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PEST RISK ANALYSIS
A Perspective

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CONTENTS

FOREWORD

One of the principal activities of Program V: Agricultural Health, of the Inter-American Institute for Cooperation on Agriculture (IICA), is to facilitate the export of agricultural products from IICA member countries. Assistance is provided to national and international technical and political organizations so that they can comply with phyto- and zoosanitary requirements imposed on international trade.

During the Uruguay Round of the General Agreement on Tariffs and Trade (GATT), one of the issues receiving attention was sanitary and phytosanitary standards. These standards have been and could continue to be used as non-tariff trade barriers. Central to the issue of sanitary and phytosanitary standards is the adoption of international pest risk analysis (PRA) methodology. Since IICA's Agricultural Health Program is actively promoting the harmonization of scientifically-based sanitary and phytosanitary standards, this document was developed to provide assistance in the adoption and maintenance of a standardized PRA methodology.

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SUMMARY

Accomplishments on sanitary and phytosanitary issues during the Uruguay Round of multilateral trade negotiations have given rise to new incentives for development of improved decision-making procedures for agricultural health regulatory officials. In the past, decisions to allow, prohibit or restrict entry of agricultural commodities were sometimes made without the benefit of pertinent biological data. In an effort to standardize the pest risk analysis (PRA) process, the General Agreement on Tariffs and Trade (GATT) requested assistance from the International Office of Epizootics (OIE), the World Heath Organization (WHO), and the Food and Agriculture Organization of the United Nations (FAO) for the development of uniform pest risk analysis methods. There is general consensus among these international organizations that PRA methods should include four interconnected actions: Risk assessment, risk management, decision making, and risk communication. This paper presents a five-step procedure for PRA and describes the role of the Inter-American Institute for Cooperation on Agriculture (IICA) and its Agricultural Health Program in the development and implementation of this process. Unresolved issues which may impact upon the adoption of a standard PRA methodology are also discussed.

RESUMEN

Los logros en cuestiones sanitarias y fitosanitarias alcanzados durante la Ronda Uruguay sobre negociaciones comerciales multilaterales han incentivado el desarrollo de mejores procedimientos para la toma de decisiones por parte de los funcionarios encargados de regular la sanidad agropecuaria. A veces en el pasado, las decisiones para permitir, prohibir o limitar la entrada de productos agrícolas se tomaron sin contar con datos biológicos pertinentes. En un esfuerzo por estandarizar el proceso de análisis del riesgo de plagas (PRA), el Acuerdo General sobre Aranceles Aduaneros y Comercio (GATT) solicitó asistencia a la Oficina Internacional de Epizootias (OIE), a la Organización Mundial de la Salud (OMS) y a la Organización de la Naciones Unidas para la Agricultura y la Alimentación (FAO), para desarrollar métodos uniforme para el análisis del riesgo de plagas. Entre estas organizaciones internacionales existe el consenso de que en los métodos para realizar un PRA deben incluirse cuatro acciones interrelacionadas: Evaluación del riesgo, manejo del riesgo, toma de decisiones y comunicación del riesgo. En este documento se presenta un procedimiento de cinco etapas para realizar un PRA, y se describe el papel del Programa de Sanidad Agropecuaria del Instituto Interamericano de Cooperación para la Agricultura (IICA) en el desarrollo e implementación de este proceso. También se discuten algunas cuestiones no resueltas que pueden repercutir en la adopción de una metodología estándar para realizar un PRA.

1
INTRODUCTION

The General Agreement on Tariffs and Trade, during the Uruguay Round, has focused attention on the type and size of domestic subsidies that governments provide their agricultural producers. These negotiations have been directed toward four specific areas: domestic support, market access, export subsidies, and sanitary and phytosanitary standards. The Inter-American Institute for Cooperation on Agriculture has actively assisted member governments of Latin America and the Caribbean in assessing the potential impacts of a new GATT agreement on all of these areas. Of particular interest to IICA's Agricultural Health Program are the GATT negotiations dealing with sanitary and phytosanitary standards. The Program's interest in these standards is based on the premise that they have been, and may continue to be, used as non-tariff barriers to trade. Thus, IICA's Agricultural Health Program has been active in promoting the harmonization of scientifically-based standards.

At issue within the GATT negotiations on sanitary and phytosanitary measures is the question of which set of international pest risk analysis standards should be adopted. Currently, risk assessment is defined within GATT as the evaluation of the likelihood of establishment or spread of pests or diseases, or the evaluation of the potential adverse effects on human or animal health arising from additives, contaminants, toxins or disease-causing organisms in foods, feedstuffs and beverages. This definition places the method adopted for the analysis of pest risk at the core of decision making for a more liberalized agricultural trade. The international organizations responsible for developing a standard pest risk analysis method are the International Office of Epizootics (OIE), the World Health Organization (WHO) and the Food and Agriculture Organization of the United Nations (FAO). The Food and Agriculture Organization, in turn, has requested that the North American Plant Protection Organization (NAPPO) prepare a draft proposal for pest risk analysis, which will be submitted to other regional plant protection organizations for comment. The purpose of this paper is to present IICA's activities and position on the question of pest risk analysis.

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BACKGROUND

Quarantine decisions have been made by governments for several hundred years. They were first occasioned by diseases and pests transmitted by humans; however, as nations became more sophisticated in agricultural technology, they began to extend these "quarantine decisions" to include agricultural products such as live animals, plants and their products. For all intents and purposes, these quarantine decision processes were the forerunners of today's pest risk analysis methods.

Prior to the GATT negotiations, agricultural quarantine decisions were made by importing nations through the study of commodity-contaminating pests and diseases upon their arrival at ports, or before arrival, through requests from exporters, importers or exporting nations. These decisions were usually made on the basis of studies prepared by specialists in the importing country. The biological data obtained from the studies and the decision process used by the importing nation were often not known to the exporting nation. Furthermore, there was no standardized methodology used in the data gathering or in the decision-making process. The modern-day process for these import-export decisions is known as PRA or pest risk analysis. A definition of PRA follows and an explanation of the methods presently being considered for presentation to GATT as a model to be used for PRA in the settlement of trade disputes involving it.

Definition of Pest Risk Analysis

PRA is considered to be the cumulative result of four separate actions: Risk assessment, risk management, decision making and risk communication. Each of these actions is dependent upon risk, which is defined as the consequence or magnitude of an adverse event and the likelihood of its occurrence. In agricultural trade, risk associated with the importation of commodities takes into account the likelihood of entry, establishment, spread of a disease or pest agent, and the magnitude of damage to the importing nation's agricultural production system that would ensue. **Risk assessment** is the process used to identify and estimate the statistical probabilities, as well as evaluating the consequences, of all risks associated with the importation of a commodity. **Risk management** is the process used to identify and implement measures that can be applied to reduce the risk and document the final import decision. **Decision making** is the process of reviewing the data and making a decision on the entry or prohibition of a given agricultural product. **Risk communication** is the process used to communicate the risk assessment and risk management results to the regulators of the import/export programs, to industry, and to the public.

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PEST RISK ASSESSMENT METHODOLOGY

The following PRA methodology is derived from documents prepared by NAPPO (1991), Hedley *et al.* (1991), the New Zealand Ministry of Agriculture and Fisheries (NZMAF), Hopper (1991), Yuan-bo (1991), OIE (1991), Morley and Acree (1991) and Kaplan (1991). For the most part, the information from these documents has been used by paraphrasing the original.

Pest risk assessments can be initiated by three different actions: A request for movement of an agricultural commodity, either nationally or internationally; a request to move a biotic agent, nationally or internationally; the interception of a contaminant or biotic agent transported in national or international commerce.

Commodities versus Biotic Agents or Intercepted Pests: Diseases as Initiators of a PRA

It is appropriate to emphasize that commodities, biotic agents or interceptions of pests or diseases can initiate the need for a PRA; however, the process or methodology used in any or all of the cases should be equivalent. The only possible methodological difference that might be considered is the need to list several biotic agents in the case of some commodities or interceptions, but usually only one biotic agent is listed in the case of requests for movement of specific biotic agents.

STEP ONE: Determination of pest disease status

Currently, the first step of a PRA may vary between animal and plant commodities. For example, in completing PRAs for plant materials, determining whether a pest is a "quarantine pest" is often considered to be the first step of the process; in animal commodities, all diseases are considered as unwanted events or agents which cause adverse economic impacts. The International Office of Epizootics does list animal diseases as "A", "B" or "C" in a disease code list; however, no "status" determination has been considered as necessary in PRA analysis of animal commodities. This situation may change in light of information indicating that some sub-clinical or "low virulence" disease agents may protect organisms from more virulent disease forms. Perhaps the NAPPO (1991) definition of quarantine pest as "a pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled," or some similar definition (or list) may be required for application to animal diseases. Whether a list or a definition is used, the first step of the PRA process should be to determine if a commodity has the potential to carry a disease(s) or quarantine pest(s) associated with the material. If the answer is affirmative, the second step of the PRA should be initiated. If the response is negative, the PRA is complete. The importing country could simply approve entry on the basis of the negative quarantine findings.

STEP TWO: Assessment of probabilities

The second step of the PRA is to assess the likelihood of entry, establishment, spread of a disease or pest agent and the magnitude of damage to the importing nation's agricultural production system that would ensue if the other actions did occur. Relatively simple probability calculations can be used to reach a numerical value which estimates the likelihood of each of these events. In an effort to reduce the redundancy of the words "pest and disease" in this section, the word "pest" will be used to denote both. For further simplification, the terms "establishment" (the ability of a biotic agent to continue to survive and perpetuate itself indefinitely within a defined geographical area) and "spread" (the ability of a biotic agent to move from a geographical area by both natural means and by man's assistance), as defined here, will be used as components of the "probability of domestic exposure." The potential for damage to the importing country's agricultural production system is also a component of the "probability of domestic exposure," but is expressed as a monetary loss and will be treated separately.

Therefore the second step of PRA is to determine the **PROBABILITY OF AGENT ENTRY x PROBABILITY OF DOMESTIC EXPOSURE**, for which the following guidelines are provided:

a) Agent entry probability is:

$$1-(1\text{-country factor X commodity factor})^{\text{no.import units}}$$

Where "country factor" is established by predicting: Pest prevalence; agricultural health infrastructure at origin and destination; border situation; regionalization of the pest; pest control strategies; and import policies, among others. The "commodity factor" is established by predicting: Frequency and quantity of pest movement by natural means; opportunity for contamination of a commodity, cargo, or means of conveyance by a pest; product processing; pest survival during transport; number and frequency of commodity shipments; pest transmissibility; commodity variety or breed; and environmental or climatic conditions during processing or shipment.

b) Establishment and,

c) Spread or domestic exposure (part) probability is:

$1-(1\text{-establishment factor or spread factor})^{*\text{no. import units}}$

While establishment and spread are defined differently, the factors used for predicting their probabilities are nearly identical. The only difference is the probability of conveyance of the biotic agent from the site of entry to the new geographic area.

The "establishment and spread factor" is determined by predicting: Host exposure scenario; domestic use (of the commodity); domestic destination; host population density; host susceptibility; presence of vector species; environmental suitability at destination; reproductive strategy of the pest; niche availability; and conveyance(s) at the entry site.

Morley and Acree (1991) have reported that the "probability of a disease outbreak = {P(O)} following the importation of one Animal Import Unit (AIU) of the commodity $P(O)= p_1\, p_2\, p_3$ etc.," where the several "p" represent various conditional probabilities of events related to pest entry. For example, p_1= probability that the AIU is infected with the disease agent. This value would be the prevalence of the disease in the exporting country.

The same authors report that when several (n) Animal Import Units are imported, the probability of a disease outbreak is not the product of a prior and several conditional probabilities, but is instead obtained through a computation based on the binomial distribution. The equation they present is:

$$P(O)=[1-[(1-p_1)^n + \Sigma(n!/j!(n-j)!)p_1^j(1-p_1)^{n-j}(1-p_2)^j]\ {}^*p^{3*}p^{4*}p^{5*}p^{6*}p^{7*}p^8$$

Where: p_1= the probability that a single AIU is infected.

j= the number of AIUs out of n that were infected, but are now agent-free.

$1-p_2$= the probability that the agent does not survive.

p^3 through p^8= the probability that exposure, transmission, infection, disease and disease detection occurs given that at least one AIU is infected at the port of entry.

Concerning the probability of domestic exposure, Morley and Acree (1991) state that "domestic exposure is estimated by the use of detailed scenario trees. The as –planned scenario is the importation of the commodity for its intended use without the occurrence of an adverse event. Departures from this planned scenario are called **initiating events** or **initiating failures.** Each scenario is depicted diagrammatically as a path with one or more branch points. Each segment of a path has a frequency of occurrence called a **split fraction.** The frequency of each path is therefore a product of the initiating event frequency and all split fraction frequencies. Since these parameters are generally not known, probability density function curves are generated by processing all the evidence available with Bayes' Theorem. The probability of a frequency is then the parameter assigned to each segment of the path (Kaplan 1991)."

d) Damage or domestic exposure (part) benefit/cost analysis:

In its simplest form, benefit/cost analyses are the gathering of economic data on those segments of the agricultural system that would be affected by the importation of exotic pests or diseases. Some of the factors that should be considered are: industry benefits; loss of export markets; data on agricultural losses; control and testing costs; environmental damage; and social costs (e.g., unemployment), among others.

There are many accepted methods for the development of comprehensive benefit/cost analysis. It is suggested that one standard format be accepted by all parties. A possible example may be found in software titled "Farm Simulation Model" developed by the Inter-American Development Bank.

STEP THREE: Risk management

The third step in the PRA process involves assembly of a list of measures which would reduce the risk of an importing country contracting a pest or disease with the entry of an agricultural commodity. This process is known as **risk management.** These risk reduction options include: permit entry of the commodity with inspection (types of inspection may vary from visual to diagnostic); permit entry of the commodity with inspection and treatment if warranted (these treatments could be permitted at the port of origin or at the port of destination); permit entry only with certified treatment (these treatments could vary from heat treatment to various agrochemicals or vaccines); permit entry only through post-entry quarantine facilities (this would allow the testing, discovery and identification of latent or occult infections or pests that might be carried unknowingly with the commodity). If no pest risk management measures can be identified, the most restrictive management measure should be employed so as to prohibit entry of the commodity.

For pest risk management, like pest entry, establishment, spread and damage probabilities can be estimated. The procedures would be the same as those suggested above in the first and second steps of the PRA process. Again, there would be a heavy reliance on Bayes' Theorem, as much of the data needed for probability analyses are not available.

STEP FOUR: Decision making

The fourth step is **decision making** and the assembly of the information gathered during the first three steps. The biological data on the quarantine pests or diseases, their ability to enter the importing country, establish, spread, and cause economic damage are then used to determine if the agricultural commodity is to be allowed entry with the necessary risk management options, or is to enter unrestricted.

After assembling the required biological data, these should be passed to the appropriate national or international body responsible for making decisions regarding the agricultural health of the importing nation. This body must have a standard requirement for data, which should include a list of information to be reviewed, and a standard methodology for decision making. This should include items such as: Who will be present at decision-making meetings; who will preside; when and where meetings will be held; and how results of the decision-making process will be communicated to interested parties.

STEP FIVE: Risk communication

Risk communication, the fifth step of the PRA process, is perhaps the most critical. This process of explaining the biological data gathered during risk assessment and the resulting decision must terminate in agreement between the potential importing and exporting countries. The processes used, therefore, should be fully understood, transparent and participated in by all interested parties. If this is not accomplished to the satisfaction of all, it may result in a dispute requiring settlement by a third party such as GATT, OIE or the Technical Secretariat of the International Plant Protection Convention (IPPC).

Risk communication should follow a standard format which has defined pathways, networks and time limits for development and delivery of information relevant to the risk analysis process. These communication mechanisms should provide for both national and international interests and should be agreed upon by members of any dispute settlement group.

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THE ROLE OF IICA'S AGRICULTURAL HEALTH PROGRAM IN PRA

The mission of the Agricultural Health Program at IICA is to promote improved agricultural health in Latin America and the Caribbean (LAC) through the use of information systems, legislation and advanced management programs for exotic pests and diseases. To accomplish this task, the program participates in cooperative technical development programs through liaisons with other international organizations, a hemispheric project, six regional projects, and several national projects. Each of these levels of the cooperative development program has a role in the PRA process.

International Organizations

Attendance at or the holding of international meetings has often been questioned by those not present; nonetheless, it has become increasingly evident that communication about and harmonization of the PRA methodology on an international level is a desirable goal if nations are to avoid trade wars or unfair trade practices which deter agricultural growth and development. The Inter-American Institute for Cooperation on Agriculture (IICA) has hosted a number of meetings during which important aspects of the PRA process have been discussed. It should continue to be a goal of IICA's Agricultural Health Program to support the adoption of standardized PRA methods. This goal should be attained through activities involving the following international organizations: OIE; FAO (IPPC Technical Secretariat); IAEA (International Atomic Energy Agency); ICGPP (Inter-American Coordinating Group on Plant Protection); ICGAH (Inter-American Coordinating Group on Animal Health; PAHO (Pan American Health Organization); and others as required.

The principal activities in support of standardized PRA methods that should be stressed in these international interactions are standardized procedures for risk assessment, risk management, decision making, and risk communication.

Hemispheric Project

The hemispheric project of the Agricultural Health Program has adopted as its principal thrust the development of a network for sharing agricultural health information and data bases, liberalized model quarantine legislation, and procedures for the management of exotic pests and diseases. Pest risk analysis methods will require inputs from each of these activities. To insure that a strong biological basis is used in PRA decision making, IICA must continue the rapid development of tangible products in these areas.

Perhaps the most urgent activities addressed by the hemispheric project are: An assessment of information systems (existing software and hardware in LAC); assessments of information and legislation needs (which information systems and model legislation needs to be developed); development of functional information networks; development of model legislation; procedural manuals for appropriate or hemispheric pest and disease control, quarantine methods and PRA methods; and assistance in the development and testing of PRA software.

Subregional Projects

The role of these projects is to assist countries of the Caribbean, Central American, Andean, and Southern Cone subregions in harmonizing information systems and networks, model legislation, pest and disease control methods and PRA procedures. Because each subregion is in a different stage of development in the trade harmonization process, the specific projects undertaken may vary.

In the Caribbean and Central American subregions, emphasis has been placed on the development of adequate information networks and training of personnel for the distribution and recovery of information needed for agricultural health decision making. In the Southern Cone, actions have been directed to the specific problems of the formation of the common market, MERCOSUR. Actions in support of MERCOSUR include assistance with quarantine procedures, regulation, and legislation for the movement of animal and plant products between the member countries. In the Andean subregion pest control methods and standardization of laboratory tests and procedures have been the activities emphasized.

National Projects

The role of IICA's national agricultural health projects is to work directly with government officials responsible for information, legislation and pest and disease control activities. More recently, this role has expanded to include the private sector and others who may be affected by the decisions made by public officials. In this capacity, IICA has undertaken actions requested by member governments. For the most part these actions have been focused on the evaluation of the ability of national pest and disease control agencies, laboratories, and regulatory agencies to complete agricultural health tasks. In addition, actions at the national level have been designed to better manage an agricultural health program which meets a country's specific climatic, ecological and agricultural production capabilities. Of special importance has been IICA's role in NAFTA (North American Free Trade Agreement). The Agricultural Health Program's role in NAFTA has been to assist Mexico in the reorganization of the SARH (*Secretaría de Agricultura y Recursos Hidráulicos*), to meet the needs of a more liberalized trade agreement. The tasks completed by IICA include development of over 20 training manuals on quarantine activities and restructuring and privatization of plant health laboratories.

Future activities that IICA should undertake at the national level include: Providing advice to national officials and the private sector on the importance of PRA; obtaining support for the adoption of a standardized PRA methodology; assisting governments in the preparation of biologically-based pest risk assessments; assisting governments in the training of personnel in standardized PRA methodology; the provision of additional updated PRA methods as they are developed; and providing governments with the information necessary to complete pest risk analyses.

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CONCLUSIONS

Current thinking in cooperative development has concluded that lesser-developed nations have the ability to compete successfully with developed nations in the agricultural sector if barriers to free trade are removed. The Inter-American Institute for Cooperation on Agriculture has played a major role in agricultural development through its Plan of Joint Action for Agricultural Reactivation in Latin America and the Caribbean (PLANLAC) and will continue to assist in the process of trade harmonization. Through the Agricultural Health Program, support will be given to the reduction of non-tariff agricultural trade barriers. More specifically, technical assistance will be given for the adoption and maintenance of a standardized PRA methodology, as this will be the mechanism through which non-tariff barriers may be tested and reduced. It will also form the basis for dispute settlement in the case of questions regarding the biological nature of decisions to prohibit the entry of agricultural products.

While biologically-based decisions are an obvious advantage of PRA, there are a number of issues that must be resolved if PRA is to be used to its full potential. These include the categorization of pests and diseases, the interpretation of biological data and decision making, risk communication, benefit/cost analysis, increased competition, costs added to agricultural products as a result of PRA, domestic versus international standards, technological differences, dispute settlement and enforcement, and costs associated with the collection, maintenance and distribution of information. A review of these issues follows.

Categorization of Pests and Diseases

The OIE, EPPO (European Plant Protection Organization) and the NZMAF are examples of international and national organizations which have adopted the concept of categories or "risk levels" for pests and diseases. In the case of animal diseases, OIE has categorized diseases in lists "A," "B" or "C" according to trade of socio-economic importance, or having an influence on production. NZMAF uses a four-category system based on a report by Baker and Cowley (1989) to assess acceptable risk. At issue is the standardization of these categories or lists and the effort that may be required to reach agreement on the placement (high- or low-risk level) of pests and diseases on such lists. While these lists may be useful to those employing them, it appears that PRAs will be required for individual pests and diseases. It is therefore not recommended that pest and disease "risk level" categories be developed, as they may have limited utility. Perhaps the best example of their utility is in the Bayes' Theorem applications, where limited biological information exists for a given pest or disease. This utilization, however, would not warrant the development of extensive "risk level" lists that might have little universal acceptance.

Interpretation of Biological Data and Decision Making

While the methodology exists to conduct sophisticated PRAs, there is a plethora of evidence that suggests that interpretation of biological data lacks the necessary consensus required to increase agricultural trade. To avoid problems of data interpretation, regulatory or other government officials of importer and exporter nations must work closely during all aspects of the PRA process. Hedley (1990) has suggested that the use of bilateral quarantine agreements may represent a useful mechanism to improve plant quarantine. This forum may also be a suitable model for the development of PRAs. Nations trading agricultural products that might harbor pests or diseases should endeavor to develop a rapid, clear and transparent data gathering, interpretation and decision-making process for PRAs, so as to avoid confusion that may negate the benefits of more liberalized trade. It appears that PRA methodology is being developed without a clear consensus on the mechanisms for its internal and external use. If no attention is given to these processes, regulators may follow the adage "when in doubt, keep it out." It might be more appropriate for them to use the results of an analysis based on the statistics of extreme events for decision making.

Risk Communication

There are large numbers of players in the field of agricultural trade. Most of these individuals and organizations will be affected by decisions taken as a result of the completion of PRAs. To insure that the results of a PRA and the decisions taken are accepted and adhered to by these players, a mechanism must be in place to communicate results to those who need them. Questions such as: What will be communicated? When will it be communicated? By whom and from whom will it be communicated? must be addressed. The process of risk communication, like that of the PRA, will be costly. Unfortunately, many of those countries that must rely on agricultural trade do not have the fiscal and technical resources to deal with the new activities that

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will be required. If they are unable to complete these evaluations, they will be unable to stay competitive with other more advanced agricultural exporting nations. Technical cooperation through international organizations and developed nations will be necessary if these countries are to participate in PRA and communication of risks involved with agricultural trade.

Benefit/Cost Analysis

Benefit/cost analyses are, for the most part, straightforward. There are, however, what are commonly referred to as "data gaps" or areas of missing information, which abound in the area of biological systems benefit/cost analysis. Perhaps the largest unknown in these systems is the cost of agrochemical control programs to the environment. Technical ability is improving, but the cost of obtaining the information and the margin of error are still both relatively high. Less-developed nations have little experience in these analyses and will require considerable financial and technical support to complete them. A standard, simple format should therefore be developed and recommended for universal use in the analyses that may be required when completing PRAs.

Increased Competition

Technological advantages which exist in the more developed nations will make agricultural competition difficult for some lesser-developed nations, regardless of the labor cost advantage. The tendency in countries with scant technological development has been to protect "infant industries" with tariff and non-tariff barriers. This, in turn, has often resulted in deficient production practices and high prices for protected agricultural products. At times, these barriers have also provided consumers with artificially low prices for agricultural products. As trade barriers are removed, these protected industries are likely to disappear as competitors are attracted by the opportunity to sell their high-quality agricultural products at the same price as local products offered with fewer technical inputs. Constituent pressure may force politicians to assist those agricultural producers affected by the reduction of trade barriers. If this assistance is channeled in the direction of improved technology for agricultural products that have a comparative advantage, then the PRA methodology will be beneficial. If PRA methodology is blocked in an effort to reduce competition, there will be less agricultural development in the countries practicing these tactics. An assessment of the impacts of trade liberalization is currently being conducted by the Inter-American Institute for Cooperation on Agriculture (IICA). These studies must be completed in order that both public

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and private sector representatives be aware of the consequences of trade reform. Furthermore, the results of these assessments must be made known to the private sector so that they can make the necessary adjustments to the production infrastructure.

Costs Added to Agricultural Products as a Result of PRA

As mentioned earlier in the section on benefit/cost analysis, there will be additional costs associated with pest risk analysis. These may range from additional processes such as risk communication to increased need for survey, monitoring, control, and quarantine treatments that might be required as a result of risk management findings from a PRA or from the information needed to perform a PRA. In addition to these cost increases, there may also be a change in where services are performed. For example, requirements for treatment or inspection at origin, as a risk management tool, will result in an increase in the cost of perishable products at origin rather than at the point of entry. Payment for these services will then stay in the country of origin rather than being spent in the country of destination. The issue in this case will be the costs associated with the training, completion and implementation of activities connected with pest risk analyses.

Domestic versus International Standards

Many nations may need to address the question of state or provincial rights in the PRA process. Those countries with decentralized quarantine activities, or where quarantine activities have been delegated to the states, will need to redefine federal and provincial responsibilities in risk assessment, management and communication. The issue of who has the authority for decision making in the PRA process may be hotly debated. Furthermore, the question of regional versus international standards may also serve as an obstacle for the acceptance of standardized PRA methodology.

Dispute Settlement and Enforcement

The four international organizations with the potential to serve in some capacity in the agricultural trade dispute settlement arena are FAO, IOE, WHO, and GATT. Unfortunately, not all contracting parties in the GATT are members of any one of these organizations. The General Agreement on Tariffs and Trade, the most logical arbiter for the settlement of disputes involving sanitary and phytosanitary issues, has been unofficially "selected" to play the role of judge and jury in such cases, while FAO, IOE and WHO serve as "expert witnesses" in these proceedings. However, some questions have not been answered. For example, who will be held responsible in situations where private transportation companies are "slow" to move perishable imported agricultural products from the port to market? Additionally, it will be difficult for GATT to enforce sanctions against some countries for non-tariff trade violations because of its Article XX(b), which recognizes a nation's right to protect the health and safety of its residents, plants and animals. Finally, the role of the IPPC Secretariat and regional plant protection organizations in the GATT decision-making process has not been fully addressed.

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PROGRAM V: AGRICULTURAL HEALTH

The principal goal of the Agricultural Health Program is to facilitate the safe international trade of agricultural products for IICA member countries. Successful international agricultural trade depends upon reliable agricultural health information. Thus, to assure the quality of their agricultural products, countries must be able to quickly and effectively provide credible evidence of freedom from dangerous pests, diseases, and chemical residues. Within this context, the Agricultural Health Program is involved in three basic activities:

- **Development of agricultural information systems for monitoring agricultural health.** This activity provides the basis for: a) improving export capabilities of Latin American and Caribbean (LAC) countries by helping them provide quality information on their products; b) helping protect agricultural industries of LAC countries by providing them with the best information available on the agricultural health status of other countries; and c) assisting LAC countries to increase agricultural production for domestic consumption by reducing the impact of sanitary problems.

- **Harmonization of legislative, pesticide, and quarantine regulations to facilitate agricultural exports.** This is a key element in economic development, particularly in light of the various trading blocs forming in the Western hemisphere. Harmonization of regulations within these trading blocs is essential to facilitate both intra- and extra-regional trade. Important areas in this regard are: a) certification to foster the export of healthy and safe agricultural products; b) quarantine measures to prevent the entry of exotic diseases and pests; and c) use of risk analysis.

- **Promotion of appropriate agricultural health practices for the control of pests and diseases.** These practices are essential in assuring the quality of foodstuffs and their by-products, inasmuch as they are related to domestic and foreign markets, and in maintaining sustainable systems in the agricultural sector. Of particular importance to Program V are those strategies used to combat exotic plant and animal pests and diseases.

These three activities generate the essential information, procedures and practices for implementation at the regional and country level.