plant pest or a regulated commodity that may become or carry a live plant pest into the United States must first obtain a permit. Applicants may include hobbyists and researchers. Regulated commodities include plants, plant products, soil, fruits, and vegetables. Requests for such permits are sent by the applicant to the Permit Unit of PPQ. An analysis of the request is made to determine the safeguards necessary to allow for the requested use of the material.

The PPQ officer at the port of entry reviews the shipment for compliance with permit conditions and inspects the material as appropriate. When the shipment is in compliance with permit conditions and free from

quarantine (actionable) pests, the officer takes those steps necessary to expedite the release of the shipment. If a permit violation or pest is found, the material may be seized, treated, or refused entry and appropriate penalties can be imposed, including criminal or civil.

PPQ/state cooperation

The permit system also involves other governmental entities. At the state level, the degree of involvement varies, but usually includes review of requests for plant pest, soil, biotechnology, departmental, and post-entry quarantine permits. The state regulatory officials make recommendations to PPQ regarding approval, modification, or denial of the request and specify conditions to safeguard against pest risk. The States may also participate as cooperators by inspecting facilities, inspecting post-entry plant material, monitoring permit compliance, conducting destination inspections of shipments, and taking enforcement action when necessary.

Permit Authority

Permits are issued in accordance with Title 7, Code of Federal Regulations, for the following commodities and live organisms:

319.8	Foreign Cotton and Covers
	Cottonseed cake and cottonseed meal
	Processed lint, liners, and waste
	Hull fiber and gin trash
319.15	Sugarcane-bagasse and related sugarcane products
319.24	Corn
319.37	Nursery stock, Plants, Roots, Bulbs, Seed, and Other Plant Products
319.40	Logs & lumber and other Unmanufactured Wood Articles
319.41	Indian Corn or Maize, Broomcorn and Related Plants
319.55	Rice
319.56	Fruits and Vegetables
319.75	Khapra Beetle
	Brassware and Wooden Screens from India
	Goatskins, lambskins, sheepskins, (unless tanned)
	Used jute or burlap
319.76	Exotic Bee Diseases
	Live bees (other than *Apis*)
	Dead bees
	Beeswax
	Used bee boards, hives, nests, or nesting material
	Honey for bee feed
322.1	Honeybees and Honeybee Semen
330.200	Movement of Plant Pests
330.300	Soil

Nursery stock, plants, roots, bulbs, seed, and other plant products regulated by Section 319.37 may be separated into three categories: admissible, restricted, and prohibited. Admissible material is usually enterable with a permit and may be required to meet specified conditions. Restricted material is allowed entry under a post-entry quarantine permit, to be grown at approved sites under restrictions while being inspected during the quarantine period. Prohibited material is allowed entry only under strict safeguarding conditions, for scientific and research purposes.

In addition to the permits listed below, permits are issued by port of entry officers to allow materials to transit for export and by domestic quarantine officers for limited use or limited destination of materials. Permits are also issued by the Permit Unit for genetically engineered organisms (Biotechnology Permits, Form 2000).

During the 1998 Fiscal Year October 1, 1997 - September 30, 1998, 7,452 Plant Protection and Quarantine Permits were issued. The number of permits by type or category is as follows:

Number	Permit Type	Category
3214	Plant Pests	Form 526
Approx. 1038 Approx. 500	Nursery stock, Bulbs, and Seeds Post-entry Quarantine	Q37 Q37-7
95	Canadian Permits	Q37
890	Fruits and Vegetables	Q56
60	Mexican Avocados	Q56
443	Logs and Lumber	Q40
390	Soil (330.300)	Form 525A
254	Department Permits for Experimental/Research Purposes	Form 588
124	Corn	Q41 & Q24
20	Brassware	Q75
18	Cotton	Q8
12	Rice	Q55

5.2 Findings

Permit System:

a. The permit system provides a legal mechanism to import, maintain, use, and move admissible, restricted, or prohibited materials. It provides for the documentation of shipments as authorized while controlling pest risk through conditions, which establish safeguarding methods. The system has a protective role in preventing adverse events from occurring.

b. The permit system is a support system which is an integral part of the safeguarding system.

c. The permit system reduces decision pressures at ports of entry and enables expedited movement/entry of shipments

d. The permit system was developed many years ago and may not accurately reflect the current global situation, pest risks, and needs of the country.

e. The permit system, because it is cumbersome, has resulted in the avoidance of the system, which has resulted in an increased likelihood of smuggling.

f. There are permits not issued in a timely manner, as perceived by applicants for permits among stakeholders interviewed.

g. There has been a recent change in the submission of plant pest permit applications (Form 526) which appears to be more cumbersome and time-consuming than the former system. The change is to submit the applications directly to USDA for review and forwarding to the states for response back to USDA, rather than submitting them first to the states for comments and forwarding to USDA.

h. Penalties for permit violations are not sufficiently high to encourage compliance and are not uniformly applied across and among permits.

i. Records are not maintained of permit applications that are denied or withdrawn, or are revoked because of a violation, making follow-up difficult. There are difficulties in revoking permits when certain conditions are violated.

j. There are no fees charged for the processing of permits. Processing permits without charge encourages compliance with the system.

k. The inspector or other agricultural official often accepts the identification of the materials in the shipments as agreeing with the materials in the permit, without verification of their identity.

l. Departmental permits are successfully used for the introduction of germplasm, which would otherwise be prohibited and are considered essential in meeting the needs of industry and researchers.

Rationale for Permits and Relation to Plant Pest Risk:

a. Lapses in the permit system do not account for the majority of new invasive pest and disease introductions. There have been very few documented failures of the permit system in which a new invasive pest outbreak can be traced to a properly permitted entry, and those involved “hitch-hiking” pests.

b. The permit system resources should be most heavily invested where the greatest pest risk occurs. The level of oversight should be commensurate with the level of risk.

c. Plant pest permits are not required to import invasive plant species, other

than those listed under the Federal Noxious Weed Act of 1974. This Act provides authority for PPQ to regulate noxious weeds and requires PPQ to adopt regulations listing those weeds. Unless a weed is listed in the regulation, no noxious weed permit is required. As a result, some unlisted invasive weed species are allowed entry into the country without permit/restrictions.

d. Permits issued under Quarantine 56 (fruits & vegetables) are redundant, because port inspectors process importations of all fruits and vegetables according to the inspection manual procedures, rather than relying on any permit specifications.

e. The requirement for a PPQ permit for interstate movement of many plant pests between confined facilities (laboratories) is viewed as unnecessarily cumbersome and time consuming, and risks should be manageable by means other than a PPQ permit.

f. The regulatory basis for issuance of permits for various materials is inconsistent. Quarantine 56 prohibits fruits and vegetables unless approved for entry. Quarantine 37 allows the importation of plants unless specifically restricted or prohibited. This may be indicative of a difference in the pest risk analysis/decision-making process conducted for materials imported under these two quarantines, but is confusing and illogical.

g. For the most part, the biotechnology permit system is working and the level of permitting is adjusted to be commensurate with new data relative to pest risk. However, there are inconsistencies between PPQ requirements for the permitted material at its destination/containment facilities and the recommendations for similar material by the National Institute of Health Guidelines for Research with Recombinant DNA Containing Organisms.

h. Containment conditions are inconsistent with the level of risk and are not uniformly interpreted.

i. There are apparently no specific permit restrictions for the importation of seed to enable protection of American agriculture from the importation of seed-borne pathogens and other invasive exotic pests. This appears to be a pathway for the introduction of invasive pest organisms which is not currently being addressed.

Oversight and Follow-up:

a. There is inconsistency in the level of monitoring of permitted shipments by various ports of entry. Too often, materials entering under permit are not adequately inspected. The imported materials may not always be those authorized by the permit, may be contaminated, or may be commingled with contraband material.

b. There is a low level of monitoring of permitted activities with infrequent inspection of permit recipient facilities, including laboratories, to determine compliance with the permit conditions.

c. Permits are required to import some commodities from Canada; however, since Canadian border inspection stations are not operated on a 24-hour basis, permit enforcement is inadequate.

d. Coordination of the post-entry permit system between the states and USDA is essential because the states have the responsibility for post-entry quarantine plant material oversight and must have adequate monitoring capabilities.

e. Information Collection, Use, and Communications:

f. Good communication is often lacking among Permit Unit staff members, resulting in poor follow through in processing/expediting permit applications, causing delays in permit issuance.

g. Few, if any, electronic databases have been established to enable good communication between headquarters, ports, states, and all other cooperating agencies. This leads to poor communication, inconsistent enforcement, and inadequate monitoring of regulatory compliance.

• State Plant Health Directors and State Agriculture Department personnel have limited access to the status of permits and permit applications.

• Limited access to databases hinders the ability of Federal and state regulatory officials to set priorities for inspections of permitted shipments based on the level of potential risk and to target suspect permit violators.

• No searchable/accessible database exists for quick access to current manual/regulations and permit information for non-propagative plant material (admissible fruits and vegetables, Q56).

• No searchable/accessible database exists for quarantine (non-admissible) propagative material information (Q37), including permit requirements.

• It has been documented that some importers place prohibited (non-permitted) materials in positions within the load that cannot be examined.

• There is a lack of tracking of permitted shipments to the destination points which would enable monitoring of shipments. It is extremely important that containers be tracked to the point of destination (where the commodity is unloaded), so they can be examined by State Plant Health Directors or by State Agriculture Department personnel.

h. Violators, whose permits have been terminated, often use other business identities to obtain new permits.

i. There is a lack of complete identification of post-entry quarantine plant material (ex. species, variety, cultivar) during the post-entry quarantine process.

j. Animal and Plant Health Inspection Services, International Services, may not always notify PPQ about pest outbreaks or pest problems in foreign countries. Without this notification, permit issuance may continue even though the pest risk for the permitted article has changed.

k. Interaction and communication between the Permit Unit and the field staff is often inadequate. Information regarding changes in permitting, including denied or revoked permits, should be provided to the ports in an expeditious manner. Specific information regarding problems with permits and/or permit recipients should be documented at the ports and the information relayed to the Permit Unit.

l. Permit conditions often lack clarity which may result in non-compliance by the permit recipient. Communications between the permit recipient/applicant and the Permit Unit are often inadequate. Applicants are not always informed that some of the materials they have requested are not being approved under the permit issued.

Standardization of Operating Procedures:

a. Documentation is lacking regarding the Permit Unit's policies, protocols, and operating standards, leading to an inconsistency in how permits are to be issued. These policies and protocols are not sufficiently detailed to guide the different types of permit decisions and processes. The Permit Unit does not have a clearly defined mission statement with goals and objectives.

b. Post-entry quarantine permits require that the materials be visually inspected for a set time period, usually two years. New technologies that could detect certain pathogens at an earlier stage and decrease the inspection time are not being utilized in monitoring and inspection procedures, because these technologies have not been approved as alternatives to inspection.

c. No performance standards have been established for permit recipients, relative to the level of performance desired for the safeguarding of specific materials and how these standards can be met.

Organization:

a. Plant Protection and Quarantine lacks clear leadership, direction, and supervision due, in part, to downsizing, reorganizations and staff fragmentation.

b. Fragmentation of the organizational structure of the Permit Unit appears to lead to inconsistencies and tendencies toward individual actions. There appears to be little leadership support resulting in the individuals in the Permit Unit having to act independently.

c. The existing permit system does not result in effective and efficient use of staff. An example is the disproportionate use of staff in the issuance of Quarantine 56 (Fruits and vegetables) and plant pest permits.

d. PPQ permit and permit enforcement staff at Riverdale and the ports appear to be seriously affected by excessively frequent reorganizations. Frequent staff rotation policies do not recognize the levels of expertise necessary to accomplish permit related activities.

e. There is a lack of information technology support staff for the Permit Unit at Riverdale and in the regions.

f. Issuance time frame guidelines, to be conscientiously followed by staff, have not been instituted for many types of permits. These guidelines should distinguish between permits for interstate movement and for importation. Predictability is important to industry, researchers, and other applicants.

5.3 Recommendations

Short term

■ P-1 Combine the present two organizational structures within Scientific Services Unit under one Assistant Director. Such restructuring will eliminate personnel fragmentation and provide for efficient use of staff. (Finding 1.k, 4.a, 6.a, 6.c., 6.d)

■ P-2. Develop standard practice guidelines for the various types of permitted materials. These guidelines should provide for greater permit recipient involvement, responsibility, and awareness. They should allow a risk appropriate level of flexibility in the manner of performance standards. (Finding 5.c)

■ P-3 Initiate expanded use of compliance agreements, memoranda of understanding, or other legally binding documents with industry, research and educational institutions to reduce the number of permits issued/needed. (Finding 6.c)

■ P-4 Institute a system to review permitted activities to ensure compliance with permit conditions, including verification of identification of imported material and final disposition of the permitted materials. (Finding 1.i, 3.a, 3.b)

■ P-5 Civil penalties for permit violation need to be uniformly and fairly assessed in respect to the nature of the violation. The cost of civil penalties should be increased to encourage compliance. Penalties should be vigorously pursued when appropriate for intentional permit violations. (Finding 1.h, 3.c, 4.c)

■ P-6 Bring into concordance with similar condition requirements and performance standards, those organisms covered by both PPQ biotechnology regulations and NIH Guidelines for Research and Recombinant DNA Containing Organisms. (Finding 2.g)

■ P-7 Modify containment requirements for organisms, being imported under the authorization of plant pest permits, to be made consistent with the level of pest risk. (Finding 2.h)

■ P-8 Develop procedures that will include complete identification information of the plant materials in each shipment in/with the post-entry quarantine paper work for arrival notification, which is used to track the materials during the quarantine period. (Finding 4.d)

■ P-9 Initiate a conscientious effort to stabilize headquarters and port staff rotation as necessary to maximize permit system effectiveness and to make staff policies consistent. (Finding 6.d)

■ P-10 Develop an external feedback /communications mechanism for stakeholders to advise the Permit Unit of concerns, provide scientific input, or suggestions for improvements. (Finding 4.g, 5.a)

Medium term

■ P-11 Develop a strategic plan that will assure uniformity within the Permit Unit providing for its mission, goals, objectives, policy and operational standards. The plan should focus permit system emphasis where risks to agriculture and the environment are the greatest. (Finding 2.b, 4.a, 5.a, 6.a, 6.b, 6.f)

■ P-12 Develop with a sense of urgency an electronic database for permit status, tracking, and permit/entry requirements for both propagative and non-propagative materials. If necessary to expedite the development of these databases, contracting with an outside entity is advised. (Finding 1.g, 1.i, 4.a, 4.b)

■ P-13 Incorporate new technologies into the permit system's inspection and monitoring programs to improve effectiveness, reduce quarantine time periods, reduce costs, and provide for better utilization of personnel. For example, under post-entry quarantine permit procedures, plants are inspected for specific diseases usually for a two-year period. Testing methods, such as ELISA, could be employed to test the plant materials, which make it possible to eliminate or shorten the post-entry inspections and quarantine period. Using sound newer technologies and monitoring procedures should reduce costs and utilize personnel in a more efficient manner. (Finding 2.b, 3.a, 4.b, 5.b)

■ P-14 Develop an education and

training program for permit system personnel, cooperators, industry, researchers, educators, students and the general public. Documents about importation requirements, distributed both with permits and as general informational, should be made more user friendly and should be specific to the types of material to be imported. (Finding 4.a)

■ P-15 Conduct an annual or biannual review of the permit system utilizing a committee of Federal, state, university and industry representatives. With the changing world and national pest risk conditions, the development of rapid communication capabilities, and the development of new technologies, the permit system should be flexible and dynamic. (Finding 4.e, 5.b)

■ P-16 Amend regulations that will promote the use of Departmental Permits as to allow appropriate facilities to import plants in response to industry needs while maintaining necessary safeguards. Departmental Permits as they are currently being issued are not always legally defensible under existing regulations. (Finding 1.l)

■ P-17 Provide continuing education and training to maintain or improve PPQ permit system personnel competency. (Finding 4.g, 6.c)

■ P-18 Time frames for issuance of permits must be reduced. Organizational standards should include specific time frames for review and issuance of each type of permit. (Finding 1.d, 1.e, 1.f. 4.a, 4.b)

■ P-19 Develop an electronic or "paper less" system that should be incorporated into an electronic database. Such system would expedite the issuance of permits and improve efficiency of the Permit Unit. (Finding 1.d, 1.e, 1.f. 4.a, 4.b)

■ P-20 Develop and maintain a documentation system as needed to support the denial or revocation of permits. The permit system database should include information regarding permit denials or revocations and this information should be made available for use by Federal and state inspectors. (Finding 4.b, 4.f, 5.a)

■ P-21 Apply the permit system to mitigate all invasive pest risks associated with the importation of seeds. (Finding 2.i)

Long term

■ P-22 Discontinue the requirements for Federal permits for interstate movement of plant pests, except those under Federal quarantine because they are not known or occur or are of very limited distribution in the United States. This will have to be reconciled with the fact that some states have mandatory plant pest permit requirements. (Finding 2.e, 6.c)

■ P-23 Discontinue the issuance of Quarantine 56 permits for admissible materials which do not have exceptionally unusual specific requirements. (Finding 2.d)

■ P-24 Develop a list of invasive plant species which, in addition to those listed in the Noxious Weed Act, would be restricted through permit requirements. This list should be developed in cooperation with and using expertise of the states, weed science and environmental organizations, universities and industry. (1.d, 2.c)

5.4 Unaddressed Issues

a. The plant pest risk and need for permits to regulate the pet trade/hobbyists should be evaluated. This may necessitate coordination with U.S. Fish and Wildlife Services and other agencies, which may have jurisdiction.

b. The permits issued at ports of entry (ex. transit and export, import and re-export) should be evaluated and with consideration given to the development of standard operating procedures for use at ports and a database for tracking the permitted materials.

c. The issuance of permits under the authority of Federal domestic quarantines by Federal quarantine officers should be reviewed (ex. limited use or limited destination) for consistency and effectiveness.

CONCLUSION

Implementation and Accountability

The Review Panel has attempted to describe the status of the system for safeguarding of American plant resources. The foundation of this system is solidly in place within the APHIS-PPQ organization. The recommendations of the Review Panel are numerous and offer specific actions for facilitating evolution of the Agency to meet the challenges presented by the ever-changing global marketplace. This report is just the beginning of a long and arduous process. Designing approaches to implement the roughly 300 recommendations made by the Review Panel must be a collaborative effort based upon endorsement by APHIS-PPQ personnel and communication with external stakeholders. Organizational change and growth will be realized only with full participation by all interested parties. Everyone must be willing to set aside narrow, short-term agendas, and nurture growth of the Agency through successful implementation.

■ **The Panel asks *APHIS management* to lead and to trust.** Leadership must commit focus and resources to the process, appoint a broad-based Agency guiding coalition, empower that coalition, and support it fully. In return, management will benefit from a highly motivated work force interested in mission-oriented solutions rather than protecting the status quo.

■ **The Panel asks *APHIS field staff* to accept some personal sacrifice for the long-term survival and good of the Agency and the safeguarding mission.** In return, field staff should expect greater job satisfaction from working for an organization that values their contributions, and listens to their ideas. They will benefit from an organization that provides training, professional development, and the tools and technology to do their jobs well. They will enjoy greater local control over program and budget management.

■ **The Panel asks *APHIS program staff* to be open to new, more collaborative approaches to risk analysis and other functions that support the safeguarding mission.** In return, they will benefit from greater confidence in Agency decisions, less political interference in those decisions, and the professional growth that results from regular interaction with leading scientists and other outside experts in relevant fields.

■ **The Panel seeks for *state cooperators, principally the Plant Boards*, the opportunity for greater participation in APHIS decision making.** In exchange for a greater voice, state cooperators must commit to building, maintaining, and implementing consensus among their peers.

■ **The Panel seeks for other *external stakeholders—notably industry and other special interest groups*—the opportunity to participate, that is, to receive information and offer input on APHIS safeguarding decisions early**

and meaningfully. In exchange, external stakeholders must commit to becoming informed beyond their focused interests. They must commit to work within the process to support APHIS in carrying out its primary mission—plant resource safeguarding—in a complementary fashion with its other critical supporting roles to facilitate trade and expedite the movement of passengers and products.

■ **The Panel envisions for *all of society* an abundant and safe food, plant and plant product supply system, a more productive economy and a healthier environment.**

The groundwork for the implementation process will be laid by an Implementation Panel of APHIS-PPQ personnel and external stakeholders. To ensure continuity, the APHIS-PPQ Steering Committee and the Review Panel will form the core of the Panel. In addition, the Review Panel requests that the APHIS Steering Committee form the nucleus of the APHIS-PPQ guiding coalition. The Implementation Panel will be responsible for clarifying recommendations in order to help APHIS set priorities, formulate objectives and timelines for implementing specific recommendations, and document progress towards these goals. Progress will be the shared responsibility of the Implementation Panel and APHIS-PPQ management. A guiding coalition will be assembled to work closely with the APHIS-PPQ management and the Implementation Panel to ensure that progress is sustained. The APHIS-PPQ Executive Team must develop a budget that provides the guiding coalition with adequate resources to perform this function.

As primary stakeholders, the National Plant Board and National Association of State Departments of Agriculture (NASDA) will play a critical role in the implementation process. These groups will assist in legislative initiatives and other activities requiring focused Congressional involvement. The Review Panel requests that APHIS-PPQ present an implementation plan for discussion at the National Plant Board and NASDA meetings in August and September, respectively. The Implementation Panel looks forward to assisting as needed toward the development of this implementation plan. A *legacy document* highlighting findings, conclusions, and progress towards achieving the implementation plan is envisioned at the end of the two-year implementation phase.

This Review would not have been possible without the determination and perseverance of the Review Team and the APHIS-PPQ Steering Committee. Together with the Implementation Panel, they have vowed to make a good Agency even better.