



## DRAFT ANNEX TO ISPM 37: Criteria for evaluation of available information for determining host status of fruit to fruit flies (Tephritidae) (2018-011)

### Status box

This is not an official part of the standard and it will be modified by the IPPC Secretariat after adoption.	
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The annex is a prescriptive part of the standard.

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## **ANNEX 1: Criteria for evaluation of available information for determining host status of fruit to fruit flies (Tephritidae)**

### **1. Introduction**

National plant protection organizations (NPPOs) use a variety of available information (e.g. scientific literature, NPPO reports, pest records) related to the host status of fruit to fruit flies when they implement adopted ISPMs related to pest risk analysis (PRA), pest free areas, the design of import and export programmes, eradication, surveillance, pest records, and more.

While many terms are used in published literature to describe the host status of fruit to fruit flies (including “potential host”, “artificial host”, “conditional non-host”, “preferred host”, “general host”, “wild host” and “alternative host”), NPPOs should only use the host status categories described in the Definitions section of this standard: natural host, conditional host and non-host.

There is a lack of consistency, however, in the interpretation of available information, and the terms used in such information to describe hosts do not always align with those defined in the core text of this standard, which can lead to trade disruption. This annex promotes consistency by outlining the criteria that should be used when evaluating available information to determine the host status of fruit to fruit flies (Tephritidae). It also provides guidance to NPPOs on assessing the uncertainty of the resulting host status determination and on applying host status determinations in activities such as PRA.

This annex provides guidance only in relation to undamaged fruit.

### **2. Criteria for evaluating available information**

#### **2.1 General criteria**

When determining host status, NPPOs should assess the quality of the available information (i.e. its completeness, reliability and relevance) by considering whether it provides the following:

- an accurate identification of the plant species (scientific name and authority), as well as the cultivar or variety name when available, with supporting evidence (e.g. published keys and taxonomic publications used for plant species (including cultivar or variety) identification, verification of plant material by a specialist taxonomist, molecular identification, voucher specimens);
- a description of the sampled area (e.g. any pest-control measures or phytosanitary measures applied in the area, presence of other natural or conditional hosts), details of location (e.g. geographic coordinates, growing region, elevation, climate), and details of sampling dates (e.g. early or late season, multiple years);
- evidence of the presence of the target fruit fly, or other fruit fly species, or both, in the sampled area before and during sampling (e.g. trap records);
- details of the fruit-sampling conditions (e.g. commercial or non-commercial environment, harvested from the plant or collected after falling to the ground);
- a description of the fruit-handling procedures (e.g. harvesting procedures, post-harvest processing and treatment, transportation procedures);
- a description of the fruit-sampling method (e.g. number and distribution of plants sampled, number of fruits sampled per plant, or sample weight);
- details of the characteristics of the skin or rind (e.g. thickness);
- confirmation on whether the fruit is damaged or not;
- details of the stage of fruit maturity (or other indicators of ripeness, e.g. dry-matter content, colour, sugar content, standardized ripeness scale);
- if used, a description of the fruit-dissection method (e.g. peeling and fruit cutting for detection of eggs or larvae);

- if used, a description of the fruit-holding method (e.g. maturity of fruits, temperature, humidity, day length, substrate for pupation including soil moisture) for determination of infestation;
- where there is infestation, a description of the fruit fly rearing method for development to adults (taking into consideration that eggs and larvae should not have been transferred from infested fruit to artificial diet for rearing);
- where there is infestation, a clear presentation of fruit fly rearing results, indicating the number of fruit fly adults reared per fruit or per weight of fruit and the total number of fruit in the fruit sample or the weight of the fruit sample under suitable conditions;
- an accurate identification of the fruit fly species (scientific name and authority) reared from the fruit, with supporting evidence (e.g. published keys and taxonomic publications used for fruit fly species identification, verification of fruit fly species by a specialist taxonomist, photographs, molecular identification, voucher specimens); and
- in the absence of infestation, a clear presentation of fruit fly rearing results (e.g. no eggs or larvae, no pupation, no viable fruit fly adults reared from the fruit under suitable conditions).

In addition to these general evaluation criteria, further information is required for each host status category as described in sections 2.2 to 2.4 of this annex.

## **2.2 Natural host**

The information used to determine natural host status should contain evidence of both infestation and development to viable adults under natural conditions.

National plant protection organizations should consider whether, in addition to the items listed in section 2.1 of this annex, the information available also provides sufficient details of the viability of emergent adults in terms of their size, flight ability, longevity and fecundity.

## **2.3 Conditional host**

The information used to determine conditional host status should contain evidence of both infestation and development to viable adults from field trials under semi-natural conditions as set out in section 2 of this standard, with published methodological details and results.

National plant protection organizations should consider whether, in addition to the items listed in section 2.1 of this annex, the information available also provides details of the viability of emergent adults in terms of their size, flight ability, longevity and fecundity.

## **2.4 Non-host**

The information used to determine non-host status should contain evidence of the absence of infestation, or of the incomplete development to viable adults under natural conditions or derived from field trials conducted under semi-natural conditions as set out in section 2 of this standard, with published methodological details and results. If this information is not available, data from laboratory experiments may be used.

If the information on non-host status is derived from field surveillance by fruit sampling, NPPOs should consider whether, in addition to the items listed in section 2.1 of this annex, the information available also provides evidence of the presence of reproductively mature adults of the target fruit fly species in the sampled area before and during sampling (e.g. from trap records).

If the information on non-host status is derived from field trials conducted under semi-natural conditions, there are no further criteria for evaluation of the information in addition to the general evaluation criteria listed in section 2.1 of this annex.

If the information on non-host status is derived from laboratory experiments, NPPOs should consider whether, in addition to the items listed in section 2.1 of this annex, the information available also provides some of the following:

- details of the fruit fly colony's origin (e.g. date of sampling and location of natural host for the parental line, number of generations reared by the start of the experiment (preferably not more than five generations, unless wild types are added during the maintenance of the colony), substrate used for egg collection (preferably fruit substrate));
- a description of the fruit fly rearing method used for maintenance of the colony (e.g. natural or artificial diet used for larvae; conditions of the rearing room, such as temperature, humidity, photoperiod);
- details of the quality of the fruit fly colony used in the experiment, including its physiological condition (i.e. details of developmental and survival rates, mating period, oviposition period, female fecundity, mating status, age (taking into consideration that the fruit fly adult females used should be mated and be at the peak of their reproductive potential));
- confirmation that the plant material used was free from pesticides and other products that could have negatively affected the oviposition behaviour of the fruit fly females used; or
- a description of the method used in the laboratory infestation (e.g. cages used, exposure period, presence of food and water in cages, number and age of females and males used per cage, use of a natural host as a control in separate cages to demonstrate normal oviposition behaviour, laboratory conditions during experiment, number of replicates in the experiment using different cohorts of flies).

### 3. Assessing the uncertainty of the host status determination

The quality (i.e. the completeness, reliability and relevance) of the available information related to the host status of plant species, cultivars or varieties to fruit flies is variable. This will, in turn, influence the level of uncertainty associated with the host status determination. Further guidance on the quality of information can be found in ISPM 6 (*Surveillance*) and ISPM 8 (*Determination of pest status in an area*).

The quality of the information should be assessed based on the design of the method used to determine the host status category (e.g. sample size, number of replicates), the robustness and presentation of results and the expertise of the contributors.

The completeness of the information should be assessed against the criteria listed in the General requirements section of this standard and the evaluation criteria listed in section 2 of this annex. National plant protection organizations should consider the key elements for the determination of host status to be the identification of the plant species, cultivar or variety and the fruit fly species by a specialist taxonomist, the deposition of voucher specimens of plant and fruit fly species, and the details provided of the fruit origin and condition.

The quality of the information sources will dictate the level of uncertainty associated with the resulting host status determination: the greater the quality of information, the lower the uncertainty. A host status determination based on multiple reports from independent sources, particularly those of higher reliability, has a low level of uncertainty.

The following cases are some examples of situations where there can be particular uncertainty associated with the host status determination because of incomplete or lower-quality information:

- A new interception record lacks relevant information or contains unconfirmed information (e.g. life stage not mentioned, the fruit fly association with the fruit is unclear, quality of fruit not mentioned).
- A new plant species, cultivar or variety is introduced into an area where a fruit fly species is present, or a fruit fly establishes in a new area and encounters new plant species.

- One or both parental species of a newly developed hybrid or cultivar are known natural or conditional hosts (in which case, the host status of the hybrid or cultivar should be considered as a potential natural or conditional host until it can be confirmed otherwise).
- There is a taxonomic change in a plant or fruit fly species. If taxonomic changes in a fruit fly species split it into two or more species, the host range of each valid species could potentially be different. If two or more fruit fly species are now synonymized, the singular new species is likely to have a broader host range. Therefore, particular attention should be paid to taxonomic changes when evaluating host records.

The result of a determination of host status should be accompanied by an assessment of the level and nature of the associated uncertainty. If the level of uncertainty is too high, and the NPPO cannot determine host status, appropriate field surveillance by fruit sampling or field trials conducted under semi-natural conditions should be used to determine host status (see step C in the section on General requirements in this standard).

#### **4. Application of the host status of a fruit to a fruit fly in pest risk analysis**

When conducting a PRA for a fruit commodity, the following requirements apply:

- The host status of a fruit to a fruit fly species (including the level and nature of the associated uncertainty) should be considered:
  - in the initiation stage;
  - in the evaluation of the probability of introduction and spread and in the assessment of impacts;
  - in the evaluation and selection of pest risk management options (e.g. inspection, phytosanitary treatment); and
  - in pest risk communication (e.g. consultation and sharing of information).
- When a PRA is conducted for import of fruit from a plant species, cultivar or variety categorized as a non-host for a particular fruit fly species, that fruit fly species should be eliminated from further consideration at the initiation or pest categorization stages.
- When a PRA is conducted for import of fruit from a plant species, cultivar or variety categorized as a conditional host, the pest risk posed by the conditional host should be considered as being lower than that posed by a natural host (when infested by the same species of fruit fly). Phytosanitary measures should be consistent with the pest risk. The measures should specify features of the conditional host that may be used to differentiate it from a natural host.
- Even if plant species, cultivars or varieties are categorized as natural hosts, they may not all pose the same pest risk. Therefore, when conducting a PRA for import of fruit from a plant species, cultivar or variety categorized as a natural host for a particular fruit fly species, the evidence that led to the decision of natural host status should be described in detail so that phytosanitary measures can be selected that are appropriate for the level of pest risk posed.