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Pest Risk Analysis

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Abstract

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According to the terms of the Agreement on Sanitary and Phytosanitary Measures of the World Trade Organization, and of the draft revision of the International Plant Protection Convention, official phytosanitary measures now have to be "technical justified". In other words, national authorities will continue to take the necessary plant quarantine measures to prevent the introduction of plant pests, but may now be called upon to explain why they need to take measures for particular imported commodities, and why severe measures are taken when lighter measures might be considered sufficient. The process of "pest risk analysis" (PRA) is the scientific and administrative process which provides this technical justification. Scientists have worked out the information which is needed to do PRA, and have developed decision-making schemes based on this information. PRA can be divided into two parts: 1) pest risk assessment, which is concerned with the probability that a pest may enter a country, become established and cause economic loss; 2) pest risk management, which is concerned with the measures which can be taken to reduce this probability to an acceptable level. Plant quarantine authorities should in the first place find PRA useful in deciding which are the most important quarantine pests to be excluded and how to do this most efficiently. This is most important for countries which actively trade in plants and plant products, and have to judge carefully which risks are acceptable to them. In the second place, PRA provides a basis for justifying phytosanitary measures to other countries which may regard them as barriers to trade. For this purpose, it is important that PRA should be conducted in an internationally accepted manner. The IPPC Scretariat of FAO has developed International Standards for PRA, while organizations like EPPO have worked out internationally accepted schemes at a more detailed level.

Introduction

Pest Risk Analysis (PRA) is a subject area of plant protection that has assumed an increased prominence in recent years. According to the terms of the Agreement on the Application of Sanitary and Phytosanitary Measures of the World Trade Organization and the draft revision of the International Plant Protection Convention, official phytosanitary measures must be technically justified; the process of PRA is the scientific and administrative process that provides this justification. PRA is not a new process and has been used for as long as countries have constructed phytosanitary regulations, but it is only since the recent obligations on countries to be capable of defending their actions against challenge that there has developed the need to codify and standardize the PRA process. Scientists have identified the information that is needed to perform PRA and have developed decision-making schemes based on this information. But such schemes have not yet been validated in practice, and PRA is likely to require much greater input from biologists, economists and plant protection experts of all types, in terms of their expertise and targeted research results, both for the development of PRA methodology and its implementation.

Why PRA is needed

Since the end of the nineteenth century and throughout the present century, countries of the world have established phytosanitary regulations intended to prevent the introduction of exotic plant pests that could seriously damage their agricultural, forestry and horticultural industries. A typical set of phytosanitary regulations has the following form:

1. List of quarantine pests; these are the pests that are considered to present the greatest risk to the crops grown in the country
2. Prohibited commodities from specified sources; these commodities are considered always to present an unacceptable risk of introduction of one or more of the pests on the quarantine list
3. Requirements for other commodities from specified sources; the importing country declares to potential exporters which measures must be applied to certain commodities that would otherwise present an unacceptable risk of introduction of the listed quarantine pests.

Commodities that are not specified in the regulations are not thought to present any risk and are free to enter without restriction.

Although the form of phytosanitary regulations described above is the most common, especially among the countries of the European and Mediterranean region, other types also exist that are much less 'transparent', in that it is not possible for an exporter to know in advance which pests are quarantine pests and which commodities are prohibited or restricted. Either this information is not published or, in some cases, it does not exist because decisions about phytosanitary risk are made on the basis of each individual application for import.

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These regulations were established separately in different countries while no criteria existed for deciding what pests should be included and what measures would be appropriate. As an inevitable consequence, the content of the regulations were very variable with many pests included that did not justify their status as quarantine pests and, conversely, pests of major importance absent. Similarly, the measures to be applied to prevent introduction of these pests were often inappropriate. Not surprisingly, the people involved with facilitating trade have found this to be an unsatisfactory situation, feeling that unjustified quarantine pests and inappropriate measures represented unnecessary barriers to trade, whereas non-transparent regulations, in addition, allowed the discriminatory treatment of different trading partners.

The International Plant Protection Convention (1952) was the first attempt to bring some harmonization to phytosanitary regulations and to ensure that they were established only to protect against genuinely dangerous pests. It recognised the right of countries to establish phytosanitary regulations and prohibitions, to list quarantine pests and to take the necessary measures to implement the regulations (inspection, treatment, destruction and/or refusal of consignments), but, in order to minimise interference with international trade, only if the regulations were made necessary by phytosanitary considerations. This convention had the aim of protecting plants without interfering unduly with international trade, whereas the Agreement on the Application of Sanitary and Phytosanitary Measures of the World Trade Organization (the "SPS agreement") approaches the problem from another perspective and tries to ensure that international trade is unhindered without unduly risking the health of plants. The SPS agreement is essentially an attempt to ensure that phytosanitary measures are not used as a disguised barrier to trade.

The SPS agreement may be summarized by saying that countries have the right to take phytosanitary measures, but that such measures should be based on scientific principles (i.e. not political or economic etc.), on pest risk assessment (using techniques developed by international organizations) and on international standards. The measures should be applied only as far as necessary to achieve an appropriate level of protection previously decided by the country; this is taken to mean that the level of protection just ensures (and no more) that the level of risk becomes acceptable. If one country believes that the measures applied by another country do not fulfil these criteria, an explanation may be requested and shall be provided.

Such an agreement is highly desirable but, in fact, the PRA techniques and the international standards are only now in the process of being developed and much more time is needed before we have a fully operational system. But this is not to say that steps have not already been taken to improve the situation. In fact, Regional Plant Protection Organizations such as the European and Mediterranean Plant Protection Organization (EPPO) have been exploiting international cooperation for a number of years to harmonize the phytosanitary Regulations of their member countries, making them more technically justified.

In the late 1970's, EPPO reviewed the phytosanitary regulations of its member countries and observed that there was no consistency in the pests that countries considered to be quarantine pests nor in the requirements that were applied. It was, therefore, decided that EPPO should recommend a list of pests that were of sufficient importance to qualify as quarantine pests. It was further agreed that EPPO should advise its member countries on the phytosanitary measures that would be appropriate to prevent introduction and spread of these pests. This work began with the preparation of a preliminary list of pests that the experts in the member countries agreed presented the most risk to the major crops growing in the region. The list was subdivided into the so-called "A1" and "A2" lists of quarantine pests; the former are pests that are absent from all parts of the region, whereas the latter are pests that are present in some parts of the region but are capable of further spread. The A1 and A2 lists have been added to, progressively, throughout the succeeding 20 years so that now there are 266 organisms on the lists. In general EPPO recommends that only these pests should be included in the quarantine lists of its member countries and it may, occasionally, advise countries that they should remove certain non-recommended pests from their lists. To accompany each of the recommended quarantine pests, EPPO has also developed specific quarantine requirements (SQRs) which explain appropriate measures to be applied (usually by the exporting country) to prevent the introduction of that pest.

It is intended that EPPO member countries should construct their phytosanitary regulations on the basis of these EPPO recommendations. They should, in general, include all of the quarantine pests on the EPPO A1 list in their national quarantine lists, and select from the A2 list those that are of relevance to themselves. They should then use the appropriate SQRs to develop a set of requirements for commodities from specified sources.

The process of deciding on quarantine pests and on the measures that should be used against them has, up to now, been done by discussion among experts in plant quarantine and/or specialists on particular groups of pests. This is precisely a process of pest risk analysis, even if not formalized and described. The activities of recent years in developing PRA have been aimed at trying to describe, in a step-wise format, the procedure that the experts have intuitively followed.

What is PRA

Risk analysis is, of course, a technique used in all areas of human activity (politics, finance, engineering etc) and in our daily lives, where a decision is needed on whether a course of action should be taken. Table 1 presents the steps taken in any risk analysis and the terminology used.

In the analysis of risk in plant quarantine, the action is the authorization of importation of a certain commodity from a certain source; the incentive could be the need to import a staple food, the need to satisfy consumer demand, the need to sustain an industry, benefits from bilateral deals, free trade policy (it is generally considered that all trade is desirable and therefore there is sufficient incentive to try to ensure that it takes place); the hazard is the introduction of an exotic pest and the economic consequences; the risk is the combination of 1) the probability of the pest entering the country and becoming established, and 2) the potential economic, social or environmental impact. In practice, PRA is performed on a single pest to decide if it should be included in phytosanitary regulations and thus become a

quarantine pest, and what measures should be taken against it.

For convenience, pest risk analysis is considered to have several parts: initiation of the process, pest risk assessment and pest risk management. There are several possible reasons why a PRA on a particular pest might be initiated; for example the pest may have been intercepted on an imported commodity, or was identified as being a pest of a commodity newly, or soon to be, imported; the pest may have been identified as a risk by scientific research, or phytosanitary regulations are being revised.

Table 1. The process of risk analysis

- Consider a course of action
- Estimate the incentive
- Identify the hazard
- Assess the risk (i.e. quantify the hazard and estimate probability of hazard occurring)
- Compare risk and incentive
- Is risk acceptable
- If yes, take the action
- If no, consider measures to reduce risk
  Are they adequate ?
  Are they practical ?
  Are they excessive ?
- If appropriate, apply measures and take the action
- If no appropriate measures can be applied, do not take the action.

Once it has been established that the pest has a distinct taxonomic identity and can be distinguished from other organisms, a preliminary evaluation ("pest categorization") is performed to decide if it clearly has the necessary characteristics to be a quarantine pest. The characteristics are : 1) that the pest is absent from the area under consideration (the "PRA area", which is usually a country), or only of limited distribution and under official control; 2) that it could be introduced by trade or other human activity; 3) that it could establish and survive in the ecological and climatic conditions of the PRA area; 4) that there is a susceptible host grown in the PRA area; and 5) that it could cause economic damage. If one or more of these characteristics is lacking, the pest could not qualify as a quarantine pest and there is no need to continue with a more detailed assessment.

The remainder of the pest risk assessment section of PRA is a detailed evaluation of the probability of the pest being introduced and becoming established, followed by assessment of the potential economic impact if the pest should be introduced. It is necessary to know which commodities could the pest be carried on and what are the probabilities of it being present on these commodities, of surviving transportation and reaching a suitable host in the PRA area. Then it must be determined whether the pest can achieve long-term establishment, considering the range and extent of host plants available in the PRA area, the biological potential of the pest to colonise new environments, the climatic conditions, and the biotic conditions (such as competition, predators, vectors etc.)

The potential economic impact is assessed by comparing the known effect in the area of origin with the crop conditions in the PRA area. The rate of spread of the pest and possibilities of control will influence the possible impact. Environmental and social impacts are considered as well as direct economic effects on agriculture, forestry and horticulture, and also the influence that the presence of the pest might have on export markets. Additional costs due to increased research and advisory needs are also taken into account.

The Pest Risk Management stage receives from the risk assessment stage the conclusions on the probability of entry and establishment and the potential economic impact, and associates them as the overall pest risk. The first question that must be addressed is whether the overall pest risk is so small as to be acceptable. If it is, then the pest does not qualify as a quarantine pest and imports that might carry it can be authorized without restriction. But if the risk is not acceptable, then measures will be sought that will reduce it to an acceptable level.

In deciding on measures that might be suitable, the characteristics of the pest (especially the ease of detection in the consignment and the original crop, susceptibility to treatment and mobility) are taken into consideration in order to choose between measures that inspect or test the consignment, treat the consignment, limit the period when the consignment might be imported, treat the growing crop, employ specialised production methods, inspect the place of production or require the crop to be grown in isolation from sources of infection. More than one measure might be chosen where different measures are considered to be equivalent, but those selected should not only be effective in excluding the pest but should also be cost-effective and should not be more trade-restrictive than necessary. It is very commonly the case that no effective measures can be found that will reduce the risk to an acceptable level, in which case the only option is a prohibition of the particular commodity (or commodities) from infected sources; this, however should be considered to be the last resort after all other options have been exhaustively explored.

Development of PRA

Attempts to reach international agreement on acceptable procedures for PRA have been proceeding for a number of years, but have been delayed by some deep divisions of opinion among different parts of the world on the basic philosophies of plant quarantine. These divisions are being narrowed by more frequent international communication and discussion. An international standard on "Guidelines on Pest Risk Analysis" (2) has been developed by the Secretariat of the International Plant Protection Convention and has been approved by the Conference of FAO, and represents an important advance in global agreement in this difficult area. But, because the Guidelines are a compromise between different opinions, they can present only the general outlines of PRA and do not provide the level of detail necessary to conduct an individual analysis. Supplementary standards giving more detail on the different sections of PRA are still under study by the IPPC Secretariat. In the meantime, individual countries and regional plant protection organizations are continuing work in this area and a decision-making scheme for pest risk assessment has recently been agreed by the member

countries of EPPO (1). This scheme follows the outline presented in this paper and also corresponds closely with the international standard in preparation.

The future

Despite the progress in the production of international standards, there are still many areas in the subject of PRA that need further development before practical, reliable procedures can be easily implemented. A major difficulty lies in the evaluation of potential economic impact, in that methods proposed have not been validated in relation to plant quarantine and the data on which the evaluation is based are often unreliable or unavailable. This latter point, shortage of data, concerns also practically all the other aspects of PRA. Although there is often a considerable amount of information about the common plant pests, it is usually the exotic pests that are of concern to plant quarantine and for these, often only little information is available. Furthermore, the available information is of a general nature and not targeted to the performance of PRA. There is, therefore, a need for scientific research to be directed towards the methodology of PRA and to obtaining the information specifically needed for that purpose.

الملخص

مكنامارا، ديفيد. 1997. تحليل خطر الآفات. مجلة وقاية النبات العربية. 15(2): 143-146.

بناء على مواد اتفاقية إجراءات الصحة النباتية التابعة للمنظمة العالمية للتجارة، والنسخة المعدلة للمدونة الدولية لوقاية النبات، لا بد من أن تكون الإجراءات الرسمية لصحة النباتات "مبررة فنيا". وبمعنى آخر، ستستمر السلطات الوطنية في أخذ الإجراءات الضرورية في مجال الحجر الزراعي للحدّ من دخول آفات نباتية. ولكن قد يطلب إليها أن تفسر مدى الحاجة للقرارات المتخذة من أجل سلع مستوردة خاصة، ولماذا اتخذت اجراءات صارمة في الوقت الذي تكون فيه الإجراءات المخففة كافية. وعملية "تحليل خطر الآفة" هي عملية علمية وإدارية التي تضمن المبرر التقني. وقد بين العلماء المعلومات الضرورية لإجراء التحليل، وطوروا خطط اتخاذ القرار بناء على تلك المعلومات. ويمكن تقسم "تحليل خطر الآفة" إلى جزئين: 1) تقدير خطر الآفة، والذي يُعنى باحتمال دخول آفة إلى بلد، وإمكانية استقرارها وإحداثها لخسائر اقتصادية؛ 2) إدارة خطر الآفة؛ والذي يُعنى بالإجراءات التي يمكن اتخاذها لتقليل هذا الإحتمال إلى مستوى مقبول. وعلى هيئات الحجر الزراعي أن يجدوا "تحليل خطر الآفة" مفيدا في المرحلة الأولى لتقرير آفات الحجر الزراعي الأكثر أهمية لاستبعادها وكيفية القيام بذلك على نحو فاعل. وهذه النقطة هامة جدا للدول النشطة في تجارة النباتات ومنتجاتها، والتي عليها ان تقرر ما هي المخاطر المقبولة بالنسبة لها. ومن ناحية أخرى. يؤمن "تحليل خطر الآفة" الأسس لتبرير الإجراءات الصحية للدول التي ترى في هذه الاخيرة عائقا للتجارة. ولذلك، فإنه من المهم تنفيذ "تحليل خطر الآفة" بطريقة مقبولة دوليا. وقد طورت الامانة العامة للمدونة العالمية لوقاية النبات التابعة لمنظمة الأغذية والزراعة معايير دولية "لتحليل خطر الآفة" بينما وضعت منظمات أخرى كمنظمة وقاية النبات الاوروبية المتوسطية مشاريع مقبولة دوليا وعلى مستويات مفصلة.

References

1. **EPPO.** 1997. Guidelines on Pest Risk Analysis (PRA) – No.3. Pest Risk Assessment Scheme. Bulletin OEPP/EPPO Bulletin 27 (in press)

2. **FAO. 1996.** Guidelines on Pest Risk Analysis; International Standards on Phytosanitary Measures, Publication No.2, 21 pp. Food and Agricultural Organization of the United Nations, Rome.

Inspection Methodology for Plant Quarantine

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Abstract

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The inspection of agricultural products for import and export is widely recognized as an essential and fundamental tool for pest risk management in phytosanitary programs throughout the world. Quarantine actions, including the treatment or rejection of consignments, is routinely required by plant protection officials based on inspection findings. These actions can have significant impacts on trade and are open to the scrutiny of trading partners and international organizations such as the World Trade Organization (WTO) and the International Plant Protection Convention (IPPC). It is therefore incumbent upon phytosanitary authorities to be clear about the role of inspection in their programs in order to ensure that the methodologies they employ provide an appropriate level of protection and are also consistent with relevant principles of trade. The criteria used to determine whether inspection should be used, and how it is to be used, must be clear at the outset. The development and selection of appropriate methodologies then requires consideration of the pest risk in relation to the detectability of the pest and the practicality of inspection at some level of intensity. A number of technical and practical variables must be carefully evaluated and certain basic principles of statistics are employed for the design of sampling plans that are as fair as possible to trade while also maximising the efficacy of inspection as a pest risk management tool.

Introduction

Plant quarantine inspection personnel in every corner of the world are required to draw inferences about consignments based on the inspection of selected samples. Hundreds of decisions are made daily using a sample to represent the whole. Millions of dollars worth of agricultural commodities hang in the balance -- hostages to the decisions believed to have plant protection as their objective. What is the technical justification for using inspection as the basis for such decisions? How is the inspection methodology determined? What criteria are used to define acceptance or rejection? And, finally, how do we know if inspection is fairly applied in trade?

The need and right of countries to protect their plant resources is not disputed. But it is also clear that some risk must be accepted when trading commodities in international