Department for Environment Food & Rural Affairs

Pest specific plant health response plan:

Xylella fastidiosa (2022)

Figure 1: Early symptoms of *Xylella fastidiosa* on *Nerium oleander* in Italy. (Françoise Petter, EPPO)
Figure 2: *Xylella fastidiosa* symptoms on cherry (Donato Boscia, Inst. Sustainable Plant Protection, Bari, Italy)
Figure 3: Symptoms of *Xylella fastidiosa* on olive in Puglia, Italy (Donato Boscia)
Figure 4: Symptoms of *Xylella fastidiosa* on *Polygala myrtifolia* (Bruno Legendre, Anses, France)

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This publication is available at

https://planthealthportal.defra.gov.uk/pests-and-diseases/contingency-planning/

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Executive summary

Background	
Regulation	GB Quarantine pest
Key Hosts	Infects a wide range of hosts including grapevine, citrus, olive, several species of broadleaf trees, shrubs and herbaceous plants.
Distribution	Argentina, Brazil, Canada, France, Iran, Israel, Italy, Mexico, Paraguay, Portugal, Puerto Rico, Spain, Taiwan, USA, Venezuela
Key pathways	Plants for planting
Industries at risk	Nurseries, garden centres, woodlands
Symptoms (2.3)*	Leaf scorch, desiccation, dieback and mortality of hosts.
Surveillance	
Demarcated zones (5.29)	Infected zone = ≤ 100 m Buffer zone ≤ 2.5 km^{+} ($^{+}$can be reduced to 1 km following surveys)
Surveillance activities (5.8, 5.12-5.14)	• Visual surveys in infected and buffer zones • Vector surveys in the infected zones
Response measures	
Interceptions (5.22-5.27)	• Destruction of infested consignments via chipping, deep burial or incineration. • Tracing exercises carried out where required • UKPHINs notifications • Further surveillance of area • Destruction of weeds may be appropriate for inland findings.
Outbreaks (5.28-5.41)	• Destruction of infected material, hosts, symptomatic and potentially infected material • Restrictions on the movement and planting of hosts • Restrictions on the movement of green waste or felled timber • Sampling and surveys including vector surveys
Key control measures	
Biological	N/A
Chemical	Foliar insecticides, herbicides
Cultural	Good hygiene practice
Declaration of eradication	
Eradication can be declared if no pest is detected during annual surveys for at least • Two years for interceptions • One year for outbreaks with reduced buffer zones (see 5.41) • Four years for outbreaks with non-reduced buffer zones (see 5.41)	

* Numbers refer to relevant points in the plan

Contents

1. Introduction and scope

1.1. This pest specific response plan has been prepared by Defra's plant health Risk and Horizon Scanning Team. It describes how the plant health service for England will respond if an infection by *Xylella fastidiosa* (Xf) is confirmed in England and how the risk is being managed. The structure of this plan is based on previous and current EU emergency measures, however some elements have been adjusted to suit the circumstances in England.

1.2. The plant health authorities in Northern Ireland, Scotland, Wales and the Crown Dependencies have been consulted on this plan and will use it as the basis for the action they will take in the event that Xf is detected in their territories.

1.3. This document is restricted to activities specific to this pest, and will be used in conjunction with the *Defra* *Generic contingency plan for plant health in England* (https://planthealthportal.defra.gov.uk/assets/uploads/Generic-Contingency-Plan-for-Plant-Health-in-England-FINAL-2.pdf) (Defra 2017a), which gives details of the teams and organisations involved in pest response in England, and their responsibilities and governance. It also describes how teams and organisations work together in the event of an outbreak of a plant health pest.

1.4. The aims of this plan are:

- to communicate how the government will respond to an outbreak of Xf to industry and other stakeholders
- to describe the actions that have been taken to assess the risk of Xf
- to set out the actions that have been and will be taken to reduce the risk of the introduction of Xf into the UK and to detect outbreaks as early as possible
- to ensure a rapid and effective response to an outbreak of Xf in order to facilitate containment or eradication.

2. Summary of the threat

2.1 *Xylella fastidiosa* is a bacterial pathogen. *Xylella fastidiosa* (Xf) and *Xylella taiwanensis* are the only members of the genus (Su et al. 2016). Three sub-species of Xf have been found in Europe and 87 sequence types have been described from around the world (Desprez-Loustau et al. 2020). The pathogen is unusual in that it lives in the xylem vessels of plants (Sicard et al. 2018). The bacterium blocks the transport of mineral nutrients and water in the xylem vessels leading to leaf scorch diseases characterised by the desiccation of leaves and dieback. Infections may be asymptomatic but can produce a range of disease symptoms from minor leaf scorch through to extensive die-back and plant death. Xf and its vectors have an exceptionally large host range and it is difficult to predict which potential UK plant host species may be susceptible to infection if the pathogen were to establish in the UK.

2.2 Xf also lives in the foregut of insect vectors which feed by sucking out the contents of xylem vessels. The pathogen is unable to survive well in the environment outside of plant and vector hosts, and disease transmission and natural spread is dependent on insect vectors. Potential vectors are insects which feed on the xylem,

including species of plant bugs (Hemiptera: Auchenorryncha) within the superfamilies Cercopoidea (froghoppers and spittlebugs) and Cicadoidea (cicadas) and one subfamily Cicadellidae, Cicadellinae (sharpshooters). The bacterium does not appear to have any detrimental impact on its insect hosts. The rate of spread of Xf, its establishment and the potential damage to crops or trees is closely related to the vectors that are present, their host ranges and host preferences in a given environmental setting. Consideration of vectors will therefore be important in responding to a confirmation of Xf infection in the UK (see section 5 and the pest risk assessment, Korycinska & Elphinstone, 2020).

2.3 **Symptoms** (EPPO 2020a). Symptoms depend on the particular combination of host and Xf subspecies and sequence type and can be confused with symptoms caused by other factors such as other pathogens, environmental stresses, water deficiency, salt, air pollutants, nutritional problems, sun scorch etc. Some symptoms are shown in figures 1-4 on the front page of this document. Generally, symptoms include leaf scorching, wilting of the foliage, defoliation, chlorosis or bronzing along the leaf margin and dwarfing. Depending on the plant species, yellow spots on leaves, chlorotic foliage (often together with pronounced yellow discolouration between healthy and necrotic tissues), irregular lignification of bark, stunting, premature leaf drop, reduction in number and size of fruits, fruit distortion, crown dieback or a combination of symptoms may occur. The bronzing may intensify before browning and drying (Janse and Obradovic 2010). Symptoms usually appear initially on just a few branches but later spread to cover the entire plant, and the infections can be so severe as to lead to the death of the infected plant. The time period between *Xf* inoculation and the appearance of symptoms in a given plant (incubation period) is highly variable and ranges from a few months to many years, depending on the *X. fastidiosa* genotype, the host species, the physiological stage (age) of the plant and growing conditions (EFSA 2019). Some infected hosts can remain asymptomatic (EFSA et al. 2019).

2.4 One known froghopper (Cercopoidea) vector is the meadow spittlebug (*Philaenus spumarius* L.). This insect is very common in the UK, it is not considered to be a damaging pest and has a wide host range especially as adults. In the event of a Xf outbreak it is likely to be the most important vector. Spittlebugs overwinter as eggs and the nymphs develop on host plants within bubbles of plant sap (the familiar 'cuckoo spit'), which are visible on inspection. There is no vertical transmission of Xf from adults to eggs and only adults are likely to transmit Xf between plants. Excluding extremely rare or threatened species, there are currently 18 species of xylem-feeding Auchenorrhyncha bugs recorded as occurring the UK and considered to be potential vectors of Xf (BRIGIT 2021). The potential vectors are in three families: Aphrophoridae – 9 spp.: *Aphorophora alni* (Fallen), *Aphorophora major* (Uhler), *Aphorophora pectoralis* Matsumura, *Aphorophora salicinia* (Goeze), *Neophilaenus campestris* (Fallen), *Neophilaenus exclamationis* (Thunberg), *Neophilaenus lineatus* (L.), *Neophilaenus longiceps* (Puton) and *Philaenus spumarius* L.; Cercopidae – 1 sp.: *Cercopis vulnerata* Rossi; and Cicadellidae – 8

spp.: *Anoterostemma ivanoffi* (Lethierry), *Cicadella lasiocarpae* Ossiannilsson, *Cicadella viridis* (L.)*, Euscelis incisus* (Kirshbaum), *Euscelis lineolatus* Brullé, *Evacanthus acuminatus* (Fabricius)*, Evacanthus interruptus* (L.) and *Graphocephala fennahi* Young. There are information sheets on all the potential vector species on the Brigit website (BRIGIT 2021). In the UK, *Neophilaenus* spp. tend to be found on grasses and rushes, *Philaenus* spp. on herbaceous plants and *Aphrophora* spp. on woody plants / shrubs. *Philaenus spumarius* (meadow spittle bug) is thought to be the most important vector of *X. fastidiosa* in Europe (Panzavolta et al. 2019, Cornara, Bosco, and Fereres 2018, EFSA et al. 2019), but other insects may be involved in transmission in parts of Europe. Transmission of *X. fastidiosa* subsp. *pauca* has been shown experimentally in Italy by *N. campestris* (which is present in the UK) and *Philaenus italosignus* Drosopoulos and Remane (absent from UK) (Cavalieri et al. 2019). These two species are unlikely to be important vectors of Xf in the UK because *N. campestris* is generally found on grass species and *P. italosignus* is absent from the country. There are photos of some potential Xf vectors for the UK in Appendix 1.

2.5 In the presence of infected vectors, Xf presents two main disease threats, firstly, to perennial hosts cultivated outdoors (e.g. *Vitis*) and secondly, to deciduous trees, especially those in urban environments. In built up areas Xf can spread to a large proportion of host tree and shrub species where chronic and persistent infections can be difficult to control. When vectors are present, significant damage to the urban landscape has been caused by Xf in some parts of the USA. Very significant losses to crops are also possible from Xf outbreaks. Highly damaging Xf epidemics have affected coffee, *Citrus* and *Vitis* production in South and Central America and southern states of the USA. The first confirmed European outbreak of Xf was in the Puglia region in the 'heel of Italy' in 2013 and has devastated some areas of olive production. The outbreak is associated with high populations of meadow spittlebugs.

2.6 There is considerable diversity within Xf and several subspecies have been discriminated phylogenetically based on DNA sequence comparisons. There are three formally accepted subspecies of *X. fastidiosa*, i.e. subspecies *fastidiosa*, *pauca* and *multiplex* (Schaad et al. 2004), based on DNA–DNA hybridization data. These three sub-species are thought to have different origins with *X. fastidiosa multiplex* from North America, *X. fastidiosa fastidiosa* from Central America and *X. fastidiosa pauca* from South America (Sicard et al. 2018). Only two subspecies, *fastidiosa* and *multiplex*, are so far considered valid names by the International Society of Plant Pathology Committee on the Taxonomy of Plant Pathogenic Bacteria (ISPP-CTPPB) (Bull et al. 2012). Since that publication, several additional *X. fastidiosa* subspecies have been proposed based on multi-locus sequence typing (MLST) analysis (Scally et al. 2005, Yuan et al. 2010), including subsp. *sandyi* (on *Nerium oleander* ;Schuenzel et al. (2005)), subsp. *tashke* (on *Chitalpa tashkentensis*; (Randall et al. 2009)) and subsp. *morus* (on mulberry; (Nunney, Ortiz, et al. 2014, Nunney, Schuenzel, et al. 2014)). Recently, a revision of the Xf

subspecies has been proposed (Marcelletti and Scortichini 2016) based on comparative genomic analysis.

2.7 **Climatic suitability of UK:** Climate is known to have a major influence on the development of disease caused by Xf, with greater impact of disease seen in locations with high temperatures. Higher temperatures increase transmission efficiency, Xf multiplication rate in plants, reduces the incubation period in plants and increases persistence of infections (Sicard et al. 2018). In addition, vectors of Xf have been shown to be less mobile in the cooler climates (unpublished data from the Brigit project). The relatively cool summers in the UK are likely to be less suitable for the development and spread of damaging outbreaks of Xf than the climate in southern Europe, but there is still uncertainty about the potential impacts in the UK (Occhibove et al. 2020). The threat could increase if there is a future increase in the frequency or duration of heat waves which cause vector host plants to desiccate and encourage the vectors to move longer distances as seen in parts of southern Europe (Morente et al. 2018).

3. Risk assessments

3.1 A UK pest risk analysis (PRA) is available (Korycinska and Elphinstone 2020) which details the threat posed by Xf to the United Kingdom.

3.2 The European Food Safety Authority updated its pest risk assessment for Xf in 2019 (EFSA 2019).

3.3 The relative threat of Xf to the UK has been assessed and published in the UK Plant Health Risk Register (https://planthealthportal.defra.gov.uk/pests-and-diseases/uk-plant-health-risk-register/viewPestRisks.cfm?cslref=12570). Xf has an unmitigated score of 60 and a mitigated score of 30. Overall scores range from 1 (very low risk) to 125 (very high risk). These scores are reviewed as and when new information becomes available. The current mitigations that are in place to justify a lower risk score include the UK import requirements for high risk hosts as described in 4.2.

3.4 The most likely pathway for introduction of Xf is the importation of plants for planting and / or infected insects (vectors) originating from areas where the pest is present (EPPO 2020a). Plants for planting are generally considered to present a high risk of pest introduction because:

- Xf can survive, and multiply, in living hosts;
- Xf can be present but asymptomatic;
- once at their destination, plants will remain planted or be replanted and Xf could then be vectored to other established plants by native vector species if the conditions are suitable.

4. Actions to prevent outbreaks

4.1 **GB regulation of Xylella**: Xf is listed in Schedule 1 of The Plant Health (Phytosanitary Conditions) (Amendment) (EU Exit) Regulations 2020. Schedule 1 is

the list of GB quarantine pests that are not known to occur in GB. Non-European Cicadellidae which are known to be vectors of Xf such as *Carneocephala fulgida* (Nottingham), *Draeculacephala minerva* Ball, *Graphocephala atropunctata* (Signoret) and *Homalodisca vitripennis* (Germar) are also included in Schedule 1. Xf is also a GB Priority Pest meaning it is a GB quarantine pest which has been assessed to have the most severe potential economic, environmental and social impacts to GB.

4.2 **GB measures to reduce the risk of Xf being introduced on plants for planting:** In 2021, new statutory measures were introduced to reduce the risk of plants for planting infected with Xf being introduced into GB (Part 3 of The Official Controls and Phytosanitary Conditions (Amendment) Regulations 2021). In this legislation, Xf host plants are divided up into four categories: i) *Coffea sp.* and *Polygala myrtifolia L.*; ii) *Lavandula sp*. L., *Nerium oleander* L. and *Salvia rosmarinus* (Spenner); iii) *Olea europaea* L. and *Prunus dulcis* (Mill.) D.A. Webb; iv) any other Xf host not listed in points i,ii or iii of this list. Xf hosts are listed in Annex 1 of (EU) 2020/1201 and also in Annex 3 of this document. The measures apply to plants for planting other than seed from all third countries and include specific requirements for plants in vitro.

4.3 **EPPO (European and Mediterranean Plant Protection Organisation) listing of *Xylella***: Xf is included on the EPPO A2 list of pests that are locally present in the EPPO region (Europe and the Mediterranean) and regulation is recommended. *Homalodisca vitripennis* is on the EPPO A1 list, pests recommended for regulation that are absent from the region.

4.4 **EU regulation of Xylella** : Annex II of EU/2019/2072 lists the 'Union quarantine pests' with Annex IIA for pests absent from the EU and Annex IIB for pests that are known to occur in the EU. Non-European Cicadellidae (leafhoppers) that are known to be vectors of Xf such as *Carneocephala fulgida* (Nottingham), *Draeculacephala minerva* Ball, *Graphocephala atropunctata* (Signoret) and *Homalodisca vitripennis* (Germar) are listed in Annex IIA and Xf is listed in Annex IIB. EU emergency measures for Xf (EU/2020/1201) came into force in August 2020. These set out the restrictions on growing and trading in certain hosts of Xf and also the eradication and containment measures required in EU member states. Xf is one of twenty species that are considered to be priority pests for the EU (EU/2019/1702). There is an obligation on EU member states to write contingency plans and conduct annual surveys for priority pests.

4.5 **Host categories in EU emergency measures**: There are three named categories of plants in the emergency measures (2020/1201): i) '**host plants'**- List of plants known to be susceptible to one or more subspecies of the specified pest. This list combines all the plants listed as 'specified plants' (Appendix 4) and for some plants whole genera of plants are included rather than individual species; ii) three lists of '**specified plants',** one for each of the three sub-species of Xf present in the EU: *Xylella fastidiosa* subsp. *fastidiosa*, *X. fastidiosa* subsp. *multiplex* and *X. fastidiosa* subsp. *pauca,* listing the plants that are known to be susceptible to each sub-

species iii) a subset of 'host plants' have been identified as being of particularly **high risk**, these are: *Coffea, Lavandula dentata* L., *Nerium oleander* L., *Olea europaea* L., *Polygala myrtifolia* L. and *Prunus dulcis* (Mill.) D.A. Webb. There are additional requirements that must be complied with before these plants can be moved within the European Union.

4.6 **Annual survey:** The UK will continue to conduct annual surveys for Xf. The surveys In England will be carried out by the Plant Health and Seeds Inspectorate (PHSI - part of the Animal and Plant Health Agency, APHA) and Forestry England (FE). A description of these surveys is provided in points 5.2-5.11 (for traded plants) and 5.12-5.14. (for plants in the wider environment). Surveys will be carried out in the spring, summer or early autumn, with a preference for late summer / early autumn when some of the symptoms characteristic of Xf such as scorch are more likely to be apparent. Plants will be inspected visually and samples will be taken from plants with suspicious symptoms and tested (see section 5.8). Annual surveys will be carried out in Great Britain, and returns will be submitted to the UK NPPO on an annual basis. A summary of that survey, including methodology used, will be made available publicly. The surveys will focus on 'high risk plants' and other 'host plants'.

4.7 Defra, PHSI and FCE will continue to raise awareness about Xf with industry bodies such as the Horticultural Trades Association and other stakeholders. This will include information on the risks associated with the movement of certain plants and also the consequences of interceptions and outbreaks. By providing such information, UK importers have been able to make well informed decisions about which plants and sources of plants present the greatest risk. Some of the relevant publications are listed in 4.8.

4.8 **Further information**.

Most plant health contingency plans drafted to date have included a factsheet. However, a number of Xf factsheets have been published, therefore we provide references to these instead.

Defra's 2019 factsheet:
https://planthealthportal.defra.gov.uk/pests-and-diseases/pest-and-disease-factsheets/notifiable-diseases/

Forestry Commission's 2015 pest alert:
https://www.forestresearch.gov.uk/research/xylella-fastidiosa-pest-alert/

EFSA's pest survey card (2019) is available here:
https://efsa.onlinelibrary.wiley.com/doi/toc/10.1002/(ISSN)1831-4732.toolkit-plant-pest-surveillance

The RHS has published advice including a video and a factsheet:

https://www.rhs.org.uk/advice/garden-health/disease/i-Xylella-fastidiosa-i

https://www.rhs.org.uk/advice/pdfs/Xylella-Vitis.pdf

The International Plant Protection Convention 2017 *Xylella fastidiosa* factsheet is here:

https://www.ippc.int/en/news/new-factsheet-on-xylella-fastidiosa/

Illustrations of possible confusion in symptoms can be seen (text in French) at: https://draaf.pays-de-la-loire.agriculture.gouv.fr/IMG/pdf/Xylella_fastidiosa_symptomes_et_risques_de_confusions_biotiques_et_abiotiques_DGAL-2016_cle029f41.pdf

5. Response activities

5.1. Interceptions or outbreaks may be discovered by PHSI or FE inspectors during the course of survey work. They could also be discovered as a result of reports from members of the public or professional operators. PHSI and FE will assess and prioritise reports of potential interceptions and outbreaks as part of their day to day work.

Actions pre-Xf diagnostic confirmation in plants moving in trade

5.2 In England, surveys and action relating to quarantine pests and pathogens on commercial plant growing and trading sites including nurseries, wholesalers and retail units, farms, orchards and residential gardens are generally the responsibility of the PHSI.

5.3 When planning surveys of traded plants, the following factors should be considered: the risks related to different third countries, the risk related to different EU countries and regions within those countries (see Appendix 2), the volume of trade, the seasonality of trade, the plant species traded and the potential presence of vectors associated with the trade. The most important Xf hosts are perennial species. Trees, shrubs or other perennial host plant species can be assumed to have a higher risk for introduction and spread of Xf (compared to annual plants) because: there is a high chance of vegetatively propagated asymptomatic plants being present in a consignment, strict certification and testing schemes are not applied to all species and a longer life cycle increases the chance of successful transfer by insect vectors when plants are grown outdoors. High priority species are listed in section 4.2.

5.4 Plants in consignments selected for inspection should be visually inspected and the incidence of symptomatic plants recorded. When plants are imported or moved in active growth with leaves, an adequate proportion (see 5.6 and 5.7) of plants of a

consignment should be subjected to a systematic examination in order to detect the presence or signs of Xf.

5.5 Symptoms of Xf are not always readily apparent on growing plants and there is a lag between infection and symptom expression. Therefore, periodic inspections should be performed according to the production cycles. Fields and facilities used to grow mother stock plants should be inspected prior to the harvest of the propagating materials, preferably between late spring and early autumn (EU 2015).

5.6 For plants originating in countries where Xf **is not known** to occur, it is recommended that inspectors should aim to detect evident symptoms present in 1% of the plants in a consignment with at least 99% reliability, as per table 1 in ISPM 31 (IPPC 2016, EPPO 2020a).

5.7 For plants originating in countries where Xf **is known** to occur, it is recommended that inspectors should aim to detect evident symptoms present in 0.1% of the plants in a consignment with at least 99% reliability as per table 1 in ISPM 31 (IPPC 2016, EPPO 2020a).

5.8 It is preferable to sample grapevines or deciduous trees from mid-summer onwards because experience in temperate countries is that Xf is not detected in new seasons growth until the middle of summer when symptoms may also become visible (EPPO 2019). Samples should be taken from symptomatic plants and in outbreak situations also from asymptomatic plants. Samples can be taken from single plants or multiple plants as appropriate, but advice should be sought from the diagnostic laboratory before pooling samples. Plant material from asymptomatic plants should not be put in the same sample as material from symptomatic plants. Symptomatic pooled samples should only contain samples with similar symptoms. One disadvantage of putting sub-samples from multiple plants in a single laboratory sample is that it will not be possible to identify individual infected plants, but this may not be crucial in some circumstances.

5.9 The petiole and midrib recovered from leaf samples are the best source for diagnosis as they contain a high number of xylem vessels (EPPO 2019). It is recommended that samples contain at least 10-25 leaves depending on leaf size. Samples should ideally include petioles and 2 cm of stem sections cut from either side of the petiole, plus a leaf or leaves which are placed in a sealed polybag to prevent desiccation.

5.10 Good hygiene practice should be employed to avoid the potential for spreading Xf on tools etc. Samples should be put in three levels of containment before being moved or posted.

5.11 When submitting samples, the information captured should include details of the consignment, for example:

- location that the sample has come from (including the name and address of the nursery, garden centre or other importer)

- the name of plant host (common name and scientific name to species and cultivar)
- import details (name and address of exporting company, date of arrival, any reference numbers)
- numbers of plants in the consignment, including asymptomatic plants of other species / cultivars
- percentage of plants which are symptomatic
- growth stage, size and intended use of the plants
- where possible a photograph of the symptoms, this should be identified with the submission reference number.

If samples cannot be dispatched immediately they should, if possible, be kept in cool conditions and out of direct sunlight.

Actions pre-Xf diagnostic confirmation in plants in the wider environment

5.12 In England, surveys and action relating to quarantine pests and pathogens in woodlands and forests are generally the responsibility of FCE. Surveys and action in other non-commercial locations such as in parks and on street trees can be led by either the PHSI or FCE.

5.13 Inspections and sampling should be performed in periods of active growth of the host plants which is likely to be from late spring until early autumn. Work in Italy and France has led to some host specific advice on sampling:

- French experience has shown that for ***Polygala myrtifolia***, the highest number of cases were on plants that had been planted out for more than two years and were located in residential areas or in Mediterranean shrubland (EU 2015). Xf has been detected in France between late spring and early autumn.
- In Apulia (Italy) withering and leaf scorching symptoms are more strongly expressed in summer in ***Olea europaea*** and ***Nerium oleander***, although they can be seen year round (EU 2015).
- In Italy, Xf has been detected consistently in symptomatic leaves collected during the summer from deciduous plant species (e.g. ***Prunus***) (EU 2015).
- Experience in midwest parts of the USA has shown that in vines (***Vitis***) and some deciduous trees e.g. almond and cherry (***Prunus***), the bacteria does not move into the new season's growth until the middle of the summer (EPPO 2020b).

Xf symptoms are most likely to be apparent in the UK during periods of water stress. This is most likely to be from summer to early autumn but will vary from year to year.

5.14 For surveying in forests or woodlands, the cardinal survey methodology will be followed. This involves sampling along four transect lines from a central point (north, south, east and west). At a convenient point along these transect lines the location will be recorded and trees will be surveyed. A proposed regime is to sample trees in four groups of six as per figure 5. It may be necessary to reduce the spacing from the centre point due to the location of tree species. Where it is not possible to locate six directly around the point, trees in the vicinity can be located. Where there are individual, or fewer than 24 suitable trees at the site, all trees of the selected species can be surveyed. See section 5.8 for advice on sampling.

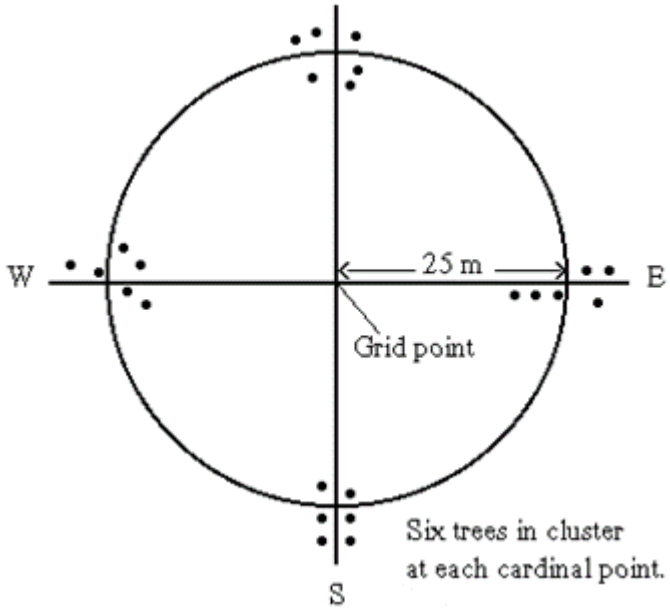


Figure 5: The Cardinal Survey Method – along the cardinal points of a compass

Xf diagnosis and confirming interception or outbreak status

5.15 **Confirmation of Xf**. Diagnostic confirmation of Xf will be carried out by Fera Science Ltd. or Forest Research following the recommendations in PM 7/24 (EPPO 2019). In the early stages of any outbreak, FCE inspectors will send samples to Alice Holt and the PHSI will send samples to Fera Science Ltd, Plant Clinic, York Biotech Campus, Sand Hutton, York, YO21 1LZ. As volumes build up, the IMT will make a decision on whether to change these arrangements. Samples from sites where there is a strong suspicion that Xf may be present (either/or as a result of intelligence from other known infected plants, the origin of the plants or the nature of the symptoms) will be treated as urgent.

5.16 Diagnosis to species level is likely to be by PCR-based testing and may take up to two weeks, however, it would be possible to prioritise a limited number of urgent samples and diagnose them within a one or two days of receipt. Attempted

diagnosis to subspecies will be by molecular testing and is likely to take one to two days after the initial diagnosis of a positive result. For new outbreaks, the Xf sequence type will also be determined if possible. Recommendations on the extent of subspecies and sequence type testing will be provided by the IMT.

5.17 If the results are all negative, in most cases no further action will be required unless inspectors, FCE or Defra recommend further sampling to confirm the result.

5.18 If Xf is **suspected on a consignment of imported plants** at a port, the consignment will be held, re-exported or destroyed under notice by the PHSI in consultation with Defra's Risk and Horizon Scanning Team. If **Xf is confirmed on imported plants at a port** the consignment will be destroyed.

5.19 If the sample is from a location other than a port and the result is **indicative of a positive** but not confirmed:

- In a scenario when there are no confirmed outbreaks of Xf in England, the Outbreak Triage Group (OTG) will meet and consider the alert status (refer to (Defra 2017b)), whether to set up an Incident Management Team (IMT), determine the control authority, and will consider any interim measures such as holding of relevant consignments of plants to prevent spread, insecticide applications etc.
- In a scenario when there is a current outbreak of Xf in England, but the sample is from outside the current demarcated areas an IMT will already have been set up and will consider any interim measures such as a hold on the movement of plants.

5.20 If the result is **confirmed positive** in a situation **other than plants being found at ports:**

- In a scenario where there are **no confirmed outbreaks of Xf in England**, the OTG will meet and determine whether the finding is to be treated as an interception or an outbreak. The OTG will also determine the control authority for handling the interception or outbreak and ask for an Incident Management Team (IMT) to be set up. Defra will be the control authority for outbreaks in England. The criteria for treating the finding as an interception are that:
- there is evidence that Xf was recently introduced or has been found at a site with physical protection from the vectors; and
    - i) there is evidence that the plants were infected before their introduction; and
    - ii) no vectors carrying the specified organism have been detected; or
    - iii) the host plants have only been present on the site when the risk of vectors being present is extremely low
- In a scenario **where there is a current outbreak of Xf in England**, an IMT will already have been set up. Any positive finds from demarcated areas will be

immediately notified to the IMT. The IMT will determine whether any additional host plant removal is required and whether the current boundaries of the demarcated areas need to be extended as a result. If the sample is from an area outside demarcated areas, the demarcated area will be extended accordingly and the IMT will determine whether any additional host plant removal is required. If the sample is from a new area the IMT will establish new demarcated areas, and treat the situation as a new outbreak.

5.21 Any confirmed finds of Xf in imported or established plants from outside demarcated areas will be immediately reported to ministers and devolved administrations in line with the *Defra Generic Contingency Plan for plant health*. A report will also be sent to EPPO.

Responses after Xf confirmation when the plants ***have*** been recently imported or introduced

5.22 Backwards and forward tracing of any related plants will be carried out by the PHSI. If plants have already been sold to the general public or other users, a product recall will be initiated. Retailers will be required to voluntarily, or under a plant health notice, make all reasonable efforts to make contact with customers who have purchased potentially infected plants. Anyone who has bought a plant from an infected batch will be asked to dig up the plant, seal it in a plastic bag and return it to the store where they purchased it. Defra will reinforce this message on its website and by issuing a press release.

5.23 The Incident Management Team (IMT) will determine the most appropriate agency to take on the different responsibilities, but in most cases, action on plants moving in trade will be led by the PHSI.

5.24 Infected consignments of plants will be destroyed as soon as possible after the diagnosis has been received. The IMT will consider whether the plants should be treated with insecticides before they are destroyed in order to reduce the risk of spread during destruction (see point 5.39 for further details). In addition, the IMT will consider whether other potentially infected consignments of plants should be destroyed on a precautionary basis. For destruction methods, see 5.32.

5.25 The IMT will consider whether the destruction of weeds (for the purposes of this contingency plan meaning uncultivated herbaceous plants) or an application of insecticides to target Xf vectors would be appropriate options (see point 5.39 for further details). This decision will be based upon the perceived risk of spread.

5.26 When Xf is confirmed in imported plants and the finding is judged to be an interception rather than an outbreak, **annual surveys will be carried out for two years** to confirm that Xf has not established within the wider environment. The results of the surveys will be reported to the UK NPPO as soon as they become available. If Xf is detected in established plants during the course of these surveys

an outbreak will be declared and demarcated areas will be established. The surveys will include taking samples of potential vectors of Xf (see section 2.4). This will include visual inspection and collection of cuckoo spit in the spring for spittlebugs and sweep netting or other sampling methods (e.g. sticky traps, beating trays and or the use of battery operated pooters / aspirators) for spittlebug adults and other potential vectors between June and September.

5.27 The area to be surveyed will be determined by the IMT, but as a guide, a radius of at least 200 metres is recommended. Factors that will influence the decision on the radius will include

- the length of time that the plants have been on site
- whether the plants have been kept within an enclosed environment, or
- the time of year and its potential impact on vector density.

Specified plants (see Appendix 4) in this area will be surveyed. Samples of symptomatic 'specified plants' and neighbouring asymptomatic plants will be taken and sent for laboratory analysis as per section 5.2. In the eventuality that infected plants have been confirmed at multiple sites, it may be necessary to prioritise survey work at locations where the risk of outbreaks or spread is considered to be particularly high, based on factors including the number of nurseries / garden centres / host plants in residential gardens in the area.

Responses after Xf confirmation when plants ***have not*** been recently imported or introduced – i.e. outbreaks

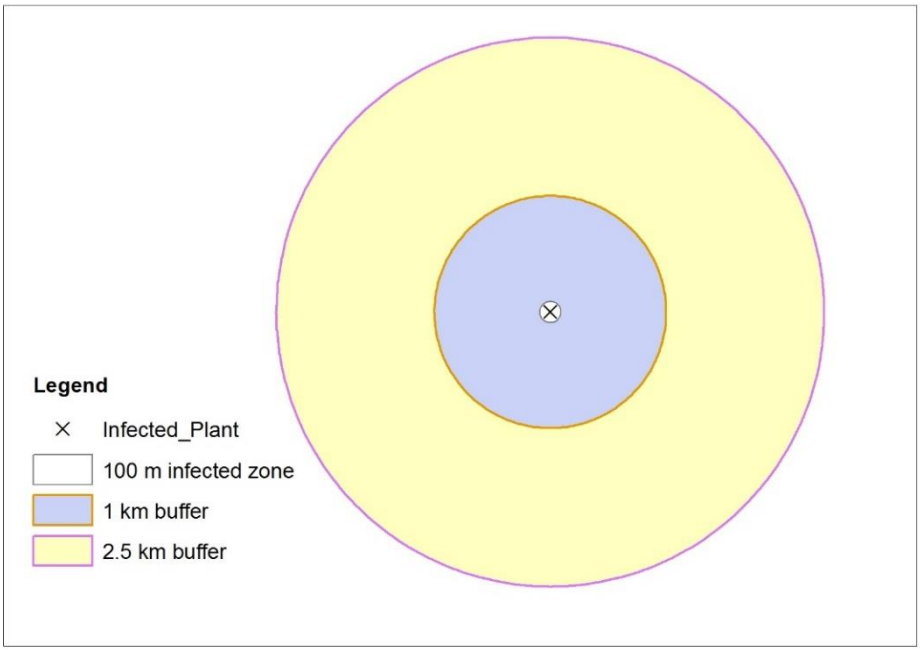
5.28 When Xf is detected and the criteria described in the first bullet point of 5.20 (i), (ii) and (iii) are not fulfilled, an outbreak of Xf will be declared by the OTG.

5.29 The IMT will decide on where demarcated areas will be established. These will consist of:

- an **infected zone,** including all host plants, plants known to be infected by Xf, all plants showing Xf symptoms, and all plants that are liable to be infected due to their proximity to infected plants or having a common source. This is likely to be the area within 100 metres of known infected plants.
- a **buffer zone** of at least 2.5 km around the infected zone (see figure 6).

The size and location of these zones will be adjusted in response to new findings of Xf. The location of the demarcated areas will be indicated with road signs at appropriate locations. This will be carried out in co-operation with the Local Resilience Forum.

Figure 6: The layout of the infected and buffer zones for an outbreak of one infected plant.



5.30 The PHSI will contact or visit all garden centres, nurseries and other traders of plants within the demarcated areas to inform them of the requirements that will apply to them (see 5.34). A second priority will be to contact the owners / managers / tenants of agricultural land, woodland areas, conservation areas and amenity land such as parks to advise on the movement of green waste (see 5.35); this will be carried out by the PHSI or FCE. Controls on the movement of plants for planting of specified plants will be implemented either by statutory plant health notices, or by a statutory instrument, or a combination of the two, depending on the nature and scale of the incident. The location of any demarcated areas will be published on '.gov.uk' in order to inform all other stakeholders (including residents, businesses and landowners) within the demarcated areas of the requirements that will apply to them. The IMT will consider the need for a local stakeholder meeting in order for Defra and the PHSI to explain the problem and the measures that are planned.

5.31 In the infected zone, the following plants will be destroyed as soon as possible:

- **specified plants** (see Appendix 4) regardless of whether or not they have symptoms and plants from the wider **host plant** list if considered necessary by the IMT.
- **plants known to be infected** by the specified organism.
- **plants showing symptoms** indicating possible infection by Xf.

The IMT will need to determine which plants need to be removed immediately and which will be tested to confirm whether or not they are infected. Decisions are likely to be

influenced by the time of year in relation to the risk of spread, the size and number of plants involved and the host status of the plant species concerned.

If there are plants of particular historic or ecological importance in the infected area, the IMT will determine whether they can be excluded from the need for destruction as long as they are tested and found to be negative for Xf and can be treated with insecticides to reduce the risk of infection. Ideally they should also be netted to reduce the risk of infection.

When possible, samples of all host species within the infected zone will be taken before destruction and subsequently tested for Xf. The IMT will consider the need for an application of a contact insecticide if vectors are detected on the plants that are due to be destroyed (see 5.39). The host list includes some tree species, such as *Acer* (maple and sycamore)*, Fraxinus* (ash)*, Platanus* (plane) *Prunus* (plum, cherry etc.)*, Quercus* (oak) and *Ulmus* (elm). Removing mature trees is likely to require consultation and planning and involve considerable financial and time resources. It can also cause significant social and economic losses to landowners, tenants and neighbours, as well as have wider environmental impacts. The stumps and roots of any destroyed plants must be removed or treated to ensure there is no re-growth. On commercial property, the removal and destruction of plants on will be the responsibility of the landowner. In the case of private householders, officials may agree to organise the felling and removal of host trees and shrubs, with responsibility for payment of costs remaining with the occupier or other person in charge. Alternatively, it may be undertaken by the relevant local authority which will be responsible for determining whether to accept responsibility for the costs of the work or seek to recover them from householders. Exceptionally, officials may in the interests of speed arrange for the work to be carried out and bear the cost, and where possible seek recovery after the event.

5.32 **Destruction of infected or potentially infected plants and plant material from the infected zone.** Trunks and large branches (>10cm diameter) from mature trees in the infected zone pose a low / minimal risk and if they are free from leaves and shoots and are not in a condition that could be replanted, no restrictions will be placed on their disposal, movement or further usage.

Any other plant material will present a risk if it could potentially be replanted or could be carrying infected adult vectors. If possible, such material should be held on site to allow desiccation / degradation of the plant material to make it unattractive to insect vectors and unsuitable for replanting (e.g. via chipping or desiccation) before being moved. This material can be moved off-site after an official inspection to confirm that it is no longer viable for replanting and all leaves have desiccated. The IMT will determine appropriate disposal methods to comply with relevant waste legislation. Possible options are:

- being sent to landfill
- burning or incineration within the infected zone or if necessary in the buffer zone. The material could be burnt in situ under an Environment Agency exemption, which allows a total quantity not exceeding 10 tonnes to be burned in any period

of 24 hours (FCE have a framework contract for the use of a mobile incinerator) or at a commercial incinerator. NB: it will often not be practical to burn whole trees or large sections, other than those with small diameters e.g. branch wood.

- deep burial on site (> 2 metres below ground level)
- composting
- anaerobic digestion

Soil or growing media and plant pots from infected plants do not pose a significant risk and could be re-used or disposed of without restrictions.

Herbicide applications could be considered as an alternative to the removal of hosts. This is most likely to be appropriate for herbaceous plants during a period of the year when vectors are unlikely to be present as adults.

Material from domestic gardens could be disposed of in local authority green waste collection after a period of desiccation.

5.33 **Planting of 'host plants' within the infected zone will be prohibited unless grown as per the conditions of 5.34.**

5.34 **The movement of plants for planting *Xf* 'host plants' (see Appendix 3) outside the demarcated areas will be restricted.** The restrictions will reflect those applying to imports of Xf plants (Statutory Instrument 2021/136), taking account of specific risk factors. To replicate the import measures the restrictions would be those listed below.

- A prohibition on the movement of ***Coffea*** *and* ***Polygala myrtifolia L.***
- Other Xf hosts could only be moved out of demarcated areas if they are grown in protected environments and comply with additional conditions.
- Plants intended for planting other than seeds, of ***Lavandula*** sp. L., ***Nerium oleander*** L. and ***Salvia rosmarinus*** (Spenner) could only be moved out of demarcated areas if:
    - they are produced in a place of production registered and supervised by the PHSI for a period of at least one year before the movement of the plants,
    - the place of production and a 200 m zone surrounding it is free from Xf,
    - the plants have been subjected to an annual official inspection, sampling and testing to confirm the absence of Xf,
    - immediately before movement, plants are subjected to an official inspection and where any symptoms are observed, testing should be carried out,
    - the plants have been grown under physical protection.
- Plants intended for planting other than seeds, of ***Olea europaea*** L. and ***Prunus dulcis*** (Mill.) D.A. Webb, could only be moved out of demarcated areas if:

- they are produced in a place of production registered and supervised by the PHSI for a period of at least one year before the movement of the plants,
- the place of production and a 200 m zone surrounding it is free from Xf,
- the plants have been subjected to an annual official inspection sampling and testing to confirm the absence of Xf,
- immediately before movement, plants are subjected to an official inspection and where any symptoms are observed, testing should be carried out,
- the plants have been grown under physical protection.

- Plants intended for planting other than seeds of Xf host plants other than those listed above, could only be moved outside the demarcated area if they are
  - grown at an officially authorised as a site that is free from Xf and its vectors,
  - the site is physically protected against the introduction of Xf,
  - the site is surrounded by a zone with a width of 100 m where plants found to be infected with Xf removed, and appropriate treatments against the vectors have been applied,
  - subject to treatments to maintain freedom from the vectors
  - at least two official inspections during the flight season of the vectors have been carried out,
  - neither symptoms of Xf or its vectors are found in the site or 100 m zone surrounding it, if suspect symptoms were observed, testing is carried out to confirm the absence of Xf,
  - there is inspection and testing prior to movement.
- Special measures would apply to dormant plants of *Vitis* intended for planting and plants grown *in vitro*.

5.35. **Movement of felled wood or green waste out of the demarcated areas.** The movement of woody material in the absence of foliage, such as trunks and branches of trees is considered to be of negligible risk and therefore will not be restricted at any time of year. The movement of freshly cut green waste (other than grass cuttings from managed turf) such as hedge clippings or larger weeds (for the purposes of this contingency plan meaning uncultivated herbaceous plants) presents some risk of moving infected adult vectors. Publicity will be issued to members of the public and others in the demarcated area to make them aware of this risk and advise them on how the risk can be reduced. The risk can be minimised by holding the material to allow desiccation before movement, the time taken for material to dry out will depend upon current weather conditions and the location. After this period, normal disposal methods such as the use of local authority green waste collection or recycling points could be used with minimal risk.

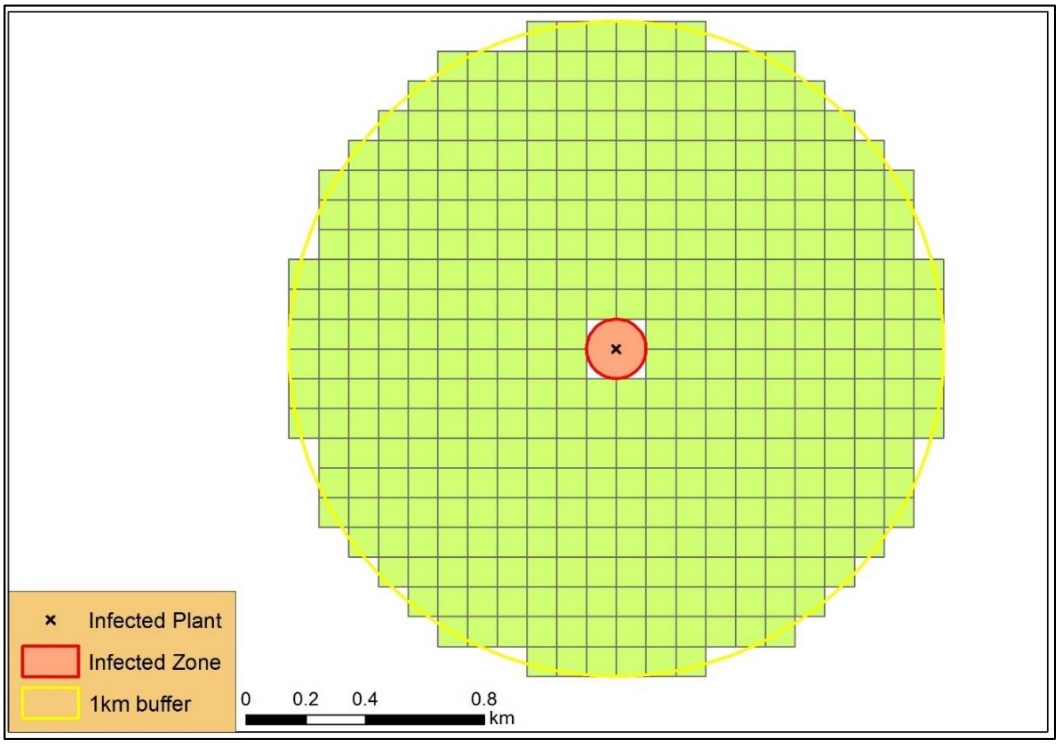


Figure 7: The 100 m x 100 m grid for surveys within 1 km of the infected zone.

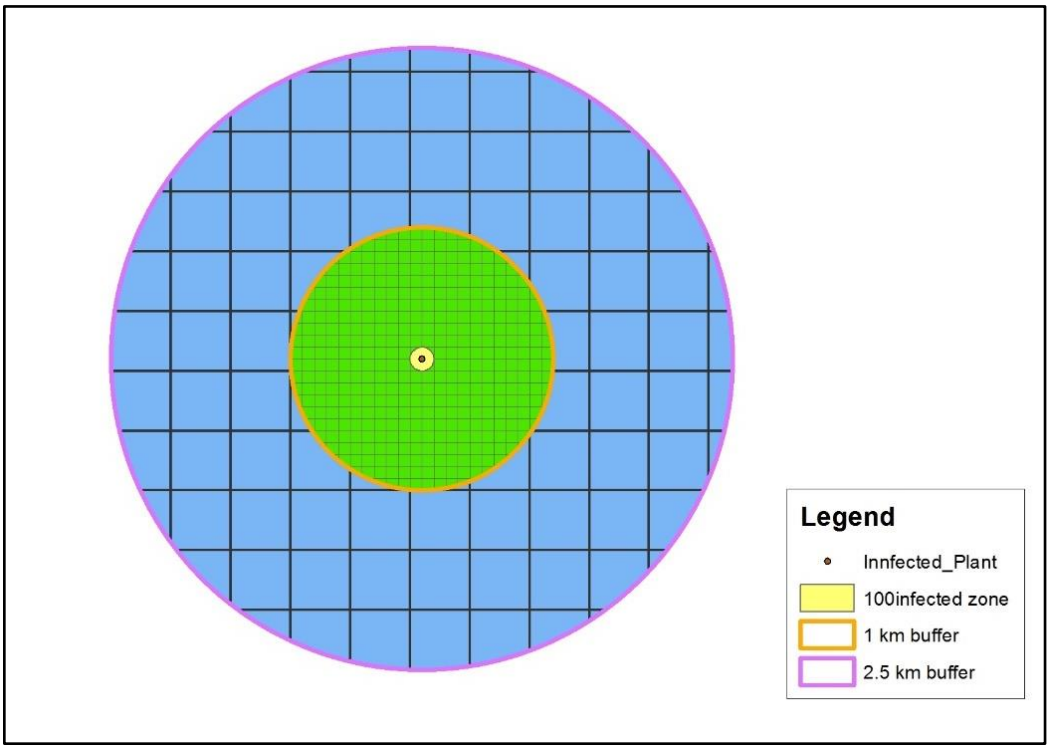


Figure 8: The 500 m x 500 m grid for surveys between 1 km and 2.5 km from the infected zone.

5.36. **A delimiting survey of the demarcated area** will be started as soon as possible after the confirmation of an outbreak. The survey will need to be carried out between late spring and early autumn when most deciduous plants will be in full leaf. There will be a preference for mid-summer to early autumn when symptoms of water stress are most likely to be evident. The area within 1 km of the infected zone will be spilt into a 100 m x 100 m grid (see figure 7).

The area between 1 km and 2.5 km from the infected zone will be spilt into a 500 m x 500 m grid (see figure 8). A representative sample of the grid cells will be surveyed. This survey will be more intensive in the grid cells surrounding the infected zone. The surveys between 0-1 km from the infected zone and the area 1-2.5 km from the infected zone will be carried out concurrently. Where possible, survey records from citizen scientists will be incorporated with official survey records to cover a wider area than it would be possible to cover with official surveillance. This survey plan will be reviewed and potentially revised by the IMT in order to account for issues such as the environment of the outbreak, the time of year that the outbreak is detected and the number of infected plants that are detected

5.37. **Sampling in the infected zone**. After the removal of host plants in the infected zone has been completed, samples will be taken from the remaining specified plants in the infected zone. Samples will be taken from symptomatic plants and neighbouring asymptomatic plants using a scheme to identify the presence of a 1% level of infection with 99% reliability. The survey will need to be carried out between late spring and early autumn when most deciduous plants will be in full leaf. There will be a preference for mid-summer to early autumn when symptoms of water stress are most likely to be evident.

5.38. **Vector survey**. Between April and mid-June inspectors will note any records of juvenile spittlebugs, principally *Philaenus spumarius* from the infected area and areas within 100 metres of it. Two surveys of adult vectors in the infected zone will be carried out between the end of June and the end of September. The survey method used will be dependent on the type of environment, but options include the use of sticky traps, sweep nets, beating traps, pooters or D-Vac sampling. Adult insects will be submitted to Fera Science Ltd. to determine whether any of them are carrying Xf.

5.39. In cases of interceptions or outbreaks, the IMT will determine whether the destruction of weeds, (for the purposes of this contingency plan meaning uncultivated herbaceous plants) either by the application of herbicides or mechanical means would be appropriate or alternatively the application of insecticides to control vectors. The application of insecticides is likely to be limited to parts of the infected zone and locations within 200m of it.

- Prior to any pesticides being used, the risk posed by the pesticide to people and the environment will be assessed.
- Any applications should be made following the advice on the product label and be in accordance with HSE guidance. In some cases there may be a requirement to carry out a Local Environment Risk Assessment for Pesticides (LERAP) depending on the product used and the situation of the finding.
- If there is a finding within a SSSI, Natural England should be contacted to assess the threat of the pesticide application to the site.

The responsibility for carrying out any treatments will be the same as for the removal of plants (see 5.31).

5.40. After the actions described in 5.32, 5.37 - 5.37-38 have been completed (host removal, demarcated area survey, infected zone host sampling and infected zone vector sampling), all results will be reviewed by the IMT. If Xf has not been detected outside the infected zone or within the infected zone after the host removal has taken place, **the IMT will determine whether the demarcated area can be reduced from 2.5 km to 1 km**. If the initial finding of Xf took place during the period between autumn and spring the following year, the completion of the actions required for reducing the demarcated area from 2.5 km to 1 km could be feasible by the following summer. However, if the initial finding of the outbreak takes place in mid or late summer, it is unlikely that all the actions required could be completed before the following summer and so the period before the demarcated area could potentially be reduced from 2.5 km to 1 km would be longer, i.e. the demarcation of a 2.5 km zone would be in place for around a year. This is because the only time of year when visual inspection of plants for symptoms can take place is June to August (or possibly later in the year depending upon the location and seasons). If there is evidence that Xf has spread beyond the infected zone, or is found in the infected zone after host removal, the demarcated area will remain in place for a minimum of four years. The extent of the demarcated area will be adjusted in response to any new finds of Xf. An annual survey for Xf will be carried out in the demarcated area as per 5.36.

5.41. In situations where it has been possible to reduce the demarcated area from 2.5 km to 1 km from the infected zone as per the description in 5.40, after a minimum of 12 months following the creation of the demarcated area, the demarcated area will be lifted if official tests indicate that the area is free of Xf. These tests will be carried out by taking sufficient samples of ‘specified plants’ from across the demarcated area to indicate that the level of infection is less than 1% with 99% reliability. This could be achieved by a stratified random sampling system. The sampling will be carried out in summer or early autumn to maximise the chance of detecting Xf. If the samples are all negative for Xf, the demarcated area will be lifted. This sampling procedure will repeated for two years following the lifting of the demarcated area. If Xf is detected, a 2.5 km demarcated area will be re-established and remain in place for a minimum

of five years. Annual surveying will be carried out in the demarcated area while it remains in place as described in 5.36 and 5.38.

6. Criteria for declaring eradication / change of policy

6.1 The IMT will advise the Chief Plant Health Officer when eradication can be declared and when a change of policy may be necessary. In the case of an interception (as described in section 5.5), the absence of Xf in annual surveys for Xf over a 2 year period is required before official action can end. In the case of an outbreak where it has been possible to reduce a demarcated area to 1km beyond the boundaries of the infected zone, eradication can be declared one year after the creation of the demarcated area if sampling demonstrates that Xf is not present (see 5.41). If it has not been possible to reduce the demarcated area to 1 km, a 2 .5km demarcated area can be lifted four years after the last finding of Xf (see 5.41). If surveys reveal that Xf has become established over such an area that eradication is not considered feasible, changing policy to one of containment will be considered by the IMT.

6.2 In the case of multiple outbreaks of Xf in England, there will be a need for frequent reviews of actions taken and resources committed, to ensure the most appropriate policy and operational response.

7. Evaluation and review of the contingency plan

7.1. This pest specific contingency plan should be reviewed regularly to consider changes in legislation, control procedures, sampling and diagnosis methods, and any other relevant amendments.

7.2. Lessons should be identified during and after any outbreak of Xf or other pest, including what went well and what did not. These should be included in any review of the contingency plan leading to continuous improvement of the plan and response to outbreaks.

8. Appendix 1

Photographs of potential vectors of Xf in the UK

Figure 9: *Philaenus spumarius* f. *albomaculata* (Sanja565658, Wikimedia) adults are 5-7 mm long

Figure 10: *Philaenus spumarius* (Anervrisme, Wikimedia) adults are 5-7 mm long

Figure 11: *Aphrophora alni* (Sanja565658, Wikimedia) adults are 9-10 mm long

Figure 12: Cuckoo spit surrounding a spittlebug on lavender (D. Eyre, Defra), the most common spittlebug in the UK is *P. spumarius*

9. Appendix 2

Map of *Xylella fastidiosa* in Europe and a summary of the Xf sub species present in the EU

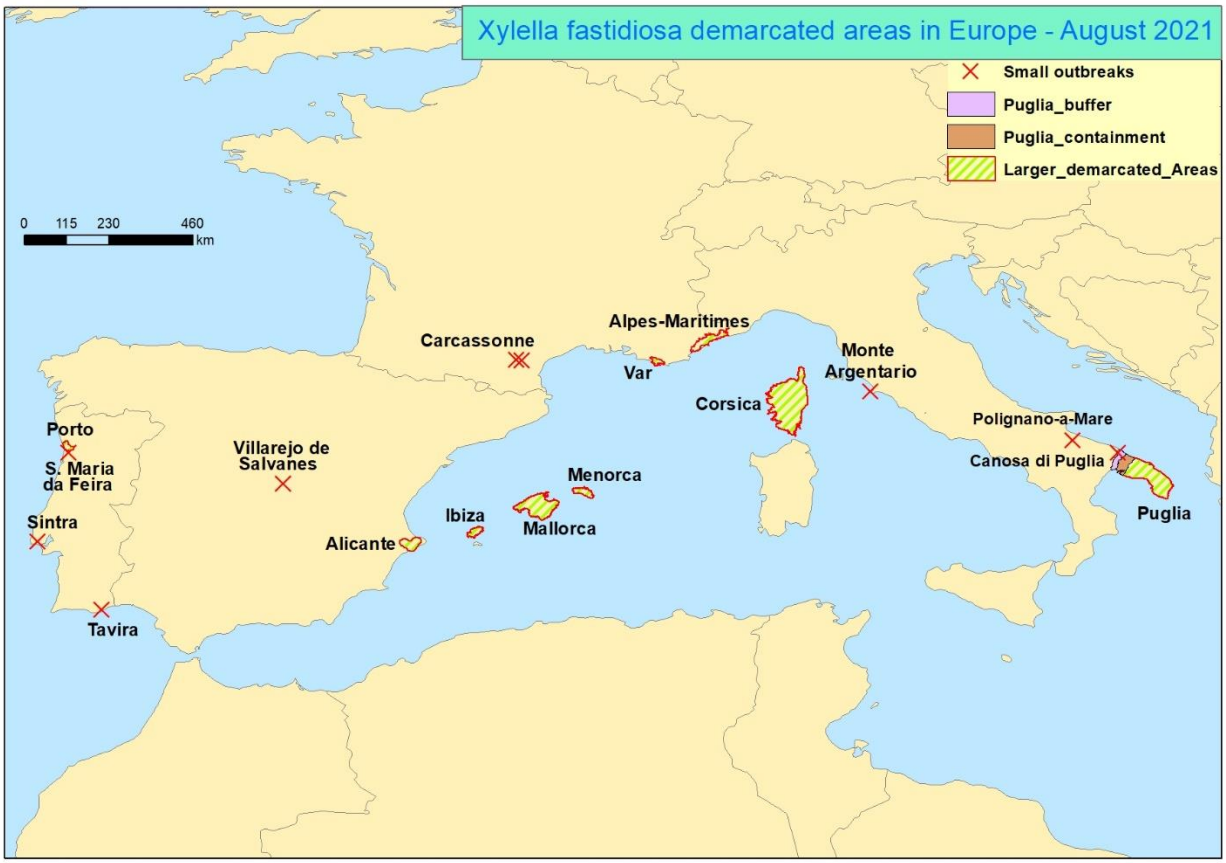


Figure 13: Map showing locations areas in Europe that have been demarcated following the detection of outbreaks of *Xylella fastidiosa*.

Summary of *Xylella fastidiosa* sub-species present in the EU

Xf was first confirmed in Europe in 2013 in southern Italy, but has now also been confirmed in France, Portugal and Spain. The outbreak detected in Germany was declared eradicated in 2018. Xf is thought to have been present in Europe for a decade or decades before it was detected. Under two different scenarios, Soubeyrand et al. (2018) calculated the likely first introduction date of Xf into Corsica as around 2001 (1998-2005) or 1985 (1978-1993).

France

Xylella fastidiosa* subspecies *multiplex was discovered in Europe in 2015 in France (in Corsica and around Nice in the Alpes-Maritimes region). In Corsica, the main hosts are *Polygala myrtifolia* L., *Calicotome villosa* (Poiret) Link, *Helichrysum italicum* (Roth) G. Don and *Cistus monspeliensis* L. On the French mainland, the main hosts have been *Polygala myrtifolia* L. and *Spartium junceum* L. In

2020, outbreaks of *X. fastidiosa multiplex* were confirmed in the Occitanie region of south-west France. A wide range of hosts have been found to be infected with *Spartium* spp. and *Lavandula* spp. being the most numerous.

Germany

Xylella fastidiosa subspecies *fastidiosa* was discovered in a nursery glasshouse in Germany in July 2016 on a single *Nerium oleander*. Subsequent sampling at the nursery confirmed the presence of Xf subsp. fastidiosa in one *Salvia rosmarinus* plant, one *Streptocarpus* and one *Erysium*. It is not known whether one of the plants arrived infected and the pathogen was spread from that plant or whether all plants arrived on the nursery infected. The pathogen has not been detected in the wider environment. The outbreak in Germany was declared eradicated in March 2018.

Belgium

In 2018, *X. fastidiosa* was detected in imported olive trees at a wholesaler in Belgium. It was not detected on other plants and so no outbreak was declared.

Italy

Xf was confirmed from olives (*Olea*) in Puglia, Italy in October 2013. It was found to be causing olive quick decline syndrome. The subspecies has subsequently been confirmed as ***X. fastidiosa pauca*** (Loconsole et al. 2016). The outbreak area in Puglia has been expanded since the first detection and the current zones are shown in figure 13. In 2021, Xf was detected at two locations in south-east Italy at outside of the demarcated areas at Polignano-a-Mare and Canosa di Puglia. Other confirmed hosts in Italy include almond (*Prunus dulcis*), *Polygala myrtifolia* and oleander (*Nerium oleander*) (Loconsole et al. 2016). In 2019, *X. fastidiosa* was detected on a consignment of *Vinca major* near Rome.

In 2018, *X. fastidiosa multiplex* was detected on Monte Argentario on the coast of Tuscany as part of a national survey. Hosts include *Spartium junceum, Polygala myrtifolia* and *Rhamnus alaternus.*

Spain

Xf was first discovered in Spain on the Balearic Islands in November 2016. It has now been found on Mallorca, Menorca and Ibiza. On **Mallorca**, **Xf subsp. *fastidiosa*** has been confirmed on *Cistus monspeliensis*, *Polygala myrtifolia, Prunus* spp. and *Vitis vinifera;* **Xf subsp. *multiplex*** has been confirmed on *Acacia saligna, Ficus carica, Fraxinus angustifolia, Lavandula dentata, Olea europea* and *Polygala myrtifolia.* On **Ibiza**, **Xf subsp. *pauca*** has been confirmed on *Acacia saligna, Lavandula dentata, Olea europea* and *Polygala myrtifolia*. On **Menorca, Xf subsp. *multiplex*** has been confirmed on *Olea europaea, Polygala myrtifolia* and *Salvia rosmarinus*.

Xf was found on the Spanish mainland for the first time in June 2017. **Xf subsp. *multiplex*** has been confirmed from almond trees (*Prunus dulcis*) in Alicante on the eastern coast of Spain. A second outbreak of Xf was reported on the Spanish mainland at Villarejo de Salvanés near Madrid in April 2018. In the same month, Xf was confirmed in *Polygala* plants that originated in another member state in the Municipality of El Ejodo, Almeria. This find is currently being treated as an interception and has not been demarcated.

Portugal

In January 2019, *Xylella fastidiosa* was confirmed in Portugal for the first time in samples collected at part of a national survey. The sample came from a flower bed of *Lavandula dentata* at a zoo in Avintes parish, Vila Nova de Gaia. Avintes is c. 4 km south-west of Porto. The subspecies has been confirmed as *X. fastidiosa* subsp. *multiplex* ST7. The sampled plants were around 6 years old and descended from plants that were more than 10 years old. *Xf* has now been detected in a wider area in *Salvia rosmarinus, Artemisia arborescens, Coprosma repens, Lavandula angustifolia, Ulex minor, Ulex europaeus* and *Vinca.* A satellite outbreak was discovered south of Porto in 2021 at Santa Maria da Feira. Two outbreaks were detected in new areas of Portugal in 2021, one in Sintra municipality near Lisbon and a second at Luz de Tavira near Faro.

10. Appendix 3:

Host plants of any species of *Xylella fastidiosa* as listed in Annex I of EU 2020/1201

Host plants from EFSA et al. (2021) added in green font

Acacia, Acer, Adenocarpus lainzii (Castrov.) Castrov. *Albizia julibrissin* Durazz., *Alnus rhombifolia* Nutt., *Amaranthus retroflexus* L., *Ambrosia, Ampelopsis arborea* (L.) Koehne, *Ampelopsis brevipedunculata* (Maxim.) Trautv., *Ampelopsis cordata* Michx., *Anthyllis hermanniae* L., *Artemisia, Asparagus acutifolius* L., *Athyrium filix-femina* (L.) Roth., *Baccharis, Brassica, Calicotome spinosa* (L.) Link, *Calicotome villosa* (Poiret) Link, *Callicarpa americana* L., *Callistemon citrinus* (Curtis) Skeels, *Calluna vulgaris* (L.) Hull, *Carya, Catharanthus, Celtis occidentalis* L,. *Cercis canadensis* L., *Cercis occidentalis* Torr., *Cercis siliquastrum* L., *Chamaecrista fasciculata* (Michx.) Greene, *Chenopodium album* L., *Chionanthus, Chitalpa tashkentensis* T. S. Elias & Wisura, *Cistus, Citrus, Clematis cirrhosa* L., *Coelorachis cylindrica* (Michx.) Nash, *Conium maculatum* L., *Convolvulus cneorum* L., *Coprosma repens* A.Rich., *Coronilla*, *Cyperus eragrostis* Lam., *Cytisus, Digitaria, Diospyros kaki* L.f., *Diplocyclos palmatus* (L.) C.Jeffrey, *Dodonaea viscosa* (L.) Jacq., *Echium plantagineum* L., *Elaeagnus angustifolia* L., *Encelia farinosa* A. Gray ex Torr., *Eremophila maculata* (Ker Gawler) F. von Müller., *Erigeron, Erodium moschatum* (L.) L'Hérit., *Erysimum, Euphorbia chamaesyce* L., *Euphorbia terracina* L., *Euryops chrysanthemoides* (DC.) B.Nord, *Euryops pectinatus* (L.) Cass., *Fagus crenata* Blume, *Fallopia japonica* (Houtt.) Ronse Decr., *Fatsia japonica* (Thunb.) Decne. & Planch., *Ficus carica* L., *Fortunella, Frangula alnus* Mill., *Fraxinus, Genista, Ginkgo biloba* L., *Gleditsia triacanthos* L., *Grevillea juniperina* Br., *Hebe, Helianthus, Helichrysum, Heliotropium europaeum* L., *Hemerocallis, Hevea brasiliensis* (Willd. ex A.Juss.) Müll.Arg., *Hibiscus, Humulus scandens* (Lour.) Merr., *Ilex aquifolium* L., *Ilex vomitoria* Sol. ex Aiton, *Iva annua* L., *Jacaranda mimosifolia* D. Don, *Juglans, Juniperus ashei* J. Buchholz, *Koelreuteria bipinnata* Franch., *Lagerstroemia, Laurus nobilis* L., *Lavandula, Lavatera cretica* L., *Ligustrum lucidum* L., *Liquidambar styraciflua* L., *Lonicera implexa* Aiton, *Lonicera japonica* Thunb., *Lupinus aridorum, Lupinus villosus, Magnolia grandiflora* L., *Mallotus paniculatus* (Lam.) Müll.Arg., *Medicago arborea* L., *Medicago sativa* L., *Metrosideros, Mimosa*, *Modiola caroliniana* (L.) G. Don, *Morus, Myoporum insulare* R. Br., *Myrtus communis* L., *Nandina domestica* Murray, *Neptunia lutea* (Leavenw.) Benth., *Nerium oleander* L., *Olea, Osteospermum ecklonis* DC., *Osteospermum fruticosum* (L.) Norl., *Parthenocissus quinquefolia* (L.) Planch., *Paspalum dilatatum* Poir., *Pelargonium, Perovskia abrotanoides* Kar., *Persea americana* Mill., *Phagnalon saxatile* (L.) Cass., *Phillyrea angustifolia* L., *Phillyrea latifolia* L., *Phlomis fruticosa* L., *Phoenix*, *Pinus taeda* L., *Pistacia vera* L., *Plantago lanceolata* L., *Platanus, Pluchea odorata* (L.) Cass., *Polygala myrtifolia* L., *Polygala* x *grandiflora* Nana, *Prunus, Psidium, Pteridium aquilinium* L. (Kuhn.), *Pyrus, Quercus, Ratibida columnifera* (Nutt.) Wooton & Standl., *Rhamnus alaternus* L., *Rhus, Robinia pseudoacacia* L., *Rosa, Rosmarinus*, *Rubus, Ruta chalepensis* L., *Salvia mellifera* Greene, *Salvia officinalis* L., *Salvia Rosmarinus, Sambucus, Santolina chamaecyparissus* L., *Santolina magonica* (O.Bolòs, Molin. & P.Monts.) Romo, *Sapindus saponaria* L., *Sassafras, Setaria magna* Griseb., *Solidago fistulosa* Mill., *Solidago virgaurea* L., *Sorghum halepense* (L.) Pers., *Spartium, Stewartia pseudocamellia, Strelitzia reginae*

Aiton, *Streptocarpus, Symphyotrichum divaricatum* (Nutt.) G.L.Nesom, *Teucrium capitatum* L., *Trifolium repens* L., *Ulex, Ulmus, Vaccinium, Vinca, Vitis, Westringia fruticosa* (Willd.) Druce, *Westringia glabra* R.Br., *Xanthium strumarium* L.

11. Appendix 4:

Hosts known to be susceptible to the three sub-species of *X. fastidiosa* found in Europe from Annex II of EU 2020/1201, known as 'specified plants'

Host plants from EFSA et al. (2021) added in green font

Plants found to be susceptible to *X. fastidiosa* subsp. *fastidiosa*

Acer, Ambrosia artemisiifolia L.*, Calicotome spinosa (L.) Link, Cercis occidentalis* Torr.*, Cistus monspeliensis* L.*, Citrus sinensis* (L.) Osbeck*, Coffea, Erysimum, Genista lucida* L.*, Juglans regia* L., *Lupinus aridorum, Magnolia grandiflora* L.*, Medicago sativa* L.*, Metrosideros, Morus, Nerium oleander* L.*, Pluchea odorata* (L.) Cass.*, Polygala myrtifolia* L.*, Prunus, Psidium, Rhamnus alaternus* L., *Ruta chalepensis* L., *Salvia rosmarinus* Spenn.], , *Rubus rigidus* Sm.*, Rubus ursinus* Cham. & Schldl.*, Sambucus, Spartium junceum* L.*, Streptocarpus, Teucrium capitatum* L.*, Ulmus americana* L., *Vaccinium corymbosum, Vinca major* L., *Vitis*

Plants found to be susceptible to *Xylella fastidiosa* subsp. *multiplex*

Acacia, Acer griseum (Franch.) Pax, *Acer pseudoplatanus* L., *Acer rubrum* L., *Adenocarpus lainzii* (Castrov.) Castrov. *Alnus rhombifolia* Nutt., *Ambrosia*, *Ampelopsis cordata* Michx., *Anthyllis hermanniae* L., *Artemisia, Asparagus acutifolius* L., *Athyrium filix-femina* (L.) Roth., *Baccharis halimifolia* L., *Calicotome spinosa* (L.) Link, *Calicotome villosa* (Poir.), *Callistemon citrinus* (Curtis) Skeels, *Calluna vulgaris* (L.) Hull, *Carya, Celtis occidentalis* L., *Cercis canadensis* L., *Cercis occidentalis* Torr., *Cercis siliquastrum* L., *Chionanthus, Cistus, Clematis cirrhosa* L., *Convolvulus cneorum* L., *Coprosma repens* A. Rich., *Coronilla*, *Cytisus, Dodonaea viscosa* (L.) Jacq., *Echium plantagineum* L., *Elaeagnus angustifolia* L., *Encelia farinosa* Gray ex Torr., *Erigeron*, *Euryops chrysanthemoides* (DC.) B.Nord., *Euryops pectinatus* (L.) Cass., *Fallopia japonica* (Houtt.) Ronse Decr., *Ficus carica* L., *Frangula alnus* Mill., *Fraxinus, Genista, Ginkgo biloba* L., *Gleditsia triacanthos* L., *Grevillea juniperina* Br., *Hebe, Helianthus, Helichrysum, Hibiscus syriacus* L., *Ilex aquifolium* L., *Iva annua* L., *Koelreuteria bipinnata* Franch., *Lagerstroemia, Laurus nobilis* L., *Lavandula, Lavatera cretica* L., *Liquidambar styraciflua* L., *Lonicera*, *Lupinus aridorum, Lupinus villosus* Willd., *Magnolia grandiflora* L., *Medicago arborea* L., *Medicago sativa* L., *Metrosideros*, *Myrtus communis* L., *Nerium oleander, Olea, Osteospermum ecklonis* (DC.) Norl., *Pelargonium, Perovskia abrotanoides* Kar., *Phagnalon saxatile* (L.) Cass., *Phillyrea angustifolia* L., *Phillyrea latifolia, Phlomis fruticosa* L., *Pistacia vera* L., *Plantago lanceolata* L., *Platanus, Polygala myrtifolia* L., *Polygala* x *grandiflora* Nana, *Prunus, Pteridium aquilinium* L. (Kuhn.), *Quercus, Ratibida columnifera* (Nutt.) Wooton & Standl., *Rhamnus*, *Robinia pseudoacacia L., Rosa, Rubus, Salvia mellifera* Greene, *Salvia officinalis* L., *Salvia Rosmarinus, Sambucus, Santolina chamaecyparissus* L., *Santolina magonica* (O.Bolòs, Molin. & P.Monts.) Romo, *Sapindus saponaria* L., *Solidago virgaurea* L.,

Spartium, Strelitzia reginae Aiton, *Ulex, Ulmus, Vaccinium, Vinca, Westringia fruticosa Guerin., Xanthium strumarium L.*

Plants found to be susceptible to X. fastidiosa subsp. pauca

Acacia, Amaranthus retroflexus L., *Asparagus acutifolius* L., *Catharanthus roseus* (L.) G. Don, *Chenopodium album* L., *Cistus albidus* L., *Cistus creticus* L., *Citrus, Coffea, Dodonaea viscosa* (L.) Jacq., *Eremophila maculata* (Ker Gawler) F. von Müller., *Erigeron, Euphorbia chamaesyce* L., *Euphorbia terracina* L., *Grevillea juniperina* Br., *Hebe, Heliotropium europaeum* L., *Hibiscus, Laurus nobilis* L., *Lavandula*, *Myoporum insulare* Br., *Myrtus communis* L., *Nerium oleander* L., *Olea europaea* L., *Osteospermum fruticosum* (L.) Norl., *Pelargonium*, *Phillyrea latifolia* L., *Pistacia vera, Polygala myrtifolia* L., *Prunus, Rhamnus alaternus* L., *Salvia Rosmarinus, Spartium junceum* L., *Ulex parviflorus* Pourr., *Vinca minor* L., *Westringia fruticose (Willd.) Druce, Westringia glabra* Br.'.

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