Emerging pest criteria guidance

January 2025

**This document is intended for use by the emerging pest criteria expert working group**

**Background**

The issue of emerging pests has been discussed extensively within IPPC bodies since 2016. Initial discussions were held within the Commission on Phytosanitary Measures (CPM) Bureau, Strategic Planning Group and the Technical Consultation among Regional Plant Protection Organisations (RPPOs), with a provisional set of criteria developed by the latter in 2018. The criteria were considered further by the CPM Focus Group on Pest Outbreak Alert and Response System (POARS) in 2021, with some amendments recommended. In 2023, the Standards Committee and Strategic Planning Group advised that the criteria should be developed further. Drawing on the discussions of the criteria and definition since 2016, the POARS Steering Group developed and agreed emerging pest criteria in 2024-25.

**POARS process**

The POARS Steering Group has outlined a process for identifying, nominating, and assessing potential emerging pests of IPPC global concern, with the emerging pest criteria playing a critical part. This process (See Figure 1) includes 1) identifying emerging pests through pest reporting and horizon scanning, 2) nominating them via National Plant Protection Organisations (NPPOs), RPPOs, or the IPPC Secretariat, and 3) assessing them against established criteria. Pests meeting the criteria are designated as emerging pests of IPPC global concern (hereafter simply referred to as emerging pests), triggering alerts and targeted prevention, preparedness and response activities, while others may be added to a watch list or excluded. Pests added to a watch list may be reassessed (either on a regular or emergency basis) based on updated data or evidence. Pests not meeting the criteria and not added to a watch list are removed from the POARS process and not considered for IPPC global actions, though other relevant regional or global bodies may still consider actions for them.

The assessment phase of the process is not intended to be a pest risk analysis for the world. This is not considered to be feasible and would take too much time. The purpose of the POARS is to mobilise resources and tools quickly to prevent pests spreading, prepare for their arrival and respond effectively once they arrive. The assessment of pests against the emerging pest criteria should therefore be carried out speedily, relying more on expert judgement than extensive analysis.

A diagram of a process

Description automatically generated

**Figure 1.** Process for identifying, nominating and assessing emerging pests of IPPC global concern in the POARS.

**Criteria**

The emerging pest criteria are split into three steps:

1. Initiation – to show the pest is spreading and is not yet widespread
2. Current impact – to show the pest is already economically and/or environmentally damaging
3. Risk evidence – to show the pest is capable of entering, establishing and causing substantial impacts in new areas, and will be difficult to manage once introduced

The full set of emerging pest criteria are below (table 1).

**Table 1.** Emerging pest criteria.

|  |  |  |
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| Criterion | Description | Condition to pass |
| Step 1: Initiation | | |
| Recent geographical spread | Recent pest outbreaks[[1]](#footnote-2) are reported in more than one area, showing a *significant* expansion of the pest’s range. | Both criteria must be met to proceed to Step 2 |
| Current distribution | The pest has a limited distribution in its endangered area[[2]](#footnote-3). |
| Step 2: Current Impact | | |
| Economic impact | The pest is causing substantial economic impact according to what is described in ISPM 11 and supplement 2 of ISPM 5[[3]](#footnote-4). | At least one criterion must be met to proceed to Step 3 |
| Environmental impact | The pest is causing substantial environmental impact according to what is described in ISPM 11 and supplement 2 of ISPM 5[[4]](#footnote-5). |
| Step 3: Risk Evidence | | |
| Likelihood of introduction into new areas | The pest has a high likelihood of introduction in new areas based on assessment in line with ISPM 11. | All conditions must be met to be classified as an emerging pest of global concern. |
| Scale of impacts in new areas | The pest is likely to cause substantial impacts based on assessment in line with ISPM 11. |
| Risk management | The pest risk is likely to be difficult to manage effectively in new areas. |

Based on the assessment, pests are categorized as follows:

* **Emerging pest:** A pest that meets the relevant criteria of all three steps.
* **Non-emerging pest for the watch list:** Pests that meet the criteria of the first step but do not meet all the criteria at the current impact and risk evidence steps. For these pests, ongoing observation is proposed with reassessment if new information or data becomes available.
* **Non-emerging pest with no follow-up actions:** A pest that does not meet any of the criteria in Step 1 for initiation.

**Step 1 guidance**

**Recent geographical spread**

**Recency** – Pest outbreaks should be recent, to show that the pest is actively growing and spreading. This will vary depending on the pest biology, including the duration of its life cycle, and the ease of detection. For example, if a pest has a long life cycle and is difficult to detect, spread several years ago may be relevant, whereas if it is a pest with a short life cycle and is easier to detect, an outbreak several years ago may not show it is significantly spreading.

**Expansion** – to show that two or more outbreaks represent a significant expansion of a pest’s range and are not characteristic of local spread, the outbreaks should be far apart from each other and from the original distribution of the pest. For example, outbreaks in different countries could qualify, as could outbreaks on opposite sides of a country (assuming the country represents a large enough area). Outbreaks that are relatively close together, such as those in neighbouring areas, may also be indicative of significant expansion if there is an appreciable natural barrier between them e.g., a mountain range.

**Migratory pests** – migratory pests, such as locusts, can travel hundreds and even thousands of kilometres. For such pests, only spread outside of their usual migration route should be considered when assessing the criterion ‘Recent geographical spread’.

**Re-emerging pest** – re-emerging pests are those that once caused substantial impacts and then declined or became manageable but have since started to become a problem again. The reason why these pests have re-emerged could be due to several factors, including the emergence of a new strain, changes in production practices, and climate change. A new strain or biotype should be regarded as a new pest threat, in line with the definition of pest in ISPM 5, which is any species, strain or biotype of plant, animal or pathogenic agent injurious to plants or plant products. Two or more outbreaks of new strains or biotypes may therefore represent a significant expansion of the pest’s range, assuming they are not due to local spread. However, factors leading to re-emergence that are localised, such as short-term changes in production practices, should not be considered to be a significant expansion of a pest’s range, as they will not lead to long-term changes in pest impacts globally.

**Pest examples**

*Tobamovirus fructirugosum* (tomato brown rugose fruit virus) – since the beginning of 2024, the virus has been first reported in India, Ireland, Lithuania, Latvia, Romania, Australia and Croatia. The outbreaks are recent, as they have occurred in the last year (with tomato production generally working in annual cycles), and they are a significant distance apart, being found in seven different countries. The virus therefore meets this criterion.

*Oemona hirta* (lemon tree borer) – this pest has only ever been reported from New Zealand. As there has been no recent pest outbreaks elsewhere, it does not currently meet this criterion.

**Current distribution**

**Limited distribution** – to be considered limited, the pest should not be widespread across its endangered area. If the pest is distributed across almost all its endangered area, the pest may not qualify. However, there may be cases where a pest is present in most of its endangered area but still qualify, if for example it is still not present in multiple habitable continents or biogeographic regions where the host of concern is present.

**Pest examples**

*Anoplophora chinensis* (citrus longhorn beetle) – this pest is present in large areas of Asia, but is only present outside of Asia in Croatia, Italy and Turkey. It has the opportunity to establish and cause significant impacts in the rest of Europe, Africa, Australia and North America. It therefore meets this criterion.

*Bemisia tabaci* (tobacco whitefly) – this pest is widespread across all continents, except for Antarctica. It therefore does not meet this criterion.

*Phthorimae absoluta* (Syn: *Tuta absoluta*) – this pest is still actively spreading, but it is present across Africa, Asia, Europe and South America. Although it is not yet present in North America and Australia, where hosts of the pest are present, it is very widespread in the continents it is present and it is difficult to argue that it has a limited distribution.

**Step 2 guidance**

Most of the elements below are taken from ISPM 11 with the purpose of assessing emerging pests. Impacts should be considered with and without mitigations in place. Further guidance can be found in ISPM 11 and supplement 2 of ISPM 5.

**Economic impact**

Aspects for consideration include, but are not limited to:

* Direct impacts
  + Types, amount and frequency of damage
  + Crop losses, in yield and quality
  + Biotic factors (e.g. adaptability and virulence of the pest) affecting damage and losses
  + Abiotic factors (e.g. climate) affecting damage and losses
  + Control measures (including existing measures), their efficacy and cost
  + Cost of replanting
  + Effect on existing production practices
* Indirect impacts
  + The presence of the pest affects domestic and export markets, including export market access, and the extent of phytosanitary measures imposed by importing countries
  + Changes to producer costs or input demands, including control costs
  + Changes to domestic or foreign consumer demand for a product resulting from quality changes
  + Feasibility and cost of eradication or containment
  + Capacity to act as a vector for other pests
  + Effects of new control measures such as secondary pest outbreaks from the use of wide spectrum pesticides
  + Effects on crop yields due to reduction of pollinators from the use of wide spectrum insecticides
  + Increased human health costs associated with the use of synthetic pesticides
  + Resources needed for additional research and advice
  + Loss of jobs
  + Social unrest due to necessary interventions to contain and eradicate the emerging pest
  + Effects on tourism
  + Risk to food safety and food security

**Substantial** – economic impacts are considered to be the most severe for the native and introduced area. For example, the pest is likely to lead to a significant loss of host plant production or the death of host plants and an inability to produce and sell the plants or plant products, resulting in severe financial implications for businesses affected and/or reduced food security for the country concerned.

**Pest examples**

*Tobamovirus fructirugosum* (tomato brown rugose fruit virus) – ToBRFV can infect up to 100% of a crop and cause yield losses of between 25 and 70%. These yield losses are the result of symptomatic fruit being unmarketable and the production period being shorter for less vigorous infected crops. Other economic costs, aside from direct yield losses, include hygiene and eradication costs, export costs, and the costs of switching to a non-host crop in a specialised tomato and/or pepper production facility. There are also potential social impacts for gardens and allotments, as well as for temporary workers in tomato and pepper production if not as many jobs are generated during the growing season. This pest would therefore meet this criterion.

*Takahashia japonica* (cotton stringy scale) – this pest is native to Asia and is a polyphagous pest of woody deciduous trees. It has been reported spreading to other countries, including Croatia, Italy, Ukraine and the UK. There are few records of impacts, with the exception of Croatia, where some *Acer* sp. and *Morus alba* were reported to have suffered significant defoliation and tree decay. In the absence of further impacts, including evidence of economic losses, this pest would not meet this criterion.

**Environmental impact**

Aspects for consideration include, but are not limited to:

* Direct impacts
  + Reduction of keystone plant species
  + Reduction of plant species that are major components of ecosystems (in terms of abundance or size), and endangered native plant species (including effects below species level where there is evidence of such effects being significant)
  + Significant reduction, displacement or elimination of other plant species.
* Indirect impacts
  + Significant effects on plant communities
  + Significant effects on designated environmentally sensitive or protected areas
  + Significant change in ecological processes and the structure, stability or processes of an ecosystem (including further effects on plant species, erosion, water table changes, increased fire hazard, nutrient cycling)
  + Costs of environmental restoration
  + Effects to public and private gardens
  + Reduction in plants of national importance
  + Impacts to recreation (e.g., fishing)

**Substantial** – environmental impacts are considered to be the most severe for the native and/or introduced area. For example, the pest is likely to lead to a significant loss of host plant reproduction or the death of host plants and cause significant long-term impacts to biodiversity, ecosystem services, and important tree species.

**Pest examples**

*Agrilus planipennis* (emerald ash borer) – larvae of the beetle bore into the inner bark and outer sapwood, weakening the tree, and causing discolouration of foliage, thinning, dying branches, and ultimately the death of the tree. This has been particularly evident in North America, where tens of millions of trees have been killed. As a consequence, timber and other forestry products have been lost; ecosystem services, such as water regulation, have been impoverished; and social benefits like shading, recreation and cultural traditions have been affected. This pest would therefore meet this criterion.

*Tobamovirus fructirugosum* (tomato brown rugose fruit virus) – while this pest causes substantial economic impacts to tomato and pepper, these hosts are not considered to be environmentally important.

**Step 3 guidance**

Most of the elements below are taken from ISPM 11 with the purpose of assessing emerging pests. It is not the intention for a pest risk analysis to be conducted. However, further guidance can be found in ISPM 11 and supplement 2 of ISPM 5.

**Likelihood of introduction into new areas**

**Entry** – aspects for consideration include, but are not limited to:

* Number of pathways
* Probability of being associated with a pathway
* Probability of survival during transport or storage
* Probability of the pest surviving existing pest management procedures
* Probability of transfer to a suitable host
* Potential pathways not documented should also be assessed

**Establishment** – aspects for consideration include, but are not limited to:

* Availability, quantity and distribution of hosts
* Environmental climatic suitability
* Potential for adaptation of the pest
* Reproductive strategy of the pest
* Method of pest survival
* Cultural practices and control measures

**Pest examples**

*Tobamovirus fructirugosum* (tomato brown rugose fruit virus) – The main pathways for long distance spread of the virus are seed, plants for planting and fruit. For fruit, the risk is higher if the fruit is stored or repacked at destination in facilities that also grow host fruits, or repacked at destination in facilities that also pack local fruits. The virus can also spread by mechanical transmission on people, equipment, used containers, vehicles, machinery, bees and via plant-to-plant contact, as well as in soil, water and nutrient film solutions. These are important for local transmission and may also allow for long distance spread of the virus. As for other tobamoviruses, the virus can remain stable on a number of different surfaces for weeks and months. When you also consider the rapid spread of this pest to new countries over the last five years, the pest meets this criterion.

Pest X – this pest has a low likelihood of introduction due to official measures being in place that minimise its spread, there being limited trade in susceptible commodities to new countries and/or climate or biogeographic factors impeding natural spread.

Scale of impacts in new areas

**Predicting impacts** – to estimate the potential impacts of the pest in new areas, the impacts from the native and introduced area (from step 2) should be compared with the situation in the rest of the endangered area. If the habitats and production practices are similar in new areas, this may indicate impacts could be as severe as in the current area of distribution. Factors that may be different between areas include climate, host distribution, production practices (e.g., outdoor vs. protected cultivation), and the presence of a suitable vector. Further guidance is provided in ISPM 11.

Impacts for this criterion refer to unmitigated impacts. This gives an assessment of the risk that a pest poses in the absence of official regulatory controls being applied to control the pest.

**Pest examples**

*Tobamovirus fructirugosum* (tomato brown rugose fruit virus) – see example for current economic impacts. Given the virus has spread rapidly to a large number of countries and has shown substantial impacts in those countries, it is likely that it will be able to cause similar impacts in other countries that it is introduced into.

Pest X – this pest has low impacts in new areas, despite having substantial impacts in its native and introduced area, due to new areas not having a climate that will allow the pest to reach damaging levels.

**Risk management**

**Effectiveness** – to measure efficacy, risk management measures (both official and unofficial) that currently exist in new areas should be considered (not measures that could potentially be applied in new areas). Risk management measures include, but are not limited to:

* + Regulation of the pest or a key pathway in plant health legislation
  + Surveillance, either by targeted official surveys or general monitoring
  + Industry schemes, such as certification schemes
  + Contingency plans, both generic and those specific to the pest
  + Awareness materials, including plant pest factsheets and alerts
  + Chemical pesticides and biological control agents that are effective against the pest
  + Production practices and cultural control measures
  + Resistant plant cultivars or varieties

There should be recognition that while some countries could be prepared for the introduction of a pest and management may not be difficult, other countries will not be as prepared. If there are a significant number of countries which fall into the latter, a pest may meet this criterion.

Another factor that may impact the management of a pest is whether the host is mainly grown outdoors or under protection. Depending on the pest’s biology, it may be easier to manage the pest under protection.

**Pest examples**

*Agrilus planipennis* (emerald ash borer) – this pest can remain undetected for many years following introduction and has the capability to fly several kilometres. Attempts at eradication have generally been unsuccessful. While there are several control measures which have shown some efficacy against the pest, including trunk injections and biological control agents, these are not available in many countries. The pest therefore meets this criterion.

*Daktulosphaira vitifoliae* (grape phylloxera) – this is a hemipteran insect pest of grapevines. When it was first introduced into Europe, it had a devastating impact on grapevines. When it arrived in France in the 1800’s, for example, it was responsible for the loss of 1,000,000 ha of vineyard. However, grapevines are now largely grafted onto American rootstock, which are more tolerant to the pest. Given the availability of tolerant rootstock to countries, this pest would not meet this criterion.

**Uncertainty**

When assessing a criterion, if there is uncertainty as to whether the pest meets the criterion based on current information, this should be recorded and the assessment should continue. If, by the end of the assessment, the overall uncertainty is considered to be low, the pest should qualify as an emerging pest. However, if the overall uncertainty is considered to be high, the pest should be added to the watch list for ongoing observation.

Areas of uncertainty may include:

* Whether recent pest outbreaks are far enough apart to show a significant expansion of the pest’s range
* What the current distribution of the pest is, as the pest may be under recorded, making it difficult to conclude whether it has a limited distribution in its endangered area
* Whether impacts are still substantial if new control measures are being used and are starting to show good efficacy in some areas
* What climate conditions the pest thrives in, making it difficult to assess establishment potential
* What production practices are used across the endangered area, making it difficult to assess the scale of impacts in new areas

1. A recently detected pest population, including an incursion, or a sudden significant increase of an established pest population in an area [FAO, 1995; revised ICPM, 2003] (ISPM 5) [↑](#footnote-ref-2)
2. 1An area where ecological factors favour the establishment of a pest whose presence in the area will result in economically important loss [ISPM 2, 1995] (ISPM 5). [↑](#footnote-ref-3)
3. SUPPLEMENT 2: Guidelines on the understanding of “potential economic importance” and related terms including reference to environmental considerations [↑](#footnote-ref-4)
4. SUPPLEMENT 2: Guidelines on the understanding of “potential economic importance” and related terms including reference to environmental considerations [↑](#footnote-ref-5)