

*Publication No. 2
February 1996*

INTERNATIONAL STANDARDS FOR PHYTOSANITARY MEASURES

GUIDELINES FOR PEST RISK ANALYSIS



Secretariat of the International Plant Protection Convention
Food and Agriculture Organization
of the United Nations
Rome, 1996

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form by any means, electronic, mechanical, photocopying or otherwise, without the prior permission of the copyright owner. Applications for such permission, with a statement of the purpose and extent of the reproduction, should be addressed to the Director, Information Division, Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, 00100 Rome, Italy.

© FAO 1996

CONTENTS

<i>Endorsement</i>	1
<i>Review and amendment</i>	2
<i>Distribution</i>	3

INTRODUCTION

SCOPE	4
REFERENCES	4
DEFINITIONS AND ABBREVIATIONS	4
OUTLINE OF REQUIREMENTS	6

GENERAL REQUIREMENTS FOR PEST RISK ANALYSIS (PRA)

1.	STAGE 1: INITIATING THE PRA PROCESS	7
1.1	PRA Initiated by a Pathway	7
1.2	PRA Initiated by a Pest	9
1.3	Review of Earlier PRAs	9
1.4	Conclusion for Stage 1	9
2.	STAGE 2: PEST RISK ASSESSMENT	11
2.1	Geographical and Regulatory Criteria	11
2.2	Economic Importance Criteria	12
2.2.1	Establishment potential	12
2.2.2	Spread potential after establishment	13
2.2.3	Potential economic importance	13
2.3	Introduction Potential	14
2.4	Conclusion for Stage 2	15
3.	STAGE 3: PEST RISK MANAGEMENT	17
3.1	Risk Management Options	17
3.2	Efficacy and Impact of the Options	17
3.3	Conclusion for Stage 3	18
4.	DOCUMENTING THE PRA PROCESS	18
	<i>Figure 1. PRA Stage 1: Initiation</i>	8
	<i>Figure 2. PRA Stage 2: Assessment</i>	10
	<i>Figure 3. PRA Stage 3: Management</i>	16

Endorsement

International standards for phytosanitary measures are prepared by the Secretariat of the International Plant Protection Convention as part of the United Nations Food and Agriculture Organization's global programme of policy and technical assistance in plant quarantine. This programme makes available to FAO Members and other interested parties these standards, guidelines and recommendations to achieve international harmonization of phytosanitary measures, with the aim to facilitate trade and avoid the use of unjustifiable measures as barriers to trade.

The following standard was endorsed by the 28th Session of the FAO Conference in November 1995.

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

Review and amendment

International standards for phytosanitary measures are subject to periodic review and amendment. The next review date for this standard is 2001, or such other date as may be agreed upon by the Commission on Phytosanitary Measures.

Standards will be updated and republished as necessary. Standard holders should ensure that the current edition of this standard is being used.

Distribution

International standards for phytosanitary measures are distributed by the Secretariat of the International Plant Protection Convention to all FAO Members, plus the Executive/Technical Secretariats of the Regional Plant Protection Organizations:

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

INTRODUCTION

SCOPE

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

REFERENCES

Glossary of phytosanitary terms, 1997. ISPM Pub. No. 5, FAO, Rome.*

International Plant Protection Convention, 1992. FAO, Rome.

Principles of plant quarantine as related to international trade, 1995. ISPM Pub. No. 1, FAO, Rome.

DEFINITIONS AND ABBREVIATIONS

Area	An officially defined country, part of a country or all or parts of several countries.
Endangered area	An area where ecological factors favour the establishment of a pest whose presence in the area will result in economically important loss.
Entry (of a pest)	Movement of a pest into an area where it is not yet present, or present but not widely distributed and being officially controlled.
Entry potential	Likelihood of the entry of a pest.
Establishment	Perpetuation, for the foreseeable future, of a pest within an area after entry.
Establishment potential	Likelihood of the establishment of a pest.
Introduction	Entry of a pest resulting in its establishment.
Introduction potential	Likelihood of the introduction of a pest.
IPPC	International Plant Protection Convention, as deposited in 1951 with FAO in Rome and as subsequently amended.

* The terms and definitions published in 1996 in this standard conform to this edition of the *Glossary of phytosanitary terms*.

National Plant Protection Organization (NPPO)	Official service established by a government to discharge the functions specified by the IPPC.
Official	Established, authorized or performed by a National Plant Protection Organization.
Pest	Any species, strain or biotype of plant or animal or any pathogenic agent, injurious to plants or plant products.
Pest free area	An area in which a specific pest does not occur as demonstrated by scientific evidence and in which, where appropriate, this condition is being officially maintained.
Pest risk analysis (PRA)	Pest risk assessment and pest risk management.
Pest risk assessment	Determination of whether a pest is a quarantine pest and evaluation of its introduction potential.
Pest risk management	The decision-making process of reducing the risk of introduction of a quarantine pest.
Phytosanitary measure	Any legislation, regulation or official procedure having the purpose to prevent the introduction and/or spread of quarantine pests.
Phytosanitary regulation	Official rule to prevent the introduction and/or spread of quarantine pests, by regulating the production, movement or existence of commodities or other articles, or the normal activity of persons, and by establishing schemes for phytosanitary certification.
PRA area	Area in relation to which a pest risk analysis is conducted.
Quarantine pest	A pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled.
Spread	Expansion of the geographical distribution of a pest within an area.
Spread potential	Likelihood of the spread of a pest.

OUTLINE OF REQUIREMENTS

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

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

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

GENERAL REQUIREMENTS FOR PEST RISK ANALYSIS (PRA)

1. STAGE 1: INITIATING THE PRA PROCESS

There are generally two initiation points for a pest risk analysis (see Figure 1):

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

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

1.1 PRA Initiated by a Pathway

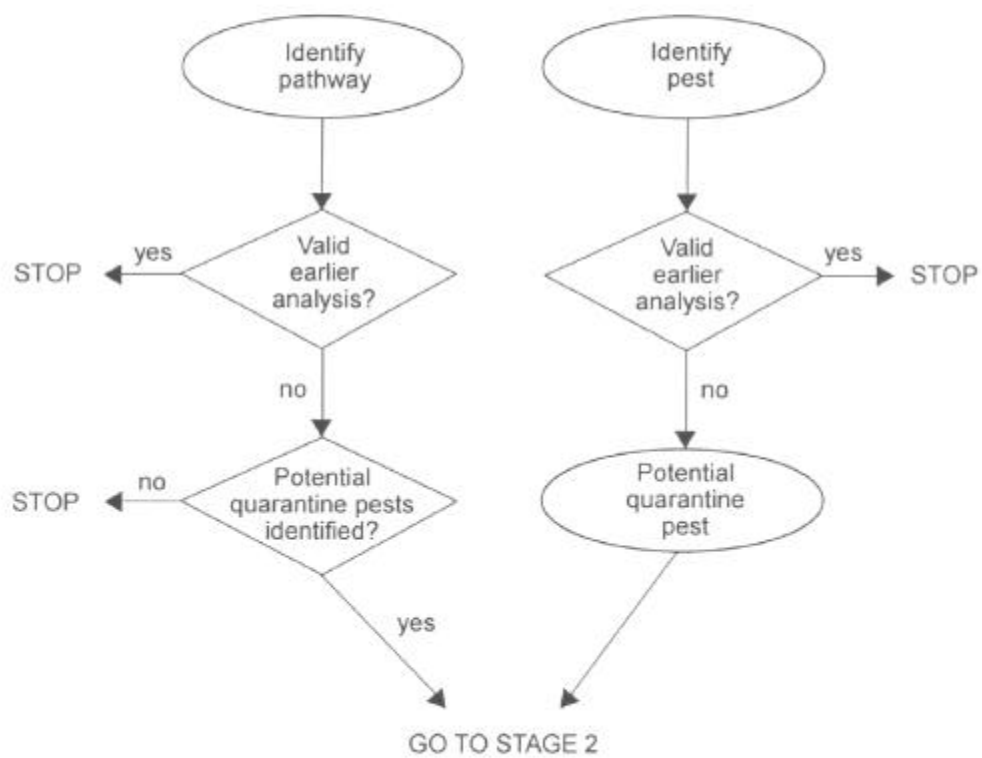
A requirement for a new or revised PRA originating from a specific pathway will most frequently arise in the following situations:

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

The pests which are likely to follow the pathway (e.g. be carried by the commodity) are then listed, and each is then subjected to Stage 2 in the PRA process¹. If no potential quarantine pests are identified as likely to follow the pathway, the PRA stops at this point.

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

FIGURE 1
PEST RISK ANALYSIS
Stage 1: Initiation



1.2 PRA Initiated by a Pest

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

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

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

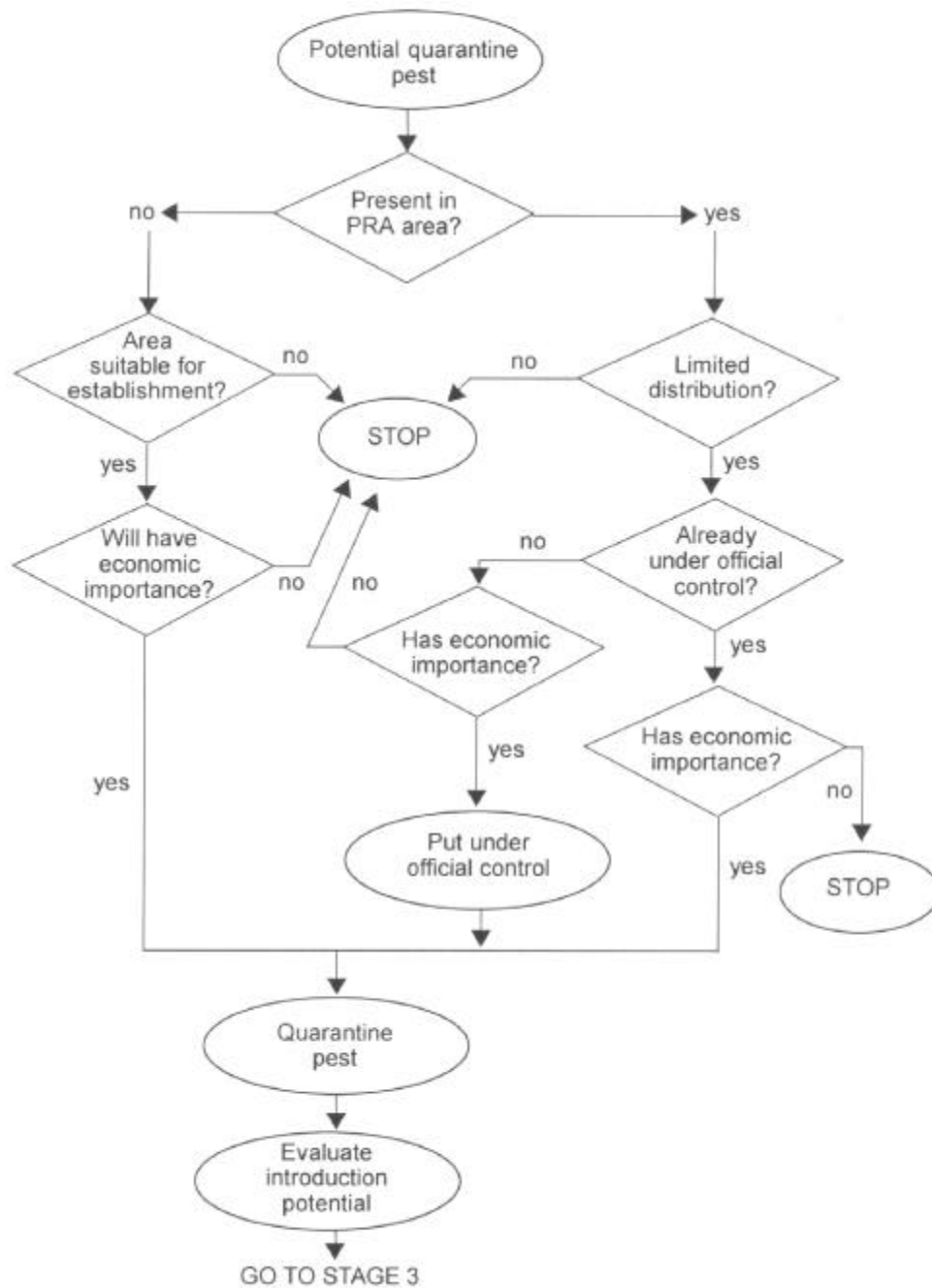
1.3 Review of Earlier PRAs

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

1.4 Conclusion for Stage 1

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

FIGURE 2
PEST RISK ANALYSIS
Stage 2: Assessment



2. STAGE 2: PEST RISK ASSESSMENT

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

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

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

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

and "endangered area" should be understood to mean:

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

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

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

2.1 Geographical and Regulatory Criteria

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

- If the pest is present in the PRA area and has reached the limits of its ecological range (i.e. is widely distributed), then the pest does not satisfy the definition of a quarantine pest and the PRA for the pest stops at this point
- If the pest is present in the PRA area and has not reached the limits of its ecological range (i.e. not widely distributed), and the pest is subject to official control in the PRA area, then the pest satisfies this aspect of the definition of a quarantine pest

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

2.2 Economic Importance Criteria

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

2.2.1 Establishment potential

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

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

- availability, quantity and distribution of hosts in the PRA area
- environmental suitability in the PRA area
- potential for adaptation of the pest
- reproductive strategy of the pest
- method of pest survival.

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

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

2.2.2 Spread potential after establishment

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

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

- suitability of the natural and/or managed environment for natural spread of the pest
- movement with commodities or conveyances
- intended use of the commodity
- potential vectors of the pest in the PRA area
- potential natural enemies of the pest in the PRA area.

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

2.2.3 Potential economic importance

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

In order to estimate the potential economic importance of the pest, information should be obtained from areas where the pest currently occurs.

For each of these areas, note whether the pest causes major, minor or no damage. Note whether the pest causes damage frequently or infrequently. Relate this, if possible, to biotic and abiotic effects, particularly climate.

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

- type of damage
- crop losses
- loss of export markets
- increases in control costs
- effects on ongoing integrated pest management (IPM) programmes
- environmental damage
- capacity to act as a vector for other pests

- perceived social costs such as unemployment.

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

2.3 Introduction Potential

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

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

Entry:

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

Establishment:

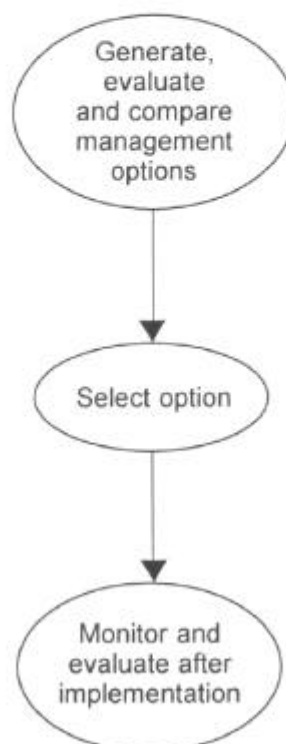
- number and frequency of consignments of the commodity
- number of individuals of a given pest associated with the means of conveyance
- intended use of the commodity
- environmental conditions and availability of hosts at the destination and during transport in the PRA area.

2.4 Conclusion for Stage 2

If the pest satisfies the definition of a quarantine pest, expert judgement should be used to review the information collected during Stage 2 to decide whether the pest has sufficient economic importance and introduction potential, i.e. sufficient risk, for phytosanitary measures to be justified. If so, proceed to Stage 3; if not, the PRA for the pest stops at this point³.

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

FIGURE 3
PEST RISK ANALYSIS
Stage 3: Management
from Stage 2



3. STAGE 3: PEST RISK MANAGEMENT

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

3.1 Risk Management Options

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

- inclusion in list of prohibited pests
- phytosanitary inspection and certification prior to export
- definition of requirements to be satisfied before export (e.g. treatment, origin from pest free area, growing season inspection, certification scheme)
- inspection at entry
- treatment at point of entry, inspection station or, if appropriate, at place of destination
- detention in post-entry quarantine
- post-entry measures (restrictions on use of commodity, control measures)
- prohibition of entry of specific commodities from specific origins.

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

3.2 Efficacy and Impact of the Options

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

- biological effectiveness
- cost/benefit of implementation
- impact on existing regulations
- commercial impact
- social impact
- phytosanitary policy considerations
- time to implement a new regulation
- efficacy of option against other quarantine pests
- environmental impact.

The positive and negative aspects of the options should be specified. While it is recognized that countries according to the sovereignty principle may exercise their sovereign right to utilize phytosanitary measures, countries should also take particular note of the "**Minimal impact**" principle:

Phytosanitary measures shall be consistent with the pest risk involved, and shall represent the least restrictive measures available which result in the minimum impediment to the international movement of people, commodities and conveyances.

Article VI.2(f) of the International Plant Protection Convention makes a similar but less comprehensive provision. Phytosanitary measures recommended should be based on all of the above factors.

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

3.3 Conclusion for Stage 3

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

4. DOCUMENTING THE PRA PROCESS

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

For further information on international standards, guidelines and recommendations concerning phytosanitary measures, and the complete list of current publications, please contact the:

Secretariat of the International Plant Protection Convention

By mail: IPPC Secretariat
 Plant Protection Service
 Food and Agriculture Organization of the United Nations (FAO)
 Viale delle Terme di Caracalla
 00100 Rome, Italy

Fax: + (39) (06) 57056347

Email: ippc@fao.org

Or visit our WEB site at:

<http://www.fao.org/WAICENT/FaoInfo/Agricult/AGP/AGPP/PQ/Default.htm>