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Pest survey card on non-EU *Choristoneura* spp.

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Abstract

This document provides the conclusions of the pest survey card that was prepared in the context of the EFSA mandate on plant pest surveillance (M-2020-0114) at the request of the European Commission. The full pest survey card for the non-EU *Choristoneura* spp. is published and available online in the EFSA Pest Survey Card gallery at the following link and will be updated whenever new information becomes available:
<https://efsa.europa.eu/plants/planthealth/monitoring/surveillance/non-eu-choristoneura>

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Keywords: 1CHONG, budworms, delimiting survey, detection survey, polyphagous, risk-based surveillance, Union quarantine pest

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1 Introduction

This pest survey card was prepared in the context of EFSA's mandate on plant pest surveillance (M-2020-0114), at the request of the European Commission. Its purpose is to guide the Member States in preparing data and information for non-EU *Choristoneura* spp. surveys. These are required to design risk-based pest surveys, in line with current international standards. The 11 taxa (nine species and two subspecies) addressed in this pest survey card belong to the genus *Choristoneura* and are regulated as Union quarantine pests. *Choristoneura* species overwinter as larvae, pupation occurs in summer and the adults emerge and oviposit in summer. They can be univoltine (*C. conflictana*, *C. fumiferana*, *C. lambertiana*, *C. occidentalis occidentalis*, *C. orae*, *C. pinus*, *C. retiniana*), bivoltine (*C. parallela*, *C. rosaceana*), or semivoltine (*C. occidentalis biennis*). Species in the *C. fumiferana* species complex (*C. carnana*, *C. fumiferana*, *C. lambertiana*, *C. occidentalis*, *C. orae*, *C. pinus* and *C. retiniana*) are restricted to conifers (*Abies*, *Larix*, *Picea*, *Pinus*, *Pseudotsuga* and *Tsuga*). The remaining species are polyphagous (*Corylus*, *Malus*, *Pistacia*, *Populus*, *Prunus*, *Pyrus*, *Rubus* and *Vaccinium* and several herbaceous species). While *C. conflictana* and *C. rosaceana* can also feed on some conifers, *C. parallela* is restricted to angiosperms. The import of the conifers above into the EU is prohibited. Detection and delimiting surveys should be based on adult trapping and visual examination for pest presence and symptoms (foliar damage, defoliation, larval webbing around leaves). However, for detection surveys in conifer forests, adult trapping is the most practical method. Identification to species level is possible through both morphological identification keys and barcoding, the latter is recommended because of the occurrence of seven native EU *Choristoneura* species, the regulation of two subspecies of *C. occidentalis*, and the possibility of hybridisation in the *C. fumiferana* species complex.

2 The survey preparation

Table 1 addresses the key questions that are relevant for preparing a pest survey. First, the plant pest needs to be characterised in terms of its life cycle and biology. Then, the structure and size of the target population needs to be characterised and these analyses should be tailored to the situation in each Member State. Figure 1 gives examples of the components of a target population for the non-EU *Choristoneura* spp. and is not necessarily exhaustive. Finally, the detection process needs to be characterised in terms of the sequence of detection and identification methods required for the survey.



Table 1: Preparation of surveys for the non-EU *Choristoneura* spp.

SURVEY QUESTION	SECTIONS	KEY INFORMATION
WHAT?	1. The pest and its biology	Non-EU <i>Choristoneura</i> spp. develop through egg, larva, pupa and adult stages. Adults emerge and oviposit in summer except the bivoltine <i>C. rosaceana</i> which also oviposits in spring.
WHERE?	2. Target population	Most of the non-EU <i>Choristoneura</i> spp. hosts are conifers. Crops such as <i>Corylus</i>, <i>Malus</i>, <i>Pistacia</i>, <i>Populus</i>, <i>Prunus</i>, <i>Pyrus</i>, <i>Rubus</i> and <i>Vaccinium</i>, along with some herbaceous species, are major hosts of <i>C. conflictana</i>, <i>C. parallela</i> and <i>C. rosaceana</i>. Based on this host grouping and on the recommended detection method (trapping), detection survey strategies differ between conifer forests and the other host situations. Delimiting surveys should focus on the species-specific hosts occurring in the survey area. Epidemiological units: areas that contain at least one individual host plant (forest, agricultural and urban areas). Risk areas: areas surrounding risk locations (ports, airports, nurseries, gardens, urban parks and plant importing companies). Inspection unit: area covered by pheromone trap or individual host plants.
HOW?	3. Detection and identification	Recommended method: adult trapping pheromone traps for detection surveys in conifer forests, combined with visual examination in other host situations (e.g. nurseries, orchards); adult trapping and visual examination for delimiting surveys. In all cases identification should be confirmed by molecular methods.
WHEN?		Although exact timing of the preferred survey period varies depending on the species, the adults can usually be detected in summer and the larvae all year around.

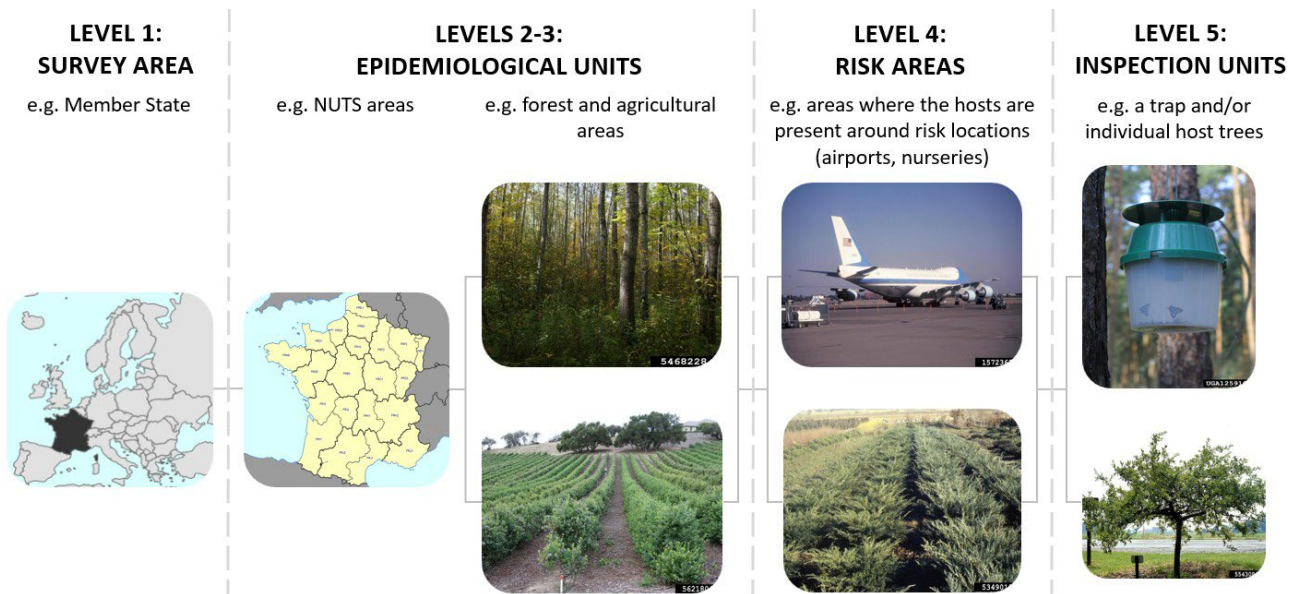


Figure 1: Example of the hierarchical structure of the target population for non-EU *Choristoneura* spp. (Sources: Eurostat, 2022 (levels 1–2); Steven Katovich, Bugwood.org (level 3, top); Gerald Holmes, Strawberry Center, Cal Poly San Luis Obispo, Bugwood.org (levels 3, bottom and 4, top); Norbert Frank, University of West Hungary, Bugwood.org (level 4, bottom); Landesforstpräsidium Sachsen, Bugwood.org (level 5, top); T. Davis Sydnor, The Ohio State University, Bugwood.org (level 5, bottom))

3 From survey preparation to survey design

Figure 2 shows the next steps after the survey preparation for designing statistically sound and risk-based detection and delimiting surveys of the non-EU *Choristoneura* spp. Guidance on the selection of type of survey, related survey preparation and design, is provided in the EFSA general guidelines for pest surveys¹.

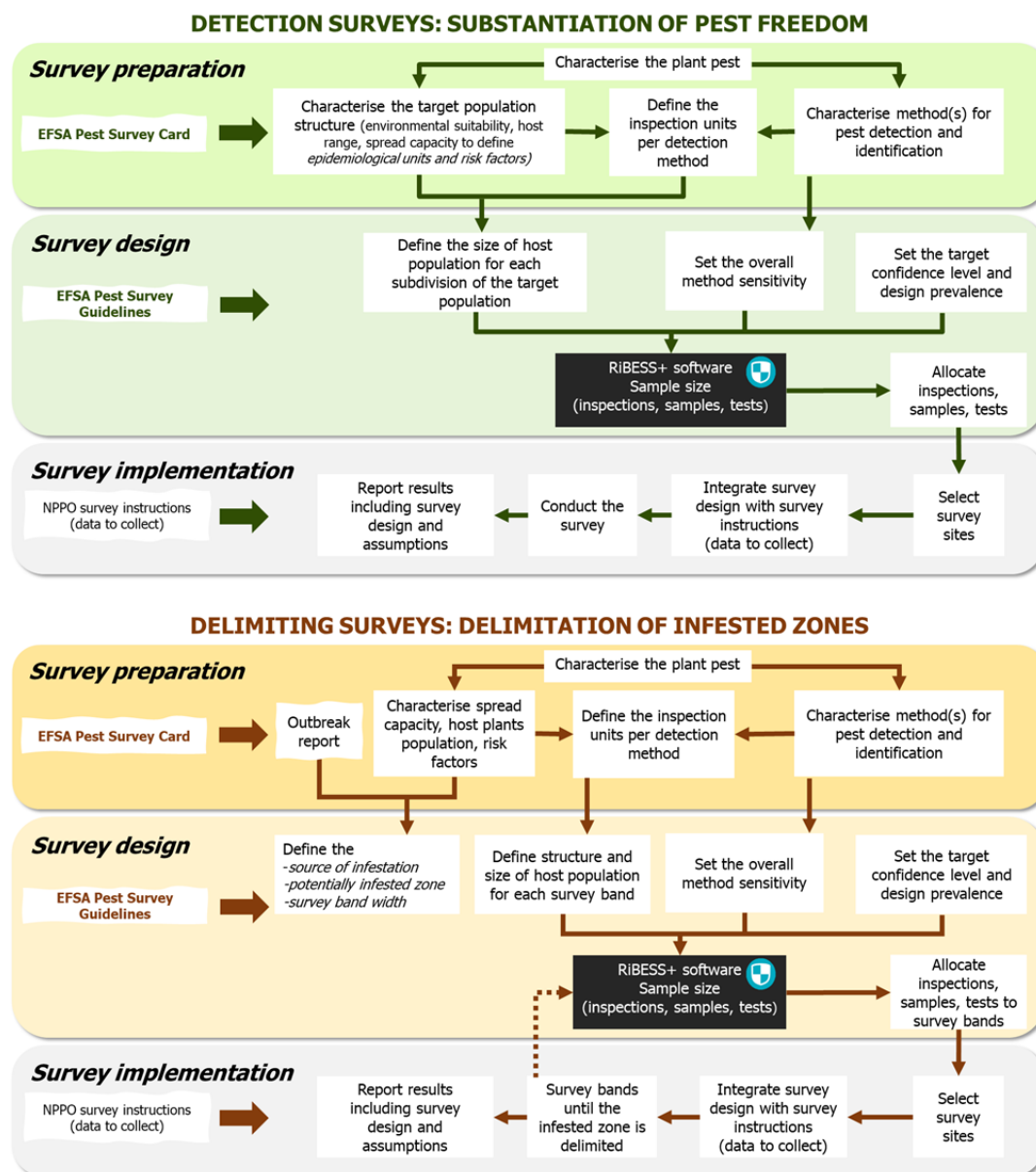


Figure 2: Steps required for the preparation, design and implementation of detection and delimiting surveys, in accordance with the methodology for statistically sound and risk-based surveillance¹

¹ EFSA (European Food Safety Authority), Lázaro E, Parnell S, Vicent Civera A, Schans J, Schenk M, Cortiñas Abrahantes J, Zancanaro G and Vos S, 2020. General guidelines for statistically sound and risk-based surveys of plant pests. EFSA supporting publication 2020:EN-1919. 65 pp. doi:10.2903/sp.efsa.2020.EN-1919 <https://efsa.onlinelibrary.wiley.com/doi/10.2903/sp.efsa.2020.EN-1919>

Relevant EFSA outputs

- General guidelines for statistically sound and risk-based surveys of plant pests: <https://efsa.onlinelibrary.wiley.com/doi/10.2903/sp.efsa.2020.EN-1919>
- Pest survey card on non-EU *Choristoneura* spp. : <https://efsa.europa.eu/plants/planthealth/monitoring/surveillance/non-eu-choristoneura>
- Pest categorisation of non-EU *Choristoneura* spp. : <https://doi.org/10.2903/j.efsa.2019.5671>
- Index of the EFSA Plant Pest Survey Toolkit: <https://efsa.europa.eu/plants/planthealth/monitoring/surveillance/index>
- EFSA Pest Survey Card gallery: <https://efsa.europa.eu/plants/planthealth/monitoring/surveillance/gallery>
- Pest survey cards: what, when, where and how to survey? <https://efsa.europa.eu/plants/planthealth/monitoring/surveillance/video-pest-survey-card>
- The statistical tool RiPEST: <https://r4eu.efsa.europa.eu/app/surveillance>
- The RiPEST manual: <https://zenodo.org/doi/10.5281/zenodo.8335472>
- The statistical tool RiBESS+: <https://r4eu.efsa.europa.eu/app/ribess>
- The RiBESS+ manual: <https://zenodo.org/doi/10.5281/zenodo.664465>
- The RiBESS+ video tutorial: <https://youtu.be/qYHqrCiMxDY>