General glossary for surveys of quarantine organisms

Introduction

This glossary is a listing of terms and definitions relevant to the implementation of the EFSA Toolkit for Plant Pest Surveillance in the EU (EFSA, 2018). For consistency with international phytosanitary terminology, the glossary draws on information from a range of sources. Where a definition is paraphrased fully or partly from another source, a citation to the source is included, and where the glossary uses a definition directly from another source, this is provided as a direct quote with an associated citation. Where the definition is EFSAs own, no quote or citation is included, or a citation to the relevant EFSA document is provided.

Table 1. Glossary of terms

Buffer zone	"An area surrounding or adjacent to an area officially delimited for phytosanitary purposes to minimize the probability of spread of the target pest into or out of the delimited area, and subject to phytosanitary or other control measures, if appropriate." FAO (2021a). In EU Regulation (EU) 2016/2031 a buffer zone is part of a **demarcated area**[1].
Buffer zone survey	**Survey** conducted to ensure the **buffer zone** is free from the pest.
Confidence level	A measure of reliability of the **survey** procedure (Montgomery and Runger, 2010; FAO, 2021b). It states the statistical confidence that a pest is absent from the surveyed area, or that its true prevalence is below the **design prevalence**. The higher the confidence level of a **survey** the stronger the evidence to substantiate pest freedom. The confidence level increases with survey effort and is a risk manager decision that considers available resources.
Demarcated area	An area that is established for the application of control or eradication measures against a quarantine pest[1]. It consists of an **infested zone** and a **buffer zone**[1].
Delimiting survey	"**Survey** conducted to establish the boundaries of an area considered to be **infested** by or free from a **pest**" (FAO 2021a).
Design prevalence	*Analogous to the term level of detection used in "Methodologies for sampling of consignments "*FAO 2021b). The minimum **pest prevalence** that a **survey** will detect with a given **confidence level**. The lower the design prevalence the stronger the evidence to substantiate pest freedom. The design prevalence decreases with increasing survey effort and is a risk manager decision that considers available resources.
Detection method	The combination of methods applied from the field to the laboratory to determine if a **pest** is present. The detection method may include a sequence of operations such as the **visual examination**, trapping,

[1]*Regulation (EU) 2016/2031 of the European Parliament of the Council of 26 October 2016 on protective measures against pests of plants.*

	sampling and testing. The sensitivity of the detection method is given by the **method sensitivity**.
Detection survey	"**Survey** conducted in an area to determine if pests are present" (FAO 2021a).
Diagnostic protocols	"Procedures and methods for the detection and identification of rsurveyegulated pests that are relevant to international trade." (FAO, 2021c).
Diagnostic sensitivity	The probability to detect the **pest** in the sample, based on a specific sampling or **diagnostic protocol** (FAO 2021c) that has been followed, given that the pest is present. When combined with the **sampling effectiveness**, it determines the overall **method sensitivity**.
Diagnostic specificity	The conditional probability of testing negative given that the individual does not have the disease of interest (Dohoo et al., 2010). The diagnostic specificity is the probability that a truly negative **inspection unit** will give a negative result and is related to the analytical specificity.
Epidemiological unit	*Analogous to the term lot used in 'Methodologies for sampling of consignments (ISPM 31: FAO 2021b)* A homogeneous area where the interactions between the pest, the **host plants** and the abiotic and biotic factors and conditions would result into the same epidemiology, should the pest be present. Epidemiological units are subdivisions of the **target population** and reflect the structure of the **target population** in a geographical area. They are the units of interest for which the **sample size** is estimated.
Host plant	Plants which provide shelter, habitat, breeding sites or serve as a food source as part of the life cycle of another organism (USDA, 2022).
Host range	The "plant species capable, under natural conditions, of sustaining a specific pest or other organism" (FAO, 2021a).
Identification	The process of assigning a taxonomic identity to an organism, specimen or an isolate of specimen.
Infection (and infected)	The process by which a microorganism can "enter, invade, or penetrate and establish a parasitic relationship with a **host plant**" (Shurtleff et al., 1997).
Infestation (and infested)	The process "to attack as a pest (used especially of insects and nematodes); to contaminate, as with microorganisms; to be present in large numbers" (Shurtleff et al., 1997). In national and international regulation, infestation and **infection** are often used interchangeably.

[1]*Regulation (EU) 2016/2031 of the European Parliament of the Council of 26 October 2016 on protective measures against pests of plants.*

Infested or infected zone	A zone within the **demarcated area** that includes all plants infested or infected by a pest or showing signs or symptoms with the pest concerned[1].
Inspection unit	The elementary units on which the **detection method** is applied (e.g. plants, plant parts, commodities, **pest** vectors that are examined for detection of a **pest**) as part of a **survey**. They define the size of the sub-divisions of the **target population**.
Inspector	"Person authorized by a national plant protection organisation to discharge its functions" (FAO, 2021a).
Method sensitivity	*Analogous to the term efficacy of detection used in 'Methodologies for sampling of consignments (FAO 2021b)* The probability that an **inspection unit** tests positive given that it is truly **infested** or **infected**. This is determined by the product of two components, the **sampling effectiveness** and the **diagnostic sensitivity**.
Pest	"Any species, strain or biotype of plant, animal or pathogenic agent injurious to plants or plant products" (FAO, 2021a).
Pest prevalence (syn.: pest incidence)	"Proportion or number of units in which a **pest** is present in a sample, consignment, field or other defined population" (FAO 2021a).
Pest status	"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 " (FAO 2021a). Different categories of **pest** status are outlined in ISPM 8 (FAO 2021d).
Population size	"The estimation of the number of **inspection units** in the **target population** to be surveyed" (EFSA et al., 2018).
Relative risk	An elevated risk of presence of the **pest** compared to a baseline level of risk (equal to 1)) (EFSA, 2018).
Representative sample	A subset of a population that replicates the characteristics of the overall population.
RiBESS+ (Risk based surveillance systems)	Open access statistical application used for estimating the **sample size** and probability of freedom from **pest** for detection and **delimiting surveys**. Free access to the software with prior user registration is available at https://r4eu.efsa.europa.eu/app/ribess
Risk activity	A type of **risk factor** (e.g. the importation of planting material) (EFSA, 2018).

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Risk area	The area surrounding a **risk location**, the size of which depends on the spread capacity of the target **pest**.
Risk-based survey	A **survey** design that allows differentiated sampling efforts based on **risk factors** and targets the survey effort in the corresponding proportion of the **target population**.
Risk factor	A biotic or abiotic factor (e.g. related to environment, ecosystem or a human activity) that increases the probability of infestation of an **epidemiological unit** by the **pest** (EFSA, 2018). Each risk factor should have more than one level of **relative risk** for the **target population**. For each level, the **relative risk** needs to be estimated as the relative probability of infestation compared to a baseline set at 1. (EFSA, 2018). Consideration of risk factors in the **survey** design allows the survey efforts to be concentrated on those areas with a higher probability to be infested by the target **pest** (EFSA, 2018).
Risk location	The location that is associated with a **risk activity** and which may be a source of entry or enhanced spread of a target **pest**.
SAMPELATOR (Sample size calculator)	Statistical application used for estimating the **sample size** for **surveys** aimed to determine **pest prevalence**. Free access to the software with prior user registration is available at https://r4eu.efsa.europa.eu/app/ribess
Sample size	The number of **inspection units** that will be inspected or tested to determine presence of the **pest** (FAO 2021b).. For the purposes of using EFSA Statistical Tools for survey design (for example RiBESS+) the term sample size refers to the number of **inspection units**, not to general biological samples (plant parts, insect specimens etc). Multiple 'biological' samples may be taken from a single **inspection unit**.
Sampling effectiveness	The probability to collect an infected/infested sample from an **inspection unit**. When combined with the **diagnostic sensitivity**, it determines the overall **method sensitivity.**
Survey	"An official procedure conducted over a defined period of time to determine the characteristics of a **pest** population or to determine which species are present in an area" (FAO, 2021a, 2021e).
Survey area	The geographic area in which the **survey** is carried out.
Target population	The set of individual plants, commodities or vectors in which the target **pest** can be detected within an area of interest. The size of the target population corresponds to the number of **inspection units** it contains and its geographic boundary (EFSA et al., 2018).

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Test	"Official examination of plants, plant products or other regulated articles, other than visual, to determine if **pest**s are present, identify **pest**s or determine compliance with specific phytosanitary requirements" (FAO, 2021a).
Visual examination	"The physical examination of plants, plant products, or other regulated articles using the unaided eye, lens, stereoscope or other optical microscope to detect **pest**s, or signs and symptoms of **pest**s" (FAO, 2021a).

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[1]*Regulation (EU) 2016/2031 of the European Parliament of the Council of 26 October 2016 on protective measures against pests of plants.*

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[1]*Regulation (EU) 2016/2031 of the European Parliament of the Council of 26 October 2016 on protective measures against pests of plants.*