ASEAN REGIONAL GUIDELINE FOR THE IMPLEMENTATION OF INTERNATIONAL STANDARDS RELATED TO SPS MEASURES

GUIDELINE 2
PEST RISK ANALYSIS

Supported by:

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Introduction

The Sanitary and Phytosanitary Measures Agreement

The World Trade Organisation (WTO) recognises each nation's sovereign right to use sanitary and phytosanitary (SPS) measures to protect animal, plant and human health. The Agreement on the Application of SPS Measures (SPS Agreement) is a WTO Agreement that formalises how these SPS measures should be used so that they do not unduly affect trade. The SPS Agreement is necessarily broad and strategic: it outlines the principles to be followed but provides little detail on how to implement these principles. International standards set by the World Organisation for Animal Health (OIE), the International Plant Protection Convention (IPPC) and the Codex Alimentarius (Codex) Commission provide further guidance, including technical details and recommendations for implementation.

The major features of the SPS Agreement include:

- countries may set their own standards and methods of inspecting products
- regulations must be justifiable and based on science
- regulations should be applied only to the extent necessary to protect human, animal and plant life or health—in other words, measures should restrict trade to the least extent possible
- regulations should not arbitrarily or unjustifiably discriminate between countries where identical or similar conditions prevail
- countries are encouraged to use international standards, guidelines and recommendations where they exist, but may implement higher standards provided these are scientifically justified and based on appropriate risk analysis that is consistently applied.

Members can use two broad approaches in setting SPS measures, consistent with the SPS Agreement:

- implement the normative standards established by the relevant international standards
- implement SPS measures to suit an individual country's risk tolerance based on a defined appropriate level of protection (ALOP), underpinned by a risk analysis and credible scientific justification.

While Members accept that each country can determine its own ALOP, the SPS Agreement seeks to ensure that SPS measures are the minimum required to provide that protection, are consistently applied, are not misused for protectionist purposes and do not result in unnecessary barriers to international trade.

Sanitary and Phytosanitary Measures Agreement in ASEAN

In recent years, the volume of trade in agri-foods has grown rapidly in Southeast Asia. However, despite formally adopting SPS Agreement principles, many ASEAN Member States (AMS) face difficulties putting into effect these principles and the relevant international standards, guidelines and recommendations. Among AMSs, there is a high degree of variability in the maturity of SPS systems and capacity to implement. Looking forward, as agri-food industries continue to expand in the region increasing the capacity for AMSs to implement the SPS agreement is of paramount importance.

ASEAN Regional Guideline for the Implementation of International Standards related to SPS Measures

The ASEAN-Australia-New Zealand Free Trade Area (AANZFTA) Economic Cooperation Support Programme (AECSP) aims to assist ASEAN countries to maximise the benefits of AANZFTA with the aim of enhancing trade within the region and between Australia, New Zealand and AMSs. A crucial

component of improving trade is to enhance implementation of the SPS agreement and international standards by AMSs.

Within this context, AANZFTA developed a project to provide assistance to the AMSs to develop their own national SPS standards based on international standards, guidelines and recommendations, where they exist. The immediate aims of the project are:

- To enhance understanding and recommend solutions about the challenges encountered by AMS in developing national SPS standards based on international standards, guidelines (IPPC, OIE, Codex); and
- To develop a regional guideline to assist AMS in their practical implementation of international standards related to SPS measures

The project is divided into two phases. Phase 1 was a comprehensive study resulting in a report, titled 'Review Report of the Implementation of SPS Agreement and International Standards in ASEAN Member States'

This guideline is the second in a series of guidelines produced as part of Phase 2 of the project. These guidelines are complemented by a collection of e-learning modules. These guidelines are deliberately succinct and written in plain language to facilitate accessibility for a wide audience

Pest risk analysis

Risk analysis in plant health

The use of risk analysis for plants and plant products commenced relatively recently, with the publishing of the SPS Agreement in 1995. As per this agreement, the IPPC's International Standards for Phytosanitary Measures (ISPMs) provide international standards for pest risk analysis (PRA). PRA is defined by the IPPC as the 'process of evaluating biological or other scientific and economic evidence to determine whether a pest should be regulated and the strength of any phytosanitary measures to be taken against it'.

PRA is now recognised as a core instrument in preventing pest incursions in the context of international trade and movement of people.

Why undertakes a PRA?

A PRA is a science-based decision-making tool used to identify whether an organism or a group of organisms is a potential pest for a given geographical area, and if so to select the appropriate phytosanitary measures, or groups of phytosanitary measures, to reduce the risk of the introduction, establishment and spread of the pest in that endangered area. It provides the rationale for the selection and application of phytosanitary measures to address the risk in the PRA area.

A PRA may be initiated to:

- Identify high-risk pests or commodities, or high-risk groups of commodities, or high-risk import pathways;
- Identify the pest potential of organisms not previously identified as pests (e.g. biological control agents, plants that may become weeds);
- Review pathways and means of entry for pests; and
- Review and amend current policy and processes to mitigate risk associated with known pests.

A PRA may focus on

- A commodity or category of commodities (e.g. citrus, cut flowers, foliage),
- A specific pest or group of pests (e.g. Phytophthora species, mealybugs, scales, thrips), and/or
- One or more forms of conveyance of the pest or commodity (e.g. importation of coco peat as growing media).

PRA requires consideration of the means of entry and spread of a pest into an area. These fall under the broad categories of natural means (not assisted by humans), trade, human travel and natural introductions.

Requirements for pest risk analysis

Human resources for PRA

Pest risk analysis is a multidisciplinary field, and requires input from experts in various fields. Depending on the risk question, these may include botany, entomology, plant pathology, mycology, virology, bacteriology, ecology, invasion biology, economics and modelling.

PRA components

The components of PRA are initiation, risk assessment and risk management. The PRA process is rarely linear and is reiterative so the development of these components is unlikely to be entirely sequential.

Pest risk initiation

The initiation stage of a PRA involves identifying the pest(s) and pathway(s) that are of quarantine concern for the area at risk. This stage will include steps to:

- Define the PRA area (the area potentially at risk, which could be a country, part of a country or a region);
- Identify the focus of the PRA (pest, commodity, or conveyance);
- Define the risk pathway(s);
- Check for existing PRAs that address a similar question to avoid unnecessary duplication.

Pest risk assessment

Risk assessment is undertaken to assess the probability of the introduction and spread of a pest, and the magnitude of the associated potential consequences.

Risk assessment may be qualitative, semi-quantitative and quantitative. Semi-quantitative risk assessments are now rarely used. Qualitative risk assessments are often preferred, because they are less complex and so require fewer resources and fewer data. In qualitative risk assessment, risk is described with words, rather than estimated using numerical probabilities. Pest risk assessment involves four components: categorisation, probability of introduction and spread, assessment of consequence and risk estimation.

Pest categorisation

Pest categorisation involves identifying whether the pest(s) are 'quarantine pests' for the PRA area. Quarantine pests are pests of potential economic importance to the area and not yet present there, or present but not widely distributed and being official controlled. The opportunity to eliminate an organism or organisms from consideration before in-depth examination is undertaken is a valuable characteristic of the pest categorization process. An advantage of pest categorization is that it can be done with relatively little information.

If the pest(s) is classified as a quarantine pest, full risk assessment is required. If the pests(s) is not a quarantine pest, no further risk assessment is required. During pest categorisation, the assessor should consider:

- Does the pest meet the criteria for a quarantine pest?
- What is the potential for the pest to be associated with the commodity or pathway under consideration?
- What is the potential impact of the pest?

- How likely is introduction and establishment of the pest if no mitigation measures are applied to the pathway(s)?

Assessment of the probability of introduction and spread of the pest

The probability of introduction of the pest (entry and establishment) and spread of the pest is estimated after pest categorisation. This involves estimating a number of probabilities including:

- The probability of the pest being associated with the risk pathway at its origin;
- The probability of survival during transport;
- The probability of transfer onto a suitable host; and
- The probability of establishment.

This requires consideration of the biology of the pest and its eventual interaction with a single or a range of hosts. Other considerations include how common the pest is at the point of origin of the risk pathway, the presence and availability of alternate hosts and or reservoir in the PRA area, the presence of vectors in the PRA area where relevant (e.g. for bacteria, viruses, viroids and phytoplasma), the presence of reservoir hosts and the overall suitability of the PRA area environment. Additional considerations may include reproductive strategies of the pest (e.g. presence or absence of compatible mating types for Phytophthora spp.), host resistance, genetic variability and adaptability, and minimum population levels or thresholds for establishment (e.g. a gravid European honey bee queen is not enough to establish a colony—she needs workers).

Assessment of potential consequences of pest introduction and spread.

The potential consequences of introduction and spread of the pest are then estimated. This requires consideration of the direct and indirect economic impacts. Some of these impacts may be:

- Economic (direct yield losses, increased cost of production due to control measures, loss of export markets or loss of access to future export markets, loss of domestic markets, impact on tourism etc.);
- Social (loss of employment on farms or in packing facilities, impact on recreational activities etc.);
- Environmental (direct or indirect effect of the pest on endemic and introduced species, managed and natural ecosystems);
- Cultural/ religious (e.g. through destruction of culturally significant species).

For qualitative assessment an economist may be required to assess the economic impact of a pest using analytical tools. For a qualitative risk analysis, the level of impact can be estimated using words (e.g. negligible/very low/low/medium/high/extreme). The IPPC guidelines on risk analysis (ISPM 2) specify that the organism has to have the potential to cause unacceptable economic impact on the PRA area for it to be classified as a pest.

Estimation of risk

To estimate risk, the probability of introduction and spread are combined with the estimated consequences. For qualitative risk analyses, matrices are commonly used for this purpose. An example matrix is shown here. This matrix is what Australia currently uses.

Likelihood of pest entry, establishment and spread	Negligible	Very low	Low	Moderate	High	Extreme
High	Negligible risk	Very low risk	Low risk	Moderate risk	High risk	Extreme risk
Moderate	Negligible risk	Very low risk	Low risk	Moderate risk	High risk	Extreme risk
Low	Negligible risk	Negligible risk	Very low risk	Low risk	Moderate risk	High risk
Very low	Negligible risk	Negligible risk	Negligible risk	Very low risk	Low risk	Moderate risk
Extremely low	Negligible risk	Negligible risk	Negligible risk	Negligible risk	Very low risk	Low risk
Negligible	Negligible risk	Negligible risk	Negligible risk	Negligible risk	Negligible risk	Very low risk

Consequences of pest entry, establishment and spread

Figure 1 Risk matrix. Source: Australian Department of Agriculture, 2014

After risk is estimated, it can be compared to your country's predefined appropriate level of protection (ALOP, see guideline 1) to identify whether the level of risk is acceptable or requires management.

Risk management

When the level of risk requires reduction, risk management is needed. The risk management phase aims to identify an appropriate strategy to lower the risk of the pest to an acceptable level (as defined by a country's ALOP).

All available mitigation strategies should be evaluated with consideration of their efficiency in reducing risk and their feasibility and cost.

The risk management strategies eventually selected must not unnecessarily restrict trade (to adhere to the IPPC principle of minimum impact). There may be 'official' phytosanitary measures to mitigate risk associated with certain pests outlined in the IPPC's ISPMs.

If there are no measures available to sufficiently lower the risk of a pest, total prohibition can be considered (e.g. banning importation of particular goods along high-risk pathways).

Consideration of the risk continuum in risk management

It is important that the full risk continuum— pre-border, border and post-border— is considered in identifying technically justified and economically optimal phytosanitary measures to mitigate risk. Pre-border activities to consider in risk management include:

- Identifying pest threats;
- Managing quarantine risks offshore;
- Undertaking offshore research and development where pests are endemic;
- Collaborating with others to reduce the likelihood of pests spreading;
- Early warning systems for emerging threats.

Border activities to consider in risk management include:

- Implementing effective quarantine for people, machinery, plants and goods;
- Establishing trapping and surveillance;
- Initiating checks and treatments to reduce the risk of pests crossing borders;
- Providing intelligence back to risk assessment areas.

Post-border activities to consider in risk management include:

- Minimising the risk of regional and property entry and establishment;
- Preparing for timely detection of emergency pests and diseases through surveillance, and for rapid response to such incursions;
- Developing capacity to respond to incursions, and thus reduce the probability of establishment of pests ;
- Working with industry and the community to develop more resilient sectors who have increased ability to manage pests and disease.

Examples of specific risk mitigation strategies are:

- Options preventing or reducing infestations in the growing crop (e.g. pest management practices, monitoring, Integrated Pest Management, etc.);
- Options ensuring that the area, place, or site of production is free from the pest (e.g. surveillance and monitoring, treatments, Pest Free Areas);
- Options for application to consignments and commodities (e.g. post-harvest treatments, phosphine fumigation, inspections, etc.);
- Options for other types of pathways (e.g. certification of packing materials etc.);
- Options to be applied within the importing country (e.g. pre-clearance, "off-shore" treatments, etc.);
- Prohibition or restriction of commodities;
- Requirement for phytosanitary certificate or other compliance measures;
- Systems approaches.

Relevant documents for PRA

There are three ISPMs directly relevant to the development of PRAs and two additional ones dedicated to a systems approach and the management of risks for exports.

- ISPM No. 2 (Framework for pest risk analysis, FAO 2007) describes the overall process of PRA for pests of plants.
- ISPM No. 11 (Pest risk analysis for quarantine pests, FAO 2017) describes the factors to consider when determining if a pest is a quarantine pest. The emphasis in ISPM No. 11 is on the pest risk assessment and risk management components of PRA, although the full PRA process is covered. ISPM No. 21 (Pest risk analysis for non-regulated pests, FAO 2004) provides guidelines for conducting PRA on regulated non-quarantine pests. The emphasis here is on the is risk caused by plant pests that are already present in the country but which pose potentially unacceptable yield losses and economic impact because they are present on plants for planting.
- ISPM No. 3 (Guidelines for the export, shipment, import and release of biological control agents and other beneficial organisms, FAO 2005) provides guidelines for the export, shipment, import and release of biological control agents and other beneficial organisms including risk management measures. It contains a section on PRAs. ISPM No. 14 (The use of integrated measures for a systems approach for pest risk management, FAO 2002) provides guidance on a systems approach to pest risk management.

Attributes of a good PRA

A good PRA is transparent, provides clear and unambiguous recommendations and is fully referenced (including referencing of the methodology). The assumptions made by the analysts should be clearly outlined and where scientific evidence is lacking, the uncertainty that results should be fully described.

Between multiple PRAs the approach applied should be consistent.

Pest risk analysis case studies

Some early pest risk analyses were based on semi-quantitative approaches by evaluating risk with a score. However, these are often limited by a lack of data, which led to difficulties in clearly identifying appropriate risk mitigation strategies. More recent PRAs tend to prefer a qualitative approach that is explicit and transparent. We propose two recent examples of import risk analyses from Australia.

Case study 1: Regional PRA for the South American Leaf Blight (SALB) of rubber (Hevea) (2007)

This is an example of a regional PRA developed for ASEAN country and initiated for a high-risk pest of rubber, the South American leaf blight (SALB) for the Australian import risk analysis of longan fruit from Vietnam (Australian Department of Agriculture, 2018). This regional PRA was developed through a range of workshops and uses a quantitative approach and provides recommendations to member countries for the prevention of the introduction of SALB in rubber growing region, including pre-export inspection and treatment for budded stumps and budwood, measures on arrival and post-entry quarantine.

A report on this analysis is available online (see resources section below).

Case study 2: Draft group PRA for mealybugs and the viruses they transmit on fresh fruit, vegetable, cut-flower and foliage imports (2019)

This is an example of a Group PRA developed for all members of the insect families Pseudococcidae, Putoidae and Rhizocecidae and considers viruses that can be transmitted by these families of mealybugs. Group PRAs assess group of pests with shared common biological characteristics and have similar likelihoods of entry, spread and establishment as well as similar consequences and might call for identical risk management measures. A group PRA also consider the risk posed by groups of pests cross numerous pathways. They improve the effectiveness and consistency in managing the risks associated with imported goods.

A report on this analysis is available online (see resources section below).

Case study 3: Draft report for the review of biosecurity import requirements for fresh longan fruit from Vietnam (2018)

This is an Australian import risk analysis of longan fruit from Vietnam (Australian Department of Agriculture, 2018). It provides an example of an Import Risk Analysis (IRA) where, 11 quarantine pests and two regulated thrips associated with longans from Vietnam were identified and required risk management measures, in combination with operational systems, to achieve Australia's appropriate level of protection. The pests identified during the PRA process were:

- Quarantine pests: guava fruit fly, Oriental fruit fly, melon fruit fly, litchi fruit borer, grey pineapple mealybug, cocoa mealybug, litchi mealybug, Pacific mealybug, coffee mealybug, intercepted mealybug and citriculus mealybug.
- Regulated articles*: chilli thrips and onion thrips. These thrips are regulated articles because they can carry and spread orthotospoviruses that are quarantine pests for Australia.

The proposed risk management measures include:

- Area freedom or fruit treatment (such as irradiation or cold disinfestation treatment) for fruit flies;
- Consignment freedom verified by pre-export visual inspection and, if found, remedial action for mealybugs and thrips;
- Area freedom, fruit treatment (such as irradiation or cold disinfestation treatment) or a systems approach for litchi fruit borer. A report on this analysis is available online (see resources section).

A report on this analysis is available online (see resources section below).

Case study 4: Pest risk analysis for cut flowers and foliage imports - part I (2019)

In 2017, Australia reported a high number of arthropod interceptions found on consignments of imported cut flowers and foliage. At the same time, a group thrips PRA was developed for thrips and orthotospoviruses on fresh fruit, vegetable, cut-flower and foliage imports. This group PRA investigated cut flowers and foliage as an import pathway for thrips including species known to act as vectors of orthotospoviruses. Of all commodity types arriving in Australia, it was found that a high proportion of arthropod interceptions (23 %) occurred on imported cut flowers and foliage and that imports of fresh flowers and foliage had increased significantly in recent years. This PRA was recently initiated to assess the risk posed by cut flowers and foliage as a commodity. The Russian wheat aphid was identified as an organism of biosecurity concern. The PRA will be done in two phases, with a first part (part I, see link below) dedicated to the predominant pests, including the three major arthropod pest taxa (mites, aphids and thrips). The second part of this cut flowers and foliage PRA will be focussing on the other pests associated with these commodities, including the brown marmorated stink bug, exotic bees, tarnished plant bug, and some flies from the Agromyzidae family as well as leafhoppers and sharpshooters with the potential to transmit Australia's number one national priority plant pest, the bacterium Xylella fastidiosa.

A total of 35 mites, 15 aphids and 82 thrips were identified in part I as quarantine pests and/or regulated articles for Australia, and a further 35 aphids were identified as potential regulated articles. Import conditions require exporters to manage biosecurity risks before they send cut flowers and foliage to Australia, so as to reduce the number of pests that arrive at Australia's borders.

The PRA proposes a range of options, including an NPPO-approved systems approach to reduce the risk posed by both cut flowers and foliage. More specifically recommendation include both off-shore and on arrival measures:

Off-shore measures

- NPPO-approved systems approach; or
- Pre-shipment methyl bromide fumigation; or alternative (e.g. low temperature phosphine fumigation);
- NPPO-approved alternative pre-shipment disinfestation treatment, and consignment freedom from live quarantine arthropod pests verified by NPPO pre-export visual inspection and remedial action if live pests are found.

On arrival

On arrival visual inspection to verify that the biosecurity status of consignments of cut flowers and foliage meet Australia's import conditions. Consignments released if arthropods are non-quarantine or unregulated, subject to freedom from other contaminants and pathogens. Consignments subject to remedial

treatment if arthropods are identified as quarantine or regulated, or if the consignment does not meet Australia's import conditions

A report on this analysis is available online (see resources section below).

*A regulated article is defined as: 'any plant, plant product, storage place, packaging, conveyance, container, soil and any other organism, object or material capable of harbouring or spreading pests, deemed to require phytosanitary measures, particularly where international transportation is involved.'

Resources

E-learning module 2.1 Pest Risk Analysis.

ISPMs. Available online: https://www.ippc.int/en/core-activities/standards-setting/ispms/ (accessed 28th October 2019).

Guidelines for the conduct of Pest Risk Analysis for ASEAN, Final Draft, 2013. https://www.asean.org/wp-content/uploads/images/Community/AEC/AMAF/OtherDocuments/ASEAN%20Guidelines%20for%20Pest%20Risk%20Analysis.pdf

IPPC Pest Risk Analysis training course, Participant manual, FAO 2007: https://www.ippc.int/en/publications/1853/

IPPC Training course on PRA- group exercises manual, FAO 2008: https://www.ippc.int/en/publications/1854/

IPPC e-learning material on PRA. https://www.ippc.int/en/e-learning/

IPPC PRA awareness material: https://www.ippc.int/en/core-activities/capacity-development/guides-and-training-materials/guides-and-training-materials/pest-risk-analysis/

IPPC guide to pest risk communication., 2019. http://www.fao.org/documents/card/en/c/ca3997en

EPPO CAPRA: Computer Assisted Pest Risk Analysis: https://www.eppo.int/RESOURCES/eppo_databases/capra

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Final pest risk analysis for cut flowers and foliage imports part I. Department of Agriculture and Water Resources (2019), Canberra. Available: http://www.agriculture.gov.au/SiteCollectionDocuments/biosecurity/risk-analysis/plant-reviews/final-report-cut-flowers.pdf (accessed 28th October 2019).