Development of an international standard to facilitate the transboundary shipment of sterile insects

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Transboundary shipment of sterile insects of target species has taken place on a continuous basis since the sterile insect technique (SIT) was first developed almost 50 years ago. The total number of sterile insects shipped is estimated at 962 billion (equivalent to about 18 000 tonnes) in more than 12 000 shipments to 22 recipient countries from 50 sterile insect production facilities in 25 countries. By following simple operational and administrative procedures, these shipments have never been subjected to any prohibition. As the SIT becomes more commercial, the need has arisen for guarantees that the sterile insects will continue to be safely and legally shipped. International regulations also reduce the need for independent development of national regulations that may hinder the insect control programmes. The potential risks involved in the transboundary shipment of sterile insects for pest control programmes are quantified by calculating the probability of a hazard occurring, times the consequences. Using a scenario analysis technique, the Consultants Group identified four potential hazards:

1. Outbreak of the target pest in a new area, where it does not already occur.
2. Increase of fitness of the local pest population through the introduction of genetic material from the escaped insects into an area where the pest already exists.
3. Unnecessary regulatory actions being initiated following false identification of captured sterile insects and conclusion that it is a quarantine threat.
4. Introduction of exotic contaminant organisms in a shipment, other than the target species for the SIT programme.

In order for any of these hazards to occur, there would have to be a breakdown at several points in the normal operations of a production facility and during shipping, all during the same shipment. The paper presents the events required for each of the four hazards to occur. For each hazard the calculated estimated risk was extremely low due to the low probability of the combined events occurring, despite the possible serious consequences. The assessment concluded that routinely applied procedures, including best practices for production, sterilization and shipment reduces risks from transboundary shipment of sterile insects to a negligible level. This analysis has been the basis for the development of a draft international standard for consideration by the Interim Commission on Phytosanitary Measures (ICPM), the governing body for the International Plant Protection Convention (IPPC). After an issue is identified as a priority by member countries, an International Standards on Phytosanitary Measures can take 3–5 years to be developed, reviewed and endorsed. In the meantime, the concepts of the proposed standard are integrated into all new versions of FAO/IAEA/USDA standard operating procedures for product quality control and shipping of sterile insects. These standard operating procedures are revised periodically to keep the document up to date. Harmonized guidance regarding regulation of the shipment of sterile insects will facilitate trade, while addressing any concerns about shipment of what could be quarantine pest species.

INTRODUCTION

Transboundary shipment of sterile insects has taken place on a continuous basis since the sterile insect technique (SIT) was first developed. The total number of sterile insects shipped is estimated at 962 billion in more than 12 000 shipments to 22 recipient countries from 50 sterile insect production facilities in 25 countries (Appendix I). During the period 1954 to 2003, no problems associated with shipping live sterile insects have been recorded. The shipment of sterile insects has never been subjected to prohibition.

Background – scenario analysis

A Consultants Group Meeting was held to discuss the potential risk from transboundary shipment of sterile insects in Vienna at the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, from 30 July tp 3 August 2001. ‘Risk’ in this context includes both the likelihood and the
consequences of an adverse event, whereas ‘transboundary’ in this context refers to entry (Customs and Agriculture clearance) of a shipment into the importing country as well as transit shipment through a third country. Transit may or may not involve transloading. The meeting was called to respond to requests for guidance from National Plant Protection Organizations (NPPOs) in light of the growing demand for the use of sterile insects and the increasing interest from the private sector to invest in fly production facilities. During the meeting a scenario analysis was carried out on risks that might result from shipment of sterile insects from and to any country in the world. The results appear in an internal FAO/IAEA report, which is available from the Joint Division upon request (FAO/IAEA 2001).

Three potential hazards, of extremely low probability of occurrence, were identified with regard to transboundary shipments of sterile insects (Fig. 1):

1. Outbreak of the target pest in a new area.
2. Increase of fitness of the local pest population through the introduction of genetic material from escaped insects into an area where the pest already exists.
3. Initiation of unnecessary regulatory actions following false identification of captured sterile insects and conclusion that it is a quarantine threat.

A fourth hazard identified was the introduction of exotic contaminant biological material in or on the shipment of sterile insects. This hazard is not unique to shipments of sterile insects and similar hazards exist with shipment of biological control agents and to some extent (for contaminant pests) with any shipment. In fact, the sterile insect mass-rearing process virtually eliminates any parasitoids, and effective steps are also routinely taken during this process to prevent contamination with pathogens and contaminant pests in general, including hitchhikers.

The scenarios for the first two hazards would require failure of the sterilization treatment as the first event (a). This could mean absolute failure (i.e. the shipment was not treated) or that the treatment was less than necessary to meet the required specifications for sterility. The second event that must occur in the first two hazards is a breach of the package to allow for spillage or escape of insects (b). In most situations this will be under adverse conditions where survival of the insect will be minimal (e.g. airport cargo handling environment). As a result, the insect must also survive until it finds a favourable environment (c). Finally, it must mate and reproduce with ‘fellow escapees’ for Hazard 1 to occur (1d) or with established insects for Hazard 2 to occur (2d, 2e). However, for Hazard 2, the scenario recognizes that the introduction of new genetic material in itself does not present a risk unless it carries an undesirable genetic trait that
also has a selective advantage so that it can spread and establish in the population.

The situation in Hazard 3 is related to regulatory actions (e.g., detection survey) that may be unnecessarily taken by the country where the pest is detected but not recognized as sterile. Adverse phytosanitary measures may be put in place by trading partners based on reporting the detection without distinguishing the pest as sterile.

For any of the identified hazards to occur, all of the events described must occur in sequential order. This is highly unlikely; yet, because of the significant consequences if the hazard(s) were to occur, steps are recommended to manage the risk.

In the scenario analysis, some of the events described that could lead to the hazards will be impacted by the application of specific procedures (control points). In the process of this analysis, the Consultants Group identified some routinely applied procedures that correspond to control points, including best practices for production, sterilization, and shipment that reduce the risk to a negligible level. Application of these procedures reduces risks from transboundary shipment of sterile insects to a negligible level. This proposed standard is based primarily on the application of these procedures.

**RELATIONSHIP TO OTHER INTERNATIONAL STANDARDS**

The movement of live insects is already addressed under the International Plant Protection Convention through its International Standard on Phytosanitary Measures (ISPM) No. 3, the Code of Conduct for the Import and Release of Exotic Biological Control Agents. Certain provisions in ISPM No. 3 are inappropriate when considering sterile insects (e.g., holding in quarantine for the next generation). In addition, the definition of biological control as it appears in the Glossary of Terms (ISPM No. 5) only involves agents that are capable of self-replicating and therefore explicitly excludes sterile insects. SIT differs from classical biological control, in the following key areas:

1. Sterile insects are not self-replicating and cannot become established in the environment.
2. Autocidal control is species-specific.
3. SIT used against an established pest never introduces an exotic species into the ecosystem.

Therefore a standard on transboundary shipment of sterile insects for use in pest control is proposed. This standard establishes guidance not covered in any existing international standard.

In order for this proposed standard to become an International Standard on Phytosanitary Measures and thereby to be legally binding to all members of the World Trade Organization, it must be approved by the Interim Commission on Phytosanitary Measures (ICPM), the governing body for the International Plant Protection Convention. The development, review, and approval of a new international standard through this mechanism can take 3–5 years after it is identified as a priority for the ICPM to consider in its full agenda. The ISPM No. 3 on Biological Control is slated for revision and could include an annex regarding sterile insects. It is unknown when this vital revision will begin.

In the meantime, the concept of the proposed standard has been included in all new versions of FAO/IAEA standard operating procedures for product quality control and shipping of sterile insects to keep the document up to date.

**PROPOSED STANDARD FOR TRANSBOUNDARY SHIPMENT OF STERILE INSECTS FOR USE IN PEST CONTROL PROGRAMMES**

**Objectives**

The objective of this standard is to facilitate the safe transboundary shipment of sterile insects. Insects that are mass-reared and then sterilized have been used in field releases as part of integrated pest control for the last 50 years. The sterile insect technique (SIT) is a method of insect control in which laboratory-propagated insects are irradiated to the point of sterility and then released into the environment to compete for mates with conspecifics in feral populations. SIT involves several activities, including mass production of the target insect species, sterilization using radiation, and release into the field on a sustained and area-wide basis and in sufficient numbers to achieve appropriate over-flooding ratios. Sterile males find and mate with fertile wild females, transferring sperm carrying dominant lethal mutations. Any egg fertilized by this sperm does not develop, leading to a reduction in the pest population. Sterile insects are often shipped for release in other countries. Transboundary shipments of sterile insects have gone from production facilities to release sites in countries throughout the world.

The National Plant Protection Organization (NPPO) of each country should designate the proper authority for assuring safe shipment of sterile insects (either through or to their territory). Because producers of sterile insects may be private
businesses as well as government, parastatal, joint venture or internationally owned facilities, it is up to the NPPO to coordinate with the producer/shipper regarding their responsibilities for achieving safe shipment.

Scope
This standard provides guidelines for transboundary shipment and importation (either as a consignment in transit or for entry to the country of destination) of sterile insects for use in the sterile insect technique (SIT) for control programmes of plant insect pests. The standard covers shipment of sterile, mass-reared insects, including those developed through traditional selection and mutation breeding. Sterile insects carrying transgenes are not covered by this standard, although the measures for safe transboundary shipment may be the same.

The production and eventual use of the sterile insects do not fall within the scope of this standard. This standard is also limited to the shipment of insects sterilized by ionizing radiation.

The standard may serve as the basis for regional or national phytosanitary measures. Governments that already regulate shipment of sterile insects, either intentionally or by inclusion under some broader regulation (i.e. of all live insects), should adapt their existing requirements in light of this standard.

Responsibilities of the producer/shipper of the sterile insects
The producer/shipper may be the NPPO, a regional authority, a research centre, or a private organization.

The producer/shipper should:
• Comply with the relevant International Quality Control Manual or any other Standard Operating Procedure (SOP) developed by the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture in cooperation with national governments that offer years of experience in running sterile insect production facilities.
• Take all necessary steps to ensure that exported sterile insects conform to relevant regulations of importing countries, especially concerning labeling and notification.
• Ensure that documentation includes instructions to handlers and officials at the point of entry on how the package should be treated to avoid damage to the contents, and on action to be taken if the packaging is breached. Documentation should also indicate whether it may be opened for customs inspection.
• Maintain contact with the FAO/IAEA Joint Division to facilitate awareness of new developments in the SOP. Keep the Joint Division informed of any difficulties in compliance with the SOP or gaps in understanding of the SOP.

The producer/shipper should give advance notice with full details of routing to the receiver to minimize delays and to alert officials at the point(s) of entry.

Responsibilities of the authorities prior to export
The NPPO in the country of export should:
• Certify that the shipment contains sterile insects that have been produced, sterilized and packed according to International Quality Control Manual or any other SOP developed by the Joint FAO/IAEA Division in cooperation with national and/or local governments.
• Verify that the shipment complies with the necessary documentation for safe transport.
• Extend a Federal Phytosanitary Certificate for the shipment.

Responsibilities of the authorities upon import (final or transit)
The authorities of the importing country should:
• Make information available regarding the proper markings on packages to officials from any agency that may be a point of first contact with a diverted package of sterile insects so that it will be properly handled and notification will be made to the producer/shipper of the action taken.
• Seek to verify the sterility of quarantine pests detected in regular surveillance, when the species detected is transiting or entering the country for use in an SIT programme.
• Seek to verify that the packages have not been breached, and/or there is living material spilled in or on the packages.
• Take phytosanitary action if an exotic contaminant species of quarantine concern is detected in or on the packaging of a consignment of sterile insects.

Any NPPO that identifies a new hazard not addressed under this standard should notify the IPPC Secretariat and the exporting country, if applicable, so that a pest risk analysis may be conducted to evaluate the additional risk and options for additional measures may be considered, taking into account that expert opinion in the original Consultants Group identified the potential hazards listed above as the primary ones.
Responsibilities of the importer
The importer may be the NPPO, a regional authority, a research centre, or a private organization. For the purposes of this standard, the primary responsibility of the importer regarding transboundary shipment is to notify the producer/shipper and appropriate authorities in the case of a missing or delayed arrival of a consignment of sterile insects to facilitate tracking the shipment and proper handling when located.

Traceability
A system to trace the sterile insect shipments throughout the whole process is of primary importance. This system is available and it is clearly described in the Manual ‘Product Quality Control and Shipping Procedures for Sterile Mass-Reared Tephritid Fruit Flies of the Joint FAO/IAEA Division and the USDA, 2003’.

Observance of this standard
This standard should be observed through collaborative action on the part of governments, international organizations, research institutes, industry (including producers and distributors) and other relevant organizations.

The Regional Plant Protection Organizations (RPPOs) and/or NPPOs may wish to impose observance of this standard as a requirement for any production of sterile insects taking place within their territory, as well as for imported consignments of sterile insects.

Funding sources, including international organizations and private investors, may also wish to impose observance of this standard on any facility receiving funds for production of sterile insects.

Countries may require a pest risk analysis be conducted if the species transported is not covered by an internationally-recognized SOP.

This standard will remain up to date with the revision and development of SOPs, including for additional species of plant pests.

CONCLUSIONS
The risks from transboundary movement of sterile insects have been determined to be negligible if procedures outlined in a FAO/IAEA/USDA manual are followed. Accordingly, many countries have not regulated this movement in the past. With the increase in the number of countries applying SIT and the number of new production sites, this proposed standard was developed to achieve a harmonized approach to regulation of transboundary shipments of sterile insects. Harmonized guidance will facilitate trade whilst addressing concerns about shipment of what could be quarantine pests.

Countries that require shipment of sterile fruit flies for their domestic control programmes may wish to request adoption of harmonized guidance through the IPPC. In particular, members of FAO or contracting parties to the convention should raise this as a priority in the next annual meeting of the ICPM. The development of this proposal was an effort to reduce the burden on the international standards development process.

Until such guidance is internationally binding, however, countries may refer to the guidance as the basis of any new regulations regarding shipment of sterile insects into or through their national territory. Parties purchasing sterile fruit flies from a foreign source may wish to require adherence to the FAO/IAEA/USDA manual to assure that steps are taken during the mass-rearing, sterilization and packing process that will reduce risks during the transport.

BIBLIOGRAPHY


<table>
<thead>
<tr>
<th>Year</th>
<th>Insect species (common name)</th>
<th>Site of production</th>
<th>Amount shipped (millions)</th>
<th>Receiver</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1954</td>
<td>Screwworm</td>
<td>Florida, U.S.A.</td>
<td>Unknown</td>
<td>Curaçao</td>
<td>Amounts were relatively small since sterile flies were used for field trials.</td>
</tr>
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<td>1962</td>
<td>Screwworm</td>
<td>Texas, U.S.A.</td>
<td>Unknown</td>
<td>Northern Mexico</td>
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<td>1963–1990</td>
<td>Mexican fruit fly</td>
<td>Monterrey, Mexico</td>
<td>Unknown</td>
<td>Texas, U.S.A.</td>
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<td>1970</td>
<td>Mediterranean fruit fly</td>
<td>Seibersdorf, Austria</td>
<td>Unknown</td>
<td>Procida, Italy, and Greece</td>
<td></td>
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<td>1970–1990</td>
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<td>Monterrey, Mexico</td>
<td>Unknown</td>
<td>Nicaragua</td>
<td></td>
</tr>
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<td>1972–1991</td>
<td>Screwworm</td>
<td>Chiapas, Mexico</td>
<td>494 000</td>
<td>Mexico</td>
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<td>Madrid, Spain</td>
<td>302</td>
<td>Canary Islands</td>
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<td>1978</td>
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<td>Unknown</td>
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<tr>
<td>1979–2000</td>
<td>Mediterranean fruit fly</td>
<td>Chiapas, Mexico</td>
<td>280 000</td>
<td>Guatemala</td>
<td>Biweekly transboundary shipments have been carried out for the past 21 years.</td>
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<td>Mediterranean fruit fly</td>
<td>Chiapas, Mexico</td>
<td>6 670</td>
<td>California, U.S.A.</td>
<td>To assist the CDFA in eradication of medfly outbreaks.</td>
</tr>
<tr>
<td>1990</td>
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<td>Chiapas, Mexico</td>
<td>552</td>
<td>Chile</td>
<td>Sterile flies donated by the Mexican government to Chile.</td>
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<tr>
<td>1990–1998</td>
<td>Tsetse fly</td>
<td>Seibersdorf, Austria</td>
<td>8</td>
<td>Tanga, Tanzania</td>
<td>Tsetse fly was eradicated from the island of Zanzibar.</td>
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<td>1990–1991</td>
<td>Screwworm</td>
<td>Chiapas, Mexico</td>
<td>1 300</td>
<td>Libya</td>
<td>Partially in transit through Frankfurt, Germany.</td>
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<td>1994</td>
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<td>60</td>
<td>Tunisia</td>
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<td>1996–2000</td>
<td>Mexican fruit fly</td>
<td>Chiapas, Mexico</td>
<td>2511</td>
<td>California, U.S.A.</td>
<td>To assist the CDFA in eradication of Mexican fruit fly outbreaks.</td>
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<td>1997–1998</td>
<td>Mediterranean fruit fly</td>
<td>Madeira, Portugal</td>
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<td>Israel</td>
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<td>1 000</td>
<td>Israel</td>
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<td>600</td>
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</tr>
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<td>2000</td>
<td>Mediterranean fruit fly</td>
<td>Mendoza, Argentina</td>
<td>1</td>
<td>Israel</td>
<td>Pilot trials.</td>
</tr>
<tr>
<td>2003</td>
<td>Mediterranean fruit fly</td>
<td>Mendoza, Argentina</td>
<td>75</td>
<td>Valencia, Spain</td>
<td>In support of pilot suppression programme.</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>962 585</td>
<td></td>
<td></td>
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</table>

1This table includes only information on shipments of sterile Mediterranean fruit flies, Mexican fruit flies, screwworm and tsetse flies. There are several other insect species that have been shipped across borders for control purposes that have not been included.
Appendix II. Harmonized measures for addressing risk from transboundary shipment of sterile insects.

Standard Operating Procedures regarding production, irradiation and shipment of sterile insects are developed by the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture in consultation with national governments with expertise in production facilities. The manuals on these procedures are revised, as appropriate, and made available to all production facilities. Although guidance currently exists for only some of the species that may be used in SIT, other guidance is under development. Currently most relevant are the referenced manuals (see Introduction) regarding product quality control, irradiation and shipping included in the Quality Control manual for Mass Produced Tephritid Fruit Flies and in the Standard Operating Procedure for irradiation dosimetry.

The procedures described in the FAO/IAEA manuals are required to assure the production of healthy, high quality sterile insects. In combination, these measures essentially also act as an integrated system to prevent the hazards that may arise during shipment and entry of the consignments.

Examples of current procedures to prevent sterilization failure include:
- Irradiation of insects (generally mature pupae or immature adults) at the proper life stage and age for maximum sterility with high quality of emerging insects.
- Minimum dosage received by all the insects involved in SIT far exceeds the dosage required to sterilize the females.
- Failsafe irradiation systems (i.e. physical and/or procedural) to ensure the containers of pupae are subjected to the treatment.
- Irradiators are equipped with automatic exposure settings that are tamper-proof.
- Each treated container has a dosimetry device that confirms the container was irradiated.
- Procedures are observed for routine calibration of the radiation equipment.
- Packages clearly labelled as containing sterile insects.
- A sample of insects from each shipment is bioassayed for sterility at factory and release site.

Examples of current procedures to prevent mishandling leading to breakage of package and loss of sterile insect quality:
- All consignments are shipped in containers that are double packaged, some triple packaged, and then sealed.
- Consignments are closely tracked with commercial motivation for rapid transit of highly perishable material.
- Rapid feedback comes from receiver when the package is delayed.
- Size and weight of package are designed to minimize breakage.
- All packages are appropriately labelled (e.g. fragile, biological material) and numbered.
- Packages packed with ‘blue ice’ to maintain the temperature at the required level.
- Data logger inside the package to record and monitor the temperature inside the container during transport.

Details of these procedures appear in each new edition of international Standard Operating Procedures, including those described in the Quality Control manuals, produced by FAO/IAEA. The relevant SOPs existing at the time of preparation of this standard are listed under References.
Appendix III. Definitions and acronyms.

Definitions

Area
An officially defined country, part of a country or all or parts of several countries.

Classical biological control
The intentional introduction and permanent establishment of an exotic biological agent for long-term pest control.

Consignment
A quantity of plants, plant products and/or other articles being moved from one country to another and covered, when required, by a single phytosanitary certificate (a consignment may be composed of one or more commodities or lots).

Consignment in transit
Consignment which is not imported into a country but passes through it to another country, subject to official procedures which ensure that it remains enclosed, and is not split up, not combined with other consignments nor has its packaging changed. (draft revised definition).

Contaminating pest
A pest that is carried by a commodity and, in the case of plants and plant products, does not infest those plants or plant products.

Control (of a pest)
Suppression, containment or eradication of a pest population.

Detection survey
Survey conducted in an area to determine if pests are present.

Entry (of a pest)
Movement of a pest into an area where it is not yet present, or is present but not widely distributed and is being officially controlled.

Entry (of a consignment)
Movement through a point of entry into an area.

Eradication
Application of phytosanitary measures to eliminate a pest from an area.

Establishment
Perpetuation, for the foreseeable future, of a pest within an area after entry.

Exotic
Not native to a particular country, ecosystem or ecoarea (applied to organisms intentionally or accidentally introduced as a result of human activity). As this Code is directed at the introduction of biological control agents from one country to another, the term ‘exotic’ is used for organisms not native to a country.

Introduction
The entry of a pest resulting in its establishment.

National Plant Protection Organization
Official service established by a government to discharge the functions specified by the IPPC.

Parasite
An organism which lives on or in a larger organism, feeding upon it.

Parasitoid
An insect parasitic only in its immature stages, killing its host in the process of its development, and free living as an adult.

Pathogen
Microorganism causing disease.

Pest
Any species, strain or biotype of plant, animal or pathogenic agent injurious to plants or plant products.

Pest status (in an area)
Presence or absence, at the present time, of a pest in an area, including where appropriate its distribution, as officially determined using expert judgement on the basis of current and historical pest records and other information.

Phytosanitary measure
Any legislation, regulation or official procedure having the purpose to prevent the introduction and/or spread of pests.

Phytosanitary procedure
Any officially prescribed method for implementing phytosanitary regulations including the performance of inspections, tests, surveillance or treatments in connection with regulated pests.

Point of entry
Airport, seaport or land border point officially designated for the importation of consignments, and/or entrance of passengers.

Progeny*
The offspring of a particular mate, or of a particular individual in the case of asexual reproduction.

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.
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Release (into the environment)</td>
<td>Intentional liberation of an organism into the environment (see also introduction and establishment).</td>
</tr>
<tr>
<td>Regional Plant Protection Organization</td>
<td>An intergovernmental organization with the functions laid down by Article IX of the IPPC.</td>
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<tr>
<td>Sterility* (radiation-induced)</td>
<td>A condition in which sperm or eggs from irradiated reproducing individuals do not result in fertile offspring following fertilization.</td>
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<tr>
<td>Suppression</td>
<td>The application of phytosanitary measures in an infested area to reduce pest populations.</td>
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<tr>
<td>Survey</td>
<td>An official procedure conducted over a defined period of time to determine the characteristics of a pest population or to determine which species occur in an area.</td>
</tr>
<tr>
<td>Treatment</td>
<td>Officially authorized procedure for the killing, removal or rendering infertile of pests.</td>
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</table>

**Acronyms**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>FAO</td>
<td>Food and Agriculture Organization of the United Nations.</td>
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<tr>
<td>IAEA</td>
<td>International Atomic Energy Agency.</td>
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<tr>
<td>ICPM</td>
<td>Interim Committee on Phytosanitary Measures.</td>
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<td>IPPC</td>
<td>The International Plant Protection Convention, as deposited in 1951 with FAO in Rome and as subsequently amended.</td>
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<td>NPPO</td>
<td>National Plant Protection Organization.</td>
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<tr>
<td>RPPO</td>
<td>Regional Plant Protection Organization.</td>
</tr>
<tr>
<td>SIT*</td>
<td>Sterile Insect Technique.</td>
</tr>
<tr>
<td>SOP*</td>
<td>Refers to the Standard Operating Procedures developed by the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture. The SOPs may be entitled as such or appear within other publications such as Quality Control Manuals, but must be recognized by this international organization.</td>
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*These terms do not appear in the International Plant Protection Convention’s Glossary ISPM No. 5 and may require review by an international panel.