

PEST SURVEY CARD SUMMARY

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Pest survey card on *Bretziella fagacearum*

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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 *Bretziella fagacearum* is published and available online in the EFSA Plant Pest Survey Cards Gallery at the following link and will be updated whenever new information becomes available: <https://efsa.europa.eu/plants/planthealth/monitoring/surveillance/bretziella-fagacearum>

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Keywords: detection survey, delimiting survey, oak wilt, red oak, risk-based surveillance, Union quarantine pest, white oak

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Figure 1: © Eurostat, 2018 (levels 1–2); © Alessandra Gionni (level 3); © University of Georgia, Bugwood.org, UGA1420126 (level 4, top); © Brian Lockhart, USDA Forest Service, Bugwood.org, UGA1118313 (level 4, bottom); © Fred Baker, Utah State University Bugwood.org, UGA4215061 (level 5).

1. Introduction

This pest survey card was prepared in the context of the EFSA 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 surveys of the causal agent of the oak wilt *Bretziella fagacearum*. This pathogen, of unknown origin, is a well-defined and distinguishable fungal species of the new genus *Bretziella* of the family Ceratocystidaceae. *Bretziella fagacearum* is a Union quarantine pest currently found exclusively in the eastern United States. The fungus is a vascular pathogen that once it enters the host tree, spreads through the xylem vessels. The resulting interruption of sap flow is the cause of the onset of crown wilt symptoms and consequent death of susceptible plants. The pathogen spreads mainly through root anastomosis between neighbouring plants and occasionally via sap beetles and less commonly via oak bark beetles. The fungus mainly infects species of the genus *Quercus*. In the United States, red oaks are highly susceptible and can be rapidly killed, while white oaks show medium to high resistance to the disease. Inoculation trials have shown that other genera belonging to the Fagaceae family (e.g. *Castanea*), as well as European oaks (*Q. robur*, *Q. petraea* and *Q. pubescens*), are highly susceptible to the disease. Climatic conditions are not to be considered as a limiting factor for the establishment of the pathogen in the EU territory if introduced. The host species are widely distributed in EU territory (forests, cities, parks) and the climate types suitable to pathogen survival overlap to a large extent with the distribution of native European oaks. Detection surveys should focus on European oaks, North American oaks introduced as ornamentals, while delimiting surveys should include all *Quercus* and also *Castanea* species. Symptoms of *B. fagacearum* infection are variable and may be confused with those caused by biotic and abiotic factors. Therefore, the pathogen must be identified in the lab using classic isolation methods and molecular diagnostic techniques. Insects *Pseudopityophthorus minutissimus* and *P. pruinosis* (Coleoptera: Curculionidae), and *Arrhenodes minutus* (Coleoptera: Brentidae) are Union quarantine pests that can potentially vector *B. fagacearum*.

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 *Bretziella fagacearum* 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 *Bretziella fagacearum*

Survey question	Section	Key information
What?	1. The pest and its biology	The fungus <i>Bretziella fagacearum</i> is a vascular pathogen which causes oak wilt.
Where?	2. Target population	Epidemiological units: homogeneous areas that contain at least one individual host plant for <i>Bretziella fagacearum</i> (e.g. <i>Quercus</i> spp.) (e.g. forest, cities, parks).
		Risk areas: areas surrounding risk locations (pure oak stands and sites where wood and wood products from <i>Quercus</i> (and other hosts) are stored or traded (e.g. lumber yards, sawmills, packaging facilities, ports, and airports)).

		Inspection units: individual host plants (e.g. <i>Quercus</i> , <i>Castanea</i>) examined and sampled for <i>B. fagacearum</i> .
How?	3. Detection and identification	Visual examination of the symptoms on the leaves and bark need to be confirmed and identified by classic methods (isolation and morphological identification) or molecular diagnostic techniques (PCR method). Oak wilt detection can also be carried out on a landscape scale using airborne spectroscopic images. In addition, sampling of vectors should be considered for delimiting surveys.
When?		Visual identification for the symptoms is best conducted from July to September, when all of the symptoms are most evident. However, plant parts for identification in the lab can be collected year-round but before the tree has desiccated after death.

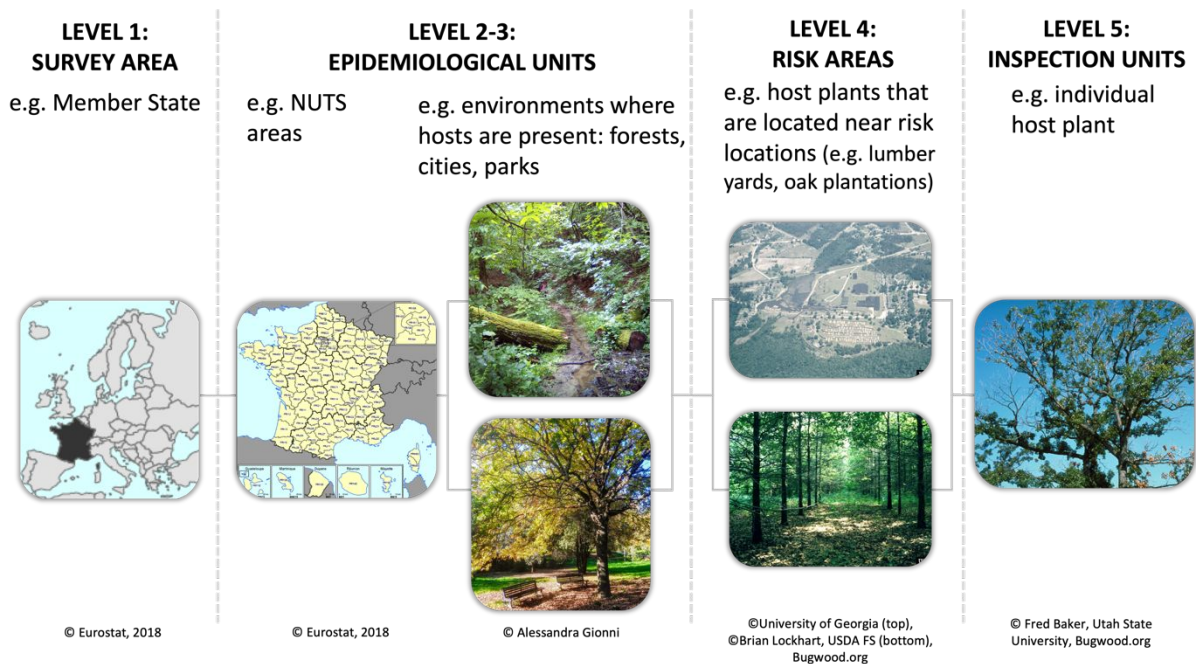


Figure 1: Example of hierarchical structure of the target population for *Bretziella fagacearum* [Sources: Eurostat, 2018 (levels 1–2); Alessandra Gionni (level 3); University of Georgia, Bugwood.org (level 4, top: aerial view of a lumber company); Brian Lockhart, USDA Forest Service, Bugwood.org (level 4, bottom); Fred Baker, Utah State University Bugwood.org (level 5)]

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 *Bretziella fagacearum*. Guidance on the selection of type of survey, related survey preparation and design, is provided in the EFSA general guidelines for pest surveys¹.

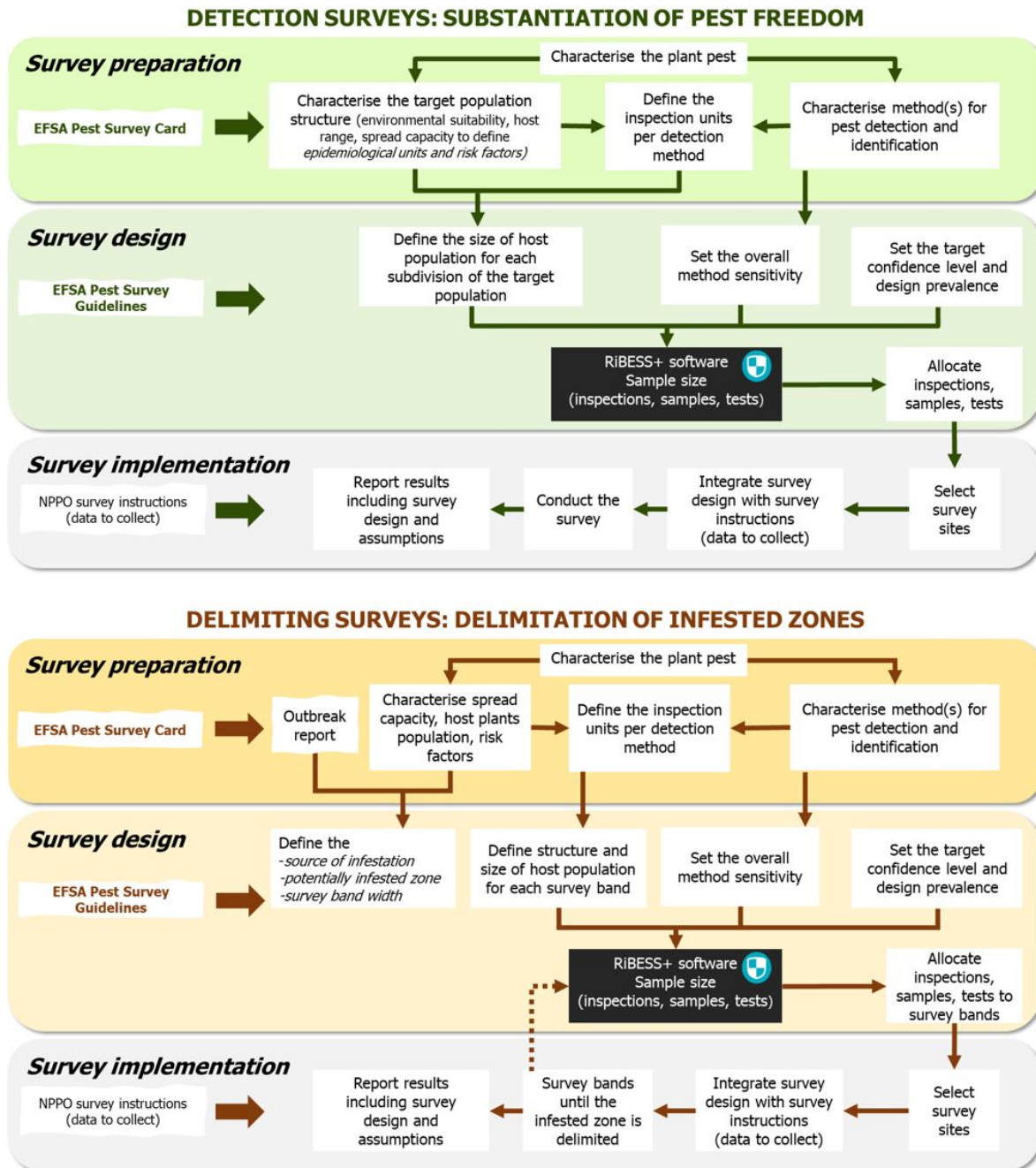


Figure 2: Steps required for the preparation, design and implementation of detection and delimiting surveys, in accordance with the methodology for statistically sound and risk-based surveillance¹

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 *Bretziella fagacearum*: <https://efsa.europa.eu/plants/planthealth/monitoring/surveillance/bretziella-fagacearum>
- Pest categorisation of *Bretziella fagacearum*: <https://efsa.onlinelibrary.wiley.com/doi/full/10.2903/j.efsa.2018.5185>
- Index of the EFSA Plant Pest Survey Toolkit: <https://efsa.europa.eu/plants/planthealth/monitoring/surveillance/index>
- Plant pest survey cards gallery: <https://efsa.europa.eu/plants/planthealth/monitoring/surveillance/gallery>
- Pest survey cards: what, when, where and how to survey? <https://www.youtube.com/watch?v=kHANmRDex8>
- The statistical tool RiBESS+: <https://r4eu.efsa.europa.eu/app/ribess>
- The RiBESS+ manual: <https://zenodo.org/record/2541541#.Ys7G5HZByUn>
- The RiBESS+ video tutorial: <https://youtu.be/qYHqrCiMxDY>