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Categorisation of plants for planting, excluding seeds, according to the risk of introduction of *Xylella fastidiosa*

European Food Safety Authority (EFSA)

Abstract

Following a request from the European Commission, EFSA was asked to provide urgent technical assistance in the field of plant health as regards the list of host plants of *Xylella fastidiosa* reported in Appendix B of the recently published EFSA Scientific Opinion on *X. fastidiosa*. In this technical report the list of host plants is categorised focusing on plant species traded as plants for planting and taking into account available data and information on the trade and cultivation of host plants and on infection with *X. fastidiosa.* Based on this characterisation, a definition of the host plants of *X. fastidiosa* which have been both (1) naturally infected and (2) confirmed by at least two different testing methods is provided, together with indication when vector transmission has been confirmed by two testing methods. An electronic dataset is appended to this technical report and provides a searchable list of host plant species.

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Keywords: *Xylella fastidiosa*, host plants, plants for planting, plant trade, susceptible species, detection

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Table of contents

Abstract 1
1. Introduction 4
1.1. Background and Terms of Reference as provided by the requestor 4
1.2. Interpretation of the Terms of Reference 5
2. Data and Methodologies 5
2.1. Data 5
2.1.1. Host plant species of *Xylella fastidiosa* 5
2.1.2. Trade data 6
2.1.3. Other databases used for the categorisation of plants for planting 6
2.1.4. Information on phytosanitary measures and interception data 6
2.2. Methodologies 6
3. Assessment 8
3.1. Type of infection with *Xylella fastidiosa* 8
3.2. Symptom development 8
3.3. Type of detection 8
3.4. Agronomic and biological traits of the host plants 8
3.5. Trade flows of plants for planting 9
3.6. Host plants in EU phytosanitary measures and interception data 9
3.7. Categorisation of host plants 12
4. Conclusions 13
References 14
Appendix A – Overview of potential host plants of *Xylella fastidiosa* regulated in the Council Directive 2000/29/EC and in the Commission Implementing Decision 2014/497/EU 15
Appendix B – Results of categorisation of *Xylella fastidiosa* host plants 17
Annex A – Electronic Excel dataset on *Xylella fastidiosa* host plants 31

1. Introduction

In January 2015 EFSA published a Scientific Opinion of the EFSA Scientific Panel on Plant Health (PLH Panel) on the risk to plant health posed by *Xylella fastidiosa* in the EU territory, with the identification and evaluation of risk reduction options (EFSA PLH Panel, 2015). In Appendix B of the above mentioned scientific opinion, a list of host plants of *X. fastidiosa* together with relevant references for each item was presented. The information provided was related mainly to the host plant species and family names, the country/location of detection, the *X. fastidiosa* subspecies, the method used for determination of the infection, the detection protocol and the reference.

The PLH Panel considered that the movement of plants for planting is the most effective way of long distance dispersal and the major entry pathway for *X. fastidiosa*. The PLH Panel evaluated the effectiveness and feasibility of risk reduction options and concluded that the priority should be to prevent the introduction focusing on the two main pathways (plants for planting and infectious insects in plant consignments) and combining, when applicable, the most effective options. For the plants for planting pathway, some risk reduction options were considered to be more effective at reducing the likelihood of introduction of *X. fastidiosa* and/or its infective insect vectors (EFSA PLH Panel, 2015):

- the prohibition of import of *X. fastidiosa* host species plants for planting for high-risk commodities;
- limiting the import of plants for planting to pest-free areas or pest-free production sites (in combination with other measures listed below);
- certification schemes;
- growing plants under exclusion conditions, such as screened greenhouse production;
- vectors control;
- treatments of the consignments such as thermotherapy of dormant plants;
- specific insecticide treatments of consignments of plants for planting.

In this technical report the list of host plants of *X. fastidiosa* from Appendix B of the EFSA PLH Panel scientific opinion (EFSA PLH Panel, 2015) is further characterised focusing on plant species traded as plants for planting and taking into account available data and information on host plant trade and cultivation and on infection with *X. fastidiosa*. Based on this characterisation, a definition of the host plants of *X. fastidiosa* which have been both (1) naturally infected and (2) confirmed by at least two different testing methods is provided, together with indication when vector transmission has been confirmed by two testing methods.

1.1. Background and Terms of Reference as provided by the requestor

In the context of Article 31 of Regulation (EC) No 178/2002[1], EFSA was asked to provide urgent technical assistance in the field of plant health as regards the regulated harmful organism *X. fastidiosa*.

Specifically, on the basis of the risk factors for the introduction of *X. fastidiosa* into the EU, EFSA was requested to further characterise the list of host plants of *X. fastidiosa* reported in the Appendix B of the recently published EFSA Scientific Opinion on *X. fastidiosa*. The focus should be on plant species traded as plants for planting, taking into account available data and information on trade, cultivation and infection of *X. fastidiosa*, such as:

- trade flows;
- type of infection reported in the country of origin (e.g. natural versus artificial inoculation, symptomatic versus asymptomatic infection);
- mode of propagation of the plant material (e.g. vegetatively propagated versus seed propagated species);

[1] Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety. OJ L 31/1, 1.2.2002, p. 1–24.

- use of the plants for planting once imported into the EU (e.g. for plant propagation, for outdoors cultivation, or for indoors/greenhouse cultivation);
- and/or other relevant factors to be identified by EFSA.

In addition, in a second request, EFSA was requested to define the host plants which have been (1) naturally infected and (2) confirmed by at least two different testing methods. This should take into account the characterisation exercise requested from EFSA (Ares(2015)556065) for the list of host plants of *X. fastidiosa* reported in the Appendix B of the recently published EFSA Scientific Opinion on *X. fastidiosa*, in addition to the criteria previously indicated. As part of this process, it would be also appropriate to identify when vector transmission has been confirmed by two testing methods.

EFSA was also is requested to maintain and keep up to date a comprehensive database on host plants of *X. fastidiosa* on the basis of new scientific developments, including the list of confirmed host plants known to be affected by the Apulian strain (CoDiRO) of *X. fastidiosa*, as investigations in Italy progress, is the latter is shown to be gradually increasing. The information collected should be made available to Member States.

1.2. Interpretation of the Terms of Reference

This technical report provides a categorisation of species of plants for planting according to the risk of introduction of the plant pathogenic bacterium *X. fastidiosa*. The categorisation is based on the host plant species listed in Appendix B of the EFSA PLH Panel Scientific Opinion on *X. fastidiosa* pest risk assessment (EFSA PLH Panel, 2015), updated with new host plants reported in Apulia (Boscia, 2014).

In the ISPM 5— Glossary of phytosanitary terms (FAO, 2007) and in the European plant health law (Directive 2000/29/EC[2]), plants are defined as any living plants and their living parts, including seeds, therefore plants intended for planting also include seeds. However, as seeds are not considered to be a relevant entry pathway for this pathogen (EFSA PLH Panel, 2015), the risk of introduction via seeds was not analysed here.

According to the International Standard for Phytosanitary Measures n. 32 'Categorization of commodities according to their pest risk' (FAO, 2009), the risk of commodities should be categorised according to (i) the degree of processing before import/export and (ii) the intended use. With regard to the degree of processing, although several measures could, if applied, reduce the risk of introduction through the pathway of plants for planting (e.g. thermotherapy/heat treatment; certification; testing; growing plants under screened houses) (EFSA PLH Panel, 2015), these options will not be included as criteria in this categorisation of risk of commodities, as data on their current application in Third Countries for most the listed host plant species are not available or not accessible within the timeframe of this request.

With regard to the additional request cited in the Terms of References (section 1.1), the range of reported natural hosts of *X. fastidiosa* will be screened to assess for which plant species the infection by *X. fastidiosa* has been determined by more than one category of detection methods. In addition, the host status determined by experimental vector transmission will be screened for confirmation by other categories of detection methods.

2. Data and Methodologies

2.1. Data

For the purpose of this scientific report, the following sources of data and information were considered.

2.1.1. Host plant species of *Xylella fastidiosa*

The list of *X. fastidiosa* host plant species was extracted from Appendix B of the EFSA PLH Panel (2015). In addition, new records of *X. fastidiosa* host plant species from the Apulian outbreak area were also considered. The original cited references were reviewed focusing on experimental versus

[2] Council Directive 2000/29/EC of 8 May 2000 on protective measures against the introduction into the Community of organisms harmful to plants or plant products and against their spread within the Community. OJ L 169/1, 10.7.2000, p. 1–112.

natural infection and on records of asymptomatic infection. The host status was reviewed based on the specific results of surveys and experiments, additional details on detection methods were recorded whilst plant species names were updated in line with taxonomic changes when applicable.

2.1.2. Trade data

Trade data of plants (or portion of plants, i.e. cuttings, pieces, etc.) for planting were obtained from the ISEFOR database. This database, produced by the EU project ISEFOR (http://www.isefor.com/), was consulted to extract information on genera of plants for planting hosts of *X. fastidiosa* which are imported into the EU[3]. This database includes data on imports into 14 EU countries during varying time intervals between 2000 and 2012. While these data are not exhaustive, the database provides nevertheless information on the range of hosts of *X. fastidiosa* in the international trade of plants for planting. All the quantities are assumed to be 'pieces' as quantity unit, because this was the dominant type reported in the database.

2.1.3. Other databases used for the categorisation of plants for planting

The list of *X. fastidiosa* host plant species from the Appendix B of EFSA PLH Panel (2015) was matched against lists of woody plant species, shrubs and perennials obtained from the websites of:

- the European Nursery Stock Association (http://www.enaplants.eu/EXEN/site/quality.aspx),
- the Quality Standards Committee of the Dutch Nursery Council (Raad voor de Boomkwekerij/Kwaliteitsnormen Commissie http://www.kwaliteitsnormenboomkwekerij.nl/Kwaliteitsnormen+van+Boomkwekerijproducten/), and
- the List of Names of Woody Plants and Perennials by the Netherlands Inspection Service for Horticulture -Naktuinbow (http://www.internationalplantnames.com/).

In addition, the USDA Plants Database (http://plants.usda.gov/java/) was consulted particularly for herbaceous species or when information was not available in the above mentioned databases. Information on common propagation methods for landscape plants was also obtained from the University of Florida Environmental Horticulture website (http://hort.ifas.ufl.edu/database/lppi/).

The taxonomy of the host species was also checked based on the databases UniProt (http://www.uniprot.org/taxonomy/) and NCBI Taxonomy Browser (http://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?lvl=0&id=50207). In addition the following databases were also consulted: Encyclopedia of Life - EOL (http://eol.org/) and Global Biodiversity Information Facility - GIBIF (http://www.gbif.org/).

2.1.4. Information on phytosanitary measures and interception data

Information on whether species of plants for planting reported as hosts of *X. fastidiosa* are already included in EU phytosanitary measures was extracted from the Annexes of Directive 2000/29/EC and EU emergency measures. Data on interception at EU points of entry of consignments of plants for planting due to detection of *X. fastidiosa* were extracted on 23 February 2015 from the Europhyt database.

2.2. Methodologies

In order to provide urgent advice to the European Commission, a categorisation of plants for planting for the risk of introduction of *X. fastidiosa* was conducted based on data and information sources accessible within the requested timeframe.

[3] Two records on import of plants of *Vitis* sp. and *Citrus* sp. respectively were excluded from the analysis as unreliable: a record of import of plants of *Vitis* sp. from Canada to France in 2008 was due to the reimport of a French consignment (C. Picard, French Ministry of Agriculture, Agro-Food and Forestry, General Directorate for Food Service for Prevention of the Sanitary Risks of the Primary Production, Sub-directorate for Plant Quality and Protection, Seeds and Plant Health Section, personal communication, 27 February 2015; a record of import of plants of *Citrus* sp. from Mexico to the Netherlands in 2004 was considered to be instead an import of lime fruit (D.J. van der Gaag, Netherlands Food and Consumer Product Safety Authority, personal communication, 12 March 2015.

The following categorisation criteria were applied:

- **Type of infection with *X. fastidiosa***, as reported in the literature: based on a review of the literature cited in Appendix B of EFSA PLH Panel (2015), natural infection of host plants species determined by surveys was distinguished from experimental infection of host plants conducted by needle inoculation or by forced exposure to infective vectors. In some cases, the type of infection was not reported in the literature, whereas in other cases a species was determined infected with *X. fastidiosa* by both survey and experimental infection.
- **Symptoms development**, as reported in the literature**:** based on a review of the references cited in Appendix B of EFSA PLH Panel (2015), the occurrence of asymptomatic infections with *X. fastidiosa* was checked in relation to the development of typical symptoms in the reported host plant species;
- **Type of detection**, as reported in the literature: based on a review of the references cited in Appendix B of EFSA PLH Panel (2015), the methods applied for detection of *X. fastidiosa* in each report and for each plant species were recorded as follows (when an acronym is used in the dataset, it is reported in brackets):
    1. **Microscopy**, including: light microscopy studies (LMS); epifluorescence microscopy (EFM); electron microscopy studies (EMS).
    2. **Serology**, including: enzyme-linked immunosorbent assay (ELISA); immunobinding; immunoblot: Western blot; agar gel double diffusion (Double_diffusion).
    3. **Molecular detection methods**, including: polymerase chain reaction (PCR_S), nested PCR (PCR_N), multiprimer PCR assay (PCR_M), repetitive PCR (PCR_R), real time quantitative PCR with SYBR Green (QPCR_S), real time quantitative PCR with specific probes (QPCR_P), Internal Transcribed Spacer region amplification (ITS), Northern blot, random amplified polymorphic DNA (RAPD), phylogenetic studies.
    4. **Culturing and identification of bacteria (CB)**
    5. **Vectors transmission**: pathogenicity tests with vectors (PTV).
    6. **Mechanical transmission**: Plant inoculation made by needle injection (PTM), transmission by grafting (Graft).
    7. **Unclear detection**, including: unspecified detection methods in the reference (unknown), unclear detection methods (unclear), detection by observation of symptoms (SYM) (symptoms occurring on plants in nature are not considered as a valid detection method due to their possible atypical appearance following infection by *X. fastidiosa*. Therefore this category is grouped together with the unknown or unclearly described detection methods).
- **Agronomic and biological traits of the host plants**, as reported in databases listed in section 2.1.3: is the host plant species a tree, a shrub or a herb, does it have a perennial or annual/biennial life cycle, is it commonly propagated vegetatively or by seed?
- **Trade flows of plants for planting,** as reported in the ISEFOR database (section 2.1.2): the overall trade of plants for planting for each plant species was ranked in five categories based on the yearly average of plants imported from all Third Countries into the EU, calculated over the whole period covered by the database: below 1 000 plants, between 1 000 and 9 999 plants, between 10 000 and 99 999 plants, between 100 000 and 999 999 plants, more than 1 000 000 plants. The overall trade from all Third Countries was considered as it was deemed a better indicator of the trade flow than the trade only from countries where *X. fastidiosa* is reported, due to the dynamic nature in the trade of plants for planting (Brasier 2008; Dehnen-Schmutz et al. 2010; Grousset et al. 2012; Pautasso and Jeger 2014).

3. Assessment

3.1. Type of infection with *Xylella fastidiosa*

Natural infection of host plants species determined by surveys was distinguished from experimental infection of host plants conducted by needle inoculation, grafting or by forced exposure to infective vectors. In some cases the type of infection was unclear or not reported in the scientific paper. The majority of the host plants reports were based on natural infections found in pest surveys (Table 1).

Table 1: Frequency distribution of the *Xylella fastidiosa* host plant species based on the type of infection (natural infection determined by surveys or experimental infection conducted by needle inoculation or by vectors).

Infection type	Number of reported host plant species[(a)]
Unknown type of infection	17
Natural infection (by survey)	229
Experimental infection (by vectors transmission, needle inoculation or by grafting transmission)	175
Both natural and experimental infection	80

(a): Including also hybrids and records at genus level

3.2. Symptom development

The occurrence of asymptomatic infections with *X. fastidiosa* was reported in 108 records out of a total of 1010 examined records (10.7%).The information on symptom occurrence was however not available in more than half of the records and plant species examined (Table 2). In some records, e.g. for the oleander leaf scorch in Texas, symptomless infection was reported for some varieties while other varieties manifested typical symptoms of *X. fastidiosa* (Huang et al. 2004). In addition, the time needed for symptom expression can also be rather long and varies among different species and experiments. Therefore the occurrence of asymptomatic infection does not seem applicable as a criterion for a general categorisation of plants for planting for the risk of introduction of *X. fastidiosa*.

The frequency of occurrence of symptomless infections needs however to be carefully considered when dealing with inspection and testing of imported consignments of plants for planting (EFSA PLH Panel, 2015).

Table 2: Frequency distribution of records of symptomless and symptomatic *Xylella fastidiosa* infections in citations listed in Appendix B of EFSA PLH Panel (2015)

Evidence of symptoms	Literature reports	%
Records of asymptomatic infections	108	10.7
Records of symptomatic infections	321	31.8
Not reported	581	57.5
Total	1010	100.0

3.3. Type of detection

The references of Appendix B of EFSA PLH Panel (2015) were reviewed and the detection categories applied were recorded (see section 2.2).

3.4. Agronomic and biological traits of the host plants

The host plant species of *X. fastidiosa* were categorised based on information from databases described in section 2.1.3 on two broad categories: tree, shrub or perennial species; annual or biennial herbaceous species primarily propagated by seed. It is assumed in this report that plants for planting of tree, shrub or perennial host plant species would present a higher risk for the introduction of *X. fastidiosa* because of: a higher chance of propagating vegetatively asymptomatic infected plants,

strict certification and testing systems are not applied; and a longer life cycle increasing the chance of successful transfer by insect vectors. Annual or biennial herbaceous plant species primarily propagated by seed are assumed to present a lower risk than perennials because of: unlikely seed transmission of *X. fastidiosa*; lower chance of meeting an insect vector due to the shorter life-cycle; in addition these reported species are usually weeds or herbs sampled within or around infected crops, more than cultivated plant species intended for planting. Annual or biannual herbaceous species can also be infected if grown unprotected or during the season of insect vectors flight, however they can also be more easily protected in nurseries through screen-house production and vectors treatment. It should be noted however, that also several tree species (especially used in forestry) are primarily seed propagated (http://hort.ifas.ufl.edu/database/lppi/).

3.5. Trade flows of plants for planting

The overall trade of plants for planting for each plant species was ranked in five categories based on yearly average of numbers of plants imported from all Third Countries into the EU, as reported in the ISEFOR database (section 2.1.2): below 1 000 pieces, between 1 000 and 9 999 pieces, between 10 000 and 99 999 pieces, between 100 000 and 999 999 pieces, more than 1 000 000 pieces. The overall trade in ISEFOR database from all Third Countries was deemed as a better indicator of the trade flow than the trade only from countries where *X. fastidiosa* is reported, due to the frequent changes in trade of plants for planting (see section 2.2). Approximately one third of the host plants have a trade larger than 100 000 plants per year (Table 3). Global trade flows and trade flows from countries where *X. fastidiosa* is reported are shown for each genus in the electronic database in the Annex A.

Table 3: Frequency distribution of the *Xylella fastidiosa* host species based on the type of infection and the trade flows

Frequency distribution	Unknown infection	Natural infection (by survey)	Experimental infection	Both Methods	Total
X ≥ 1 000 000	1	25	16	8	50 (10%)
100 000 ≤ X < 1 000 000	1	43	35	18	97 (19%)
10 000 ≤ X < 100 000	4	69	43	20	136 (27%)
1 000 ≤ X < 10 000	2	28	31	12	73 (15%)
X < 1 000	9	64	50	22	145 (29%)
Total	17	229	175	80	501[(a)]

(a): This number is higher than the number of species because some of them are included in more than one class

3.6. Host plants in EU phytosanitary measures and interception data

A screening of the Annexes of the Council Directive 2000/29/EC was carried out for the potential *X. fastidiosa* host plants species, concerning plants for planting pathway exclusively. The requirements for plants for plantings described in Commission Implementing Decision 2014/497/EU[4] were also taken into consideration.

Prohibitions for importing host plants, special requirements, emergency measures and further restrictions specifically applied on certain host plants of *X. fastidiosa* are summarised in Appendix A. It has to be noted that, there are no specific phytosanitary requirements for certain host plants in the Council Directive, the general provisions laid in Annex V Part B Section I of Council Directive 2000/29/EC apply to all species of plants intended for planting, including documentary check, identity check and plant-health check.

To investigate the risk associated with specific commodities of plants for planting, the EUROPHYT database was consulted searching for pest-specific notifications on interceptions. Since October 2014 eleven interceptions of *X. fastidiosa* on coffee plants were reported in Europhyt database by the

[4] Commission Implementing Decision of 23 July 2014 as regards measures to prevent the introduction into and the spread within the Union of *Xylella fastidiosa* (Well and Raju). OJ L 219/56, 27.5.2014, p. 1–9.

Netherlands, Germany and Italy (Table 4). *X. fastidiosa* had been already isolated in 2012, in France from coffee plants (*Coffea arabica* and *C. canephora*) originating from Ecuador and Mexico (Legendre et al., 2014), but those plants were grown in a confined glasshouse and the outbreak was eradicated (ANSES, 2012; EPPO 2012; EFSA PLH Panel, 2015).

Table 4: Overview of pest-specific notifications on interceptions based on EUROPHYT database search performed on 23 February 2015

	EU interception number	Plant species	Exporting country	Point of entry	Destination country	Class of commodity	Date of interception
1.	92461	*Coffea arabica*	COSTA RICA	NETHERLANDS	SWITZERLAND	Plants for planting	06.02.2015
2.	91935	*Coffea arabica*	COSTA RICA	NETHERLANDS	SWITZERLAND	Plants for planting	27.10.2014
3.	91934	*Coffea arabica*	COSTA RICA	NETHERLANDS	SWITZERLAND	Plants for planting	16.10.2014
4.	91235	*Coffea arabica*	COSTA RICA	NETHERLANDS	GERMANY	Plants for planting	21.10.2014
5.	91234	*Coffea arabica*	COSTA RICA	NETHERLANDS	GERMANY	Plants for planting	17.10.2014
6.	91233	*Coffea arabica*	COSTA RICA	NETHERLANDS	GERMANY	Plants for planting	29.10.2014
7.	90965	*Coffea arabica*	COSTA RICA	GERMANY	GERMANY	Plants for planting	21.10.2014
8.	90827	*Coffea arabica*	HONDURAS	NETHERLANDS	NETHERLANDS	Plants for planting	23.10.2014
9.	90646	*Coffea arabica*	COSTA RICA	NETHERLANDS	GERMANY	Plants for planting	17.10.2014
10.	90579	*Coffea arabica*	COSTA RICA	ITALY	ITALY	Plants for planting	29.10.2014
11.	90320	*Coffea arabica*	COSTA RICA	NETHERLANDS	GERMANY	Plants for planting	17.10.2014

3.7. Categorisation of host plants

A first categorisation of *X. fastidiosa* host plants was conducted based on the following criteria: tree or shrub or perennial plant (versus annual or biennial herbaceous seed propagated plant); natural infection determined by survey (versus host status determined by experimental inoculation); trade flow indicators for plant genus based on ISEFOR database. Tree species, shrubs and perennials with high trade flows (Tables 9–11) are considered having a higher risk than herbaceous plants (Tables 12–14) and therefore have been analysed separately, with regard to trade flows. The summary results are presented in Table 5 for host species determined by survey of natural infections, distinction between perennial and annual/biennial and ranked by trade indicators. Table 6 presents the summary results for host species determined by experimental infection. Table 7 presents the summary results for host species for which the infection method was not reported in the reference. It has to be noted that when species names were found synonyms during the review, the species are counted in these tables only once with the accepted name (e.g. *Franseria acanthicarpa* was considered a synonym of *Ambrosia acanthicarpa*, and *Silybum fistulosa* a synonym of *Solidago fistulosa)*. The detailed results for these three categories of infection are shown in Tables 9–14 in Appendix B.

Table 5: Summary results for *Xylella fastidiosa* host species determined by survey of natural infections, distinct between perennial and annual/biennial species and ranked by trade indicators

Survey hosts		
Trade	**Tree, shrub or perennial**	**Annual/biennial**
x ≥ 1 000 000	19	6
100 000 ≤ x < 1 000 000	36	7
10 000 ≤ x < 100 000	69	1
1000 ≤ x < 10 000	22	6
x < 1000	44	20
Total	190	39

Table 6: Summary results for *Xylella fastidiosa* host species determined by experimental infection with distinction between perennial and annual/biennial species and ranked by trade indicators

Experimental hosts		
Trade	**Tree, shrub or perennial**	**Annual/biennial**
x ≥ 1 000 000	14	2
100 000 ≤ x < 1 000 000	29	6
10 000 ≤ x < 100 000	38	5
1000 ≤ x < 10 000	21	10
x < 1000	28	22
Total	130	45

Table 7: Summary results for *Xylella fastidiosa* host species for which the infection method was not reported in the reference distinct between perennial and annual/biennial species and ranked by trade indicators

Host for which the infection method was not reported in the reference		
Trade	**Tree, shrub or perennial**	**Annual/biennial**
x ≥ 1 000 000	1	-
100 000 ≤ x < 1 000 000	4	-
10 000 ≤ x < 100 000	5	-
1000 ≤ x < 10 000	2	-
x < 1000	5	4
Total	17	4

In addition, following the second request of technical assistance (see Section 1.1), the reported host plants of *X. fastidiosa* were categorised mainly based on the type of infection and on the category and number of detection methods applied.

From reports of natural infections/surveys, a total of 204 distinct plant species (Table 15) and 25 unspecified plant genera or hybrids (Table 16) were identified as host. Of the 204 host plant species reported from natural infections/surveys, 82 plant species were identified by more than one category of detection methods.

4. Conclusions

In January 2015 EFSA published a scientific opinion of the EFSA PLH Panel on the risk to plant health posed by *X. fastidiosa* in the EU territory, with the identification and evaluation of risk reduction options. The PLH Panel concluded that the main pathway for entry and long distance dispersal of *X. fastidiosa* is the movement of infected plants intended for planting. A list of plant species hosts of *X. fastidiosa* was derived from a literature search and presented in the opinion.

In this scientific report, the list of host plant species of *X. fastidiosa* is further categorised focusing on plant species traded as plants for planting, and taking into account available data and information on the agronomic and biological traits, trade volumes of host plants, as well as on the type of infection and detection reported in the literature for each species.

The list of *X. fastidiosa* host plant species includes 312 plant species (excluding synonyms, hybrids and unspecified records) from 192 genera and 69 different botanical families. Tree, shrub and perennial species make up 79% of the host species and are assumed to pose a higher risk for the introduction of *X. fastidiosa* than annual or biennial herbaceous plants primarily propagated by seed. In addition, the reported annual host plants species are usually weeds or herbs sampled within or around infected crops, rather than cultivated plant species intended for planting. However, also annual or biennial herbaceous species could be infected if grown unprotected or during the flight season of insect vectors.

Another factor considered in the categorisation was the type of infection recorded for each host plant species in the literature. Determination of host species by natural infection in surveys was considered a better indicator of host susceptibility in the agro-ecosystem or in the environment than an experimental infection. For 5% of the reported host species the type of infection was not indicated in the references. In the appendix the host species by natural infection and by experimental infection (by vector) are classified on the base of the number of detection methods applied. The occurrence of asymptomaticinfections was reported in references concerning more than 10% of the references, however this factor varied for the same species among cultivars and was not considered further in the categorisation.

Average global trade data of EU imports of plants for planting from the ISEFOR database were used as indicators of trade flows for the 182 plant genera of *X. fastidiosa* host plant species. More than 34 species belonged to genera for which more than 1 million plants were traded yearly. Other 61 species belonged to genera with trade flows between 100 000 and 1 000 000 plants, and 96 between 10 000 and 100 000 plants. Currently the only species repeatedly intercepted at EU points of entry due to *X. fastidiosa* detection in consignments of plants for planting is coffee, with trade flows between 1 000 and 10 000 plants per year.

Based on type of reported infection (natural versus experimental), biological traits (perennial versus annual/biennial) and indicators of trade flows for plants for planting, the host plants of *X. fastidiosa* have been categorised. An electronic dataset appended to this technical report provides a searchable list of host plant species. When interpreting these data, consideration has to be given to uncertainties: there is a lack of knowledge on the prevalence of *X. fastidiosa* in the cultivation of host plant species produced for use as plants for planting; trade of plants for planting is rapidly changing; many species can be propagated both by seed and vegetatively propagation but the ratio between these two types of propagation is not known; the database include hosts reported with different detection methods; *X. fastidiosa* subspecies and strains can have different host specificity.

This analysis aims to provide support to risk managers for the selection of effective risk reduction options and for the prioritisation of border inspections for plants for planting. Effective risk reduction

options for the pathway of plants for planting are described and discussed in the EFSA PLH Panel opinion on the risk to plant health posed by *X. fastidiosa*. It is recommended that the list of the host plants of *X. fastidiosa* is updated regularly based on new findings.

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Appendix A – Overview of potential host plants of *Xylella fastidiosa* regulated in the Council Directive 2000/29/EC and in the Commission Implementing Decision 2014/497/EU

	Plants for planting prohibited for import	Plants for planting prohibited for import from specific origin	Specific requirement for the trade of plants for planting	Emergency measures
Acer saccharum			Annex VBI2. (parts of plants - origination USA and Canada)	
***Catharanthus* G. Don**				Emergency measures
***Citrus* L**	Annex IIIA 16 (Third countries)		Annex VAI 1.5	
***Cotoneaster* Ehrh**			Annex VAI 1.1 and 1.3 Annex VB II 4	
Graminacae (other than plants of ornamental perennial grasses of the subfamilies *Bambusoideae* and *Panicoideae* and of the genera *Buchloe*, *Bouteloua* Lag., *Calamagrostis*, *Cortaderia* Stapf., *Glyceria* R. Br., *Hakonechloa* Mak. ex Honda, *Hystrix*, *Molinia*, *Phalaris* L., *Shibataea*, *Spartina* Schreb., *Stipa* L. and *Uniola* L)		Annex III A 19 Third countries, other than European and Mediterranean countries		
***Fragaria* L.**			Annex VAI 2.1	
***Hibiscus* L.**			Annex VAII 2.1	
***Lactuca* spp.**			Annex VAI. 2.1	
***Lupinus* L.**			Annex VAI. 2.1	
Nerium oleander				Emergency measures
Olea europea				Emergency measures
***Pelargonium* l'Herit ex Ait**			Annex VAI. 2.1 Annex VBI. 2. (parts of plants)	
***Platanus* L**			Annex VAI. 2.1 Annex VAII I.2.	
***Prunus* L**		Annex III A.9 (Non European countries) and Annex III A.18 where appropriate, non-European countries, other than Mediterranean countries, Australia, New Zealand, Canada, the continental states of the USA	Annex VAI. 1.1 Annex VAI. 2.1., Annex VBI. 2. (parts of plants)	Emergency measures

	Plants for planting prohibited for import	Plants for planting prohibited for import from specific origin	Specific requirement for the trade of plants for planting	Emergency measures
Quercus L		Annex III A 2. (Non European Countries)	Annex VAI. 2.1 Annex VBI. 2 (parts of plants)	Emergency measures
***Rubus* L**			Annex VAI 2.1.	
Sorghum L		Annex III A 19 (Third countries, other than European and Mediterranean countries		Emergency measures
***Vinca* L**				Emergency measures
***Vitis* L**		Annex III. A 15. Third countries other than Switzerland	Annex VAI. 1.4. (plants) Annex VAII. 1.3. (plants)	

Appendix B – Results of categorisation of *Xylella fastidiosa* host plants

The acronyms reported below and the associated Web links refers to the databases used for the characterisation and categorisation of the host plant species. In case the species could not be found in the databases mentioned above the expert judgement was used. The records reported in the tables below are shown with different colour intensity according to the ranking of trade flows (darker colours = higher trade flows, lighter colours or white = lower flows trade).

ENA	http://www.enaplants.eu/EXEN/site/quality.aspx
NAK	http://www.internationalplantnames.com/
NL	http://www.kwaliteitsnormenboomkwekerij.nl/
USDA	http://plants.usda.gov/java/

Table 8: Tree, shrub or perennial plant species reported hosts of *Xylella fastidiosa* by survey/natural infection ranked by ISEFOR trade flows

FAMILY	GENUS	SPECIES	Class of yearly global trade[(a)] Source ISEFOR	Source for botanical traits
Asteraceae	*Artemisia*	*vulgaris var. heterophylla,*	4	ENA NAK
Convolvulaceae	*Convolvulus*	*arvensis*	4	USDA
Poaceae	*Cynodon*	*dactylon*	4	USDA
Moraceae	*Ficus*	*carica*	4	ENA NAK
Rosaceae	*Fragaria*	*vesca subsp. californica*	4	NAK
Onagraceae	*Fuchsia*	*magellanica*	4	NAK
Araliaceae	*Hedera*	*helix*	4	ENA NAK
Malvaceae	*Hibiscus*	*schizopetalus*	4	USDA
Malvaceae	*Hibiscus*	*syriacus*	4	NAK
Lamiaceae	*Lavandula*	*dentata*	4	ENA NAK
Arecaceae	*Phoenix*	*reclinata*	4	ENA NAK
Arecaceae	*Phoenix*	*roebelenii*	4	ENA NAK
Ranunculaceae	*Ranunculus*	*repens*	4	NAK
Rosaceae	*Rosa*	*californica*	4	NAK
Lamiaceae	*Rosmarinus*	*officinalis*	4	ENA NAK
Verbenaceae	*Verbena*	*litoralis*	4	USDA
Apocynaceae	*Vinca*	*minor*	4	NL NAK
Vitaceae	*Vitis*	*labrusca*	4	NL NAK, USDA
Vitaceae	*Vitis*	*mustangensis*	4	NL, USDA
Vitaceae	*Vitis*	*rotundifolia*	4	NL, USDA
Vitaceae	*Vitis*	*sp.*	4	NL
Vitaceae	*Vitis*	vinifera	4	ENA
Amaranthaceae	*Alternanthera*	*tenella*	3	USDA
Asteraceae	*Baccharis*	*halimifolia*	3	NAK
Asteraceae	*Baccharis*	*pilularis*	3	USDA
Cyperaceae	*Carex*	*sp.*	3	NAK
Apocynaceae	*Catharanthus*	*roseus*	3	NAK
Apocynaceae	*Catharanthus*	*sp.*	3	NAK
Rutaceae	*Citrus*	*sinensis*	3	NAK
Rutaceae	*Citrus*	*sp.*	3	NAK
Cyperaceae	*Cyperus*	*eragrostis*	3	USDA
Xanthorrhoeaceae	*Hemerocallis*	*sp.*	3	Expert judgement
Juglandaceae	*Juglans*	*californica*	3	USDA
Juglandaceae	*Juglans*	*sp.*	3	ENA
Oleaceae	*Ligustrum*	*lucidum*	3	ENA NAK
Caprifoliaceae	*Lonicera*	*japonica*	3	ENA NAK
Magnoliaceae	*Magnolia*	*grandiflora*	3	ENA NAK

FAMILY	GENUS	SPECIES	Class of yearly global trade[a] Source ISEFOR	Source for botanical traits
Apocynaceae	*Nerium*	*oleander*	3	NAK
Verbenaceae	*Phyla (Lippia)*	*nodiflora*	3	NAK
Rosaceae	*Prunus*	*angustifolia*	3	NL
Rosaceae	*Prunus*	*avium*	3	ENA NAK
Rosaceae	*Prunus*	*cerasifera*	3	ENA NAK
Rosaceae	*Prunus*	*cerasus*	3	NL NAK
Rosaceae	*Prunus*	*davidiana*	3	NL NAK
Rosaceae	*Prunus*	*domestica*	3	NL NAK
Rosaceae	*Prunus*	*dulcis*	3	ENA NAK
Rosaceae	*Prunus*	hybrid (*P.simonii* x *P.solicina* x *P.cerasifera* x *P.munsoniana*)	3	NL
Rosaceae	*Prunus*	*mahaleb*	3	NL NAK
Rosaceae	*Prunus*	*persica*	3	ENA NAK
Rosaceae	*Prunus*	*salicina*	3	NL NAK
Rosaceae	*Prunus*	*serotina*	3	NL NAK
Rosaceae	*Prunus*	*sp.*	3	NL NAK
Rosaceae	*Rubus*	*procerus*	3	NL NAK
Rosaceae	*Rubus*	*trivialis*	3	NL
Rosaceae	*Rubus*	*vitifolius*	3	NL
Salicaceae	*Salix*	*sp.*	3	ENA
Sapindaceae	*Acer*	*macrophylum*	2	NL NAK
Sapindaceae	*Acer*	*negundo*	2	ENA NAK
Sapindaceae	*Acer*	*platanoides*	2	ENA NAK
Sapindaceae	*Acer*	*rubrum*	2	NL NAK
Sapindaceae	*Acer*	*saccharum*	2	NL NAK
Sapindaceae	*Acer*	*sp.*	2	NL NAK
Poaceae	*Agrostis*	*gigantea*	2	USDA
Fabaceae	*Albizia*	*julibrissin*	2	NAK
Poaceae	*Brachiaria (Urochloa)*	*decumbens*	2	USDA
Lamiaceae	*Callicarpa*	*americana*	2	NL NAK
Juglandaceae	*Carya*	*illinoinensis*	2	NAK
Celastraceae	*Celastrus*	*orbiculata*	2	NAK
Fabaceae	*Cercis*	*occidentalis*	2	ENA NAK
Cornaceae	*Cornus*	*florida*	2	ENA NAK
Fabaceae	*Cytisus*	*scoparius*	2	NL NAK
Verbenaceae	*Duranta*	*erecta*	2	NAK
Oleaceae	*Fraxinus*	*dipetala*	2	ENA
Oleaceae	*Fraxinus*	*pennsylvanica*	2	ENA NAK
Ginkgoaceae	*Ginkgo*	*biloba*	2	ENA
Aquifoliaceae	*Ilex*	*vomitoria*	2	ENA NAK
Cupressaceae	*Juniperus*	*ashei*	2	NL NAK
Lythraceae	*Lagerstroemia*	*indica*	2	NAK
Onagraceae	*Ludwigia*	*grandiflora*	2	NAK
Malvaceae	*Malva*	*parviflora*	2	USDA
Lamiaceae	*Melissa*	*officinalis*	2	NAK
Berberidaceae	*Nandina*	*domestica*	2	NL NAK
Oleaceae	*Olea*	*europaea*	2	NAK
Lauraceae	*Persea*	*americana*	2	NAK
Pinaceae	*Pinus*	*taeda*	2	ENA NAK
Polygonaceae	*Polygonum*	*arenastrum*	2	ENA
Polygonaceae	*Polygonum*	*lapathifolium*	2	ENA
Polygonaceae	*Polygonum*	*persicaria*	2	USDA
Rosaceae	*Pyrus*	*pyrifolia*	2	ENA NAK
Fagaceae	*Quercus*	*alba*	2	NL NAK
Fagaceae	*Quercus*	*coccinea*	2	NL NAK
Fagaceae	*Quercus*	*falcata*	2	NL NAK

FAMILY	GENUS	SPECIES	Class of yearly global trade[a] Source ISEFOR	Source for botanical traits
Fagaceae	*Quercus*	*imbricaria*	2	NL NAK
Fagaceae	*Quercus*	*incana*	2	NL NAK
Fagaceae	*Quercus*	*laevis*	2	NL NAK
Fagaceae	*Quercus*	*laurifolia*	2	NL NAK
Fagaceae	*Quercus*	*macrocarpa*	2	NL NAK
Fagaceae	*Quercus*	*nigra*	2	NL NAK
Fagaceae	*Quercus*	*palustris*	2	NL NAK
Fagaceae	*Quercus*	*phellos*	2	NL NAK
Fagaceae	*Quercus*	*rubra*	2	NL NAK
Fagaceae	*Quercus*	*sp.*	2	NL NAK
Fagaceae	*Quercus*	*velutina*	2	NL NAK
Fagaceae	*Quercus*	*virginiana*	2	NL NAK
Anacardiaceae	*Rhus*	*diversiloba*	2	ENA
Polygonaceae	*Rumex*	*crispus*	2	USDA
Fabaceae	*Trifolium*	*repens*	2	NAK, USDA
Ulmaceae	*Ulmus*	*americana*	2	ENA NAK
Ulmaceae	*Ulmus*	sp.	2	ENA NAK
Ericaceae	*Vaccinium*	*corymbosum*	2	NL NAK
Vitaceae	*Ampelopsis*	*arborea*	1	NAK
Fabaceae	*Cassia*	*tora*	1	USDA
Rubiaceae	*Coffea*	*arabica*	1	NAK
Rubiaceae	*Coffea*	*sp.*	1	NAK
Myrtaceae	*Eugenia*	*myrtifolia*	1	NAK
Fagaceae	*Fagus*	*crenata*	1	ENA NAK
Altingiaceae	*Liquidambar*	*styraciflua*	1	ENA NAK
Magnoliaceae	*Liriodendron*	*tulipifera*	1	ENA NAK
Moraceae	*Morus*	*alba*	1	ENA NAK
Moraceae	*Morus*	*nigra*	1	ENA NAK
Moraceae	*Morus*	*rubra*	1	ENA NAK
Platanaceae	*Platanus*	*occidentalis*	1	ENA NAK
Platanaceae	*Platanus*	*sp.*	1	ENA NAK
Polygalaceae	*Polygala*	*myrtifolia*	1	NAK
Anacardiaceae	*Schinus*	*molle*	1	NAK
Asteraceae	*Silybum*	*marianum*	1	USDA
Caryophyllaceae	*Stellaria*	*media*	1	USDA
Fabaceae	*Acacia*	*longifolia*	0	NAK
Fabaceae	*Acacia*	*saligna*	0	NAK
Sapindaceae	*Aesculus*	*x hybrid*	0	NL NAK
Poaceae	*Bromus*	*diandrus*	0	USDA
Oleaceae	*Chionanthus*	*retusus*	0	NAK
Bignoniaceae	*Chitalpa*	*tashkentensis*	0	NAK
Poaceae	*Coelorachis*	*cylindrica*	0	USDA
Commelinaceae	*Commelina*	*benghalensis*	0	USDA
Apiaceae	*Datura*	*wrightii*	0	USDA
Poaceae	*Digitaria*	*insularis*	0	USDA
Amaranthaceae	*Disphania*	*ambrosioides*	0	ENA
Escalloniaceae	*Escallonia*	*montevidensis*	0	Expert judgement
Rosaceae	*Heteromeles*	*arbutifolia*	0	NAK
Hydrangeaceae	*Hydrangea*	*paniculata*	0	NAK
Bignoniaceae	*Jacaranda*	*mimosifolia*	0	NAK
Poaceae	*Lolium*	*perenne*	0	USDA
Poaceae	*Lolium*	*perenne ssp. multiflorum*	0	USDA
Lamiaceae	*Marrubium*	*vulgare*	0	NAK
Fabaceae	*Medicago*	*polymorpha*	0	USDA
Fabaceae	*Medicago*	*sativa*	0	USDA
Fabaceae	*Melilotus*	*sp.*	0	Expert judgement
Malvaceae	*Modiola*	*caroliniana*	0	USDA

FAMILY	GENUS	SPECIES	Class of yearly global trade[a] Source ISEFOR	Source for botanical traits
Fabaceae	*Neptunia*	*lutea*	0	USDA
Lamiaceae	*Origanum*	*majorana*	0	NAK
Poaceae	*Paspalum*	*dilatatum*	0	USDA
Anacardiaceae	*Pistachia*	*vera*	0	NAK
Plantaginaceae	*Plantago*	*lanceolata*	0	USDA
Asteraceae	*Ratibida*	*columnifera*	0	NAK
Adoxaceae	*Sambucus*	*cerulea*	0	ENA NAK
Adoxaceae	*Sambucus*	*sp.*	0	ENA NAK
Solanaceae	*Solanum*	*americanum*	0	USDA
Solanaceae	*Solanum*	*elaeagnifolium*	0	USDA
Poaceae	*Sorghum*	*halepense*	0	USDA
Fabaceae	*Spartium*	*junceum*	0	ENA NAK
Rubiaceae	*Spermacoce*	*latifolia*	0	USDA
Bromeliaceae	*Tillandsia*	*usneoides*	0	USDA
Urticaceae	*Urtica*	*gracilis*	0	USDA
Lamiaceae	*Westringia*	*fruticosa*	0	NAK

(a): 0 below 1 000, 1 between 1 000 and 10 000, 2 between 10 000 and 100 000, 3 between 100 000 and 1 000 000, 4 above 1 000 000.

Table 9: Tree, shrub or perennial plant species reported hosts of *Xylella fastidiosa* by experiment ranked by trade flows

FAMILY	GENUS	SPECIES	Class of yearly global trade[a] Source ISEFOR	Sources for botanical traits
Cannaceae	*Canna*	*sp.*	4	NAK
Convolvulaceae	*Ipomoea*	*purpurea*	4	NAK
Lamiaceae	*Mentha*	*sp.*	4	NAK
Geraniaceae	*Pelargonium*	*hortorum*	4	ENA
Poaceae	*Pennisetum*	*clandestimum*	4	USDA
Lamiaceae	*Salvia*	*apiana*	4	NAK
Lamiaceae	*Salvia*	*mellifera*	4	NAK
Apocynaceae	*Vinca*	*major*	4	NL NAK
Vitaceae	*Vitis*	*californica*	4	NL NAK
Vitaceae	*Vitis*	*rupestris*	4	NL, USDA
Asteraceae	*Baccharis*	*salicifolia*	3	USDA
Rutaceae	*Citrus*	*limon*	3	NAK
Rutaceae	*Citrus*	*limonia*	3	NAK
Cyperaceae	*Cyperus*	*esculentus*	3	NAK
Onagraceae	*Oenothera*	*elata ssp. Hookeri*	3	USDA
Rosaceae	*Prunus*	*americana*	3	NL NAK
Rosaceae	*Prunus*	*armeniaca*	3	ENA NAK
Rosaceae	*Prunus*	*hortulana*	3	NL NAK
Rosaceae	*Prunus*	*mexicana*	3	NL
Rosaceae	*Prunus*	*mume*	3	NL NAK
Rosaceae	*Rubus*	*discolor*	3	NL NAK
Rosaceae	*Rubus*	*sp.*	3	NL NAK
Rosaceae	*Rubus*	*ursinus*	3	NL
Salicaceae	*Salix*	*laevigata*	3	ENA
Salicaceae	*Salix*	*lasiolepis*	3	ENA
Oleaceae	*Syringa*	*vulgaris*	3	ENA NAK
Rosaceae	*Cotoneaster*	*rotundifolius*	2	ENA NAK
Myrtaceae	*Eucalyptus*	*camaldulensis*	2	NAK
Myrtaceae	*Eucalyptus*	*globulus*	2	NAK
Oleaceae	*Fraxinus*	*latifolia*	2	ENA NAK
Solanaceae	*Nicotiana*	*glauca*	2	USDA
Solanaceae	*Nicotiana*	*tabacum*	2	USDA

FAMILY	GENUS	SPECIES	Class of yearly global trade[(a)] Source ISEFOR	Sources for botanical traits
Polygonaceae	*Polygonum*	*convolvulus*	2	ENA
Fagaceae	*Quercus*	*agrifolia*	2	NL NAK
Fagaceae	*Quercus*	*lobata*	2	NL NAK
Resedaceae	*Reseda*	*odorata*	2	NAK
Anacardiaceae	*Rhus*	*sp.*	2	ENA
Caprifoliaceae	*Symphoricarpos*	*albus*	2	ENA NAK
Fabaceae	*Trifolium*	*fragiferum*	2	USDA
Fabaceae	*Trifolium*	*hybridum*	2	USDA
Fabaceae	*Trifolium*	*pratense*	2	USDA
Ericaceae	*Vaccinium*	*sp.*	2	NL NAK
Ericaceae	*Vaccinium*	*virgatum*	2	NAK
Betulaceae	*Alnus*	*rhombifolia*	1	ENA NAK
Rubiaceae	*Coffea*	*canephora var. robusta*	1	Expert judgement
Rubiaceae	*Coprosma*	*baueri*	1	ENA
Rubiaceae	*Coprosma*	*repens*	1	NAK
Vitaceae	*Parthenocissus*	*quinquefolia*	1	ENA NAK
Vitaceae	*Parthenocissus*	*tricuspidata*	1	ENA NAK
Pittosporaceae	*Pittosporum*	*crassifolium*	1	NAK
Platanaceae	*Platanus*	*racemosa*	1	ENA NAK
Salicaceae	*Populus*	*fremontii*	1	ENA
Polygonaceae	*Rheum*	*rhabarbarum (rhaponticum)*	1	USDA
Asteraceae	*Solidago (Silybum)*	*fistulosa*	1	USDA
Sapindaceae	*Aesculus*	*californica*	0	NL NAK
Poaceae	*Bromus*	*catharticus*	0	USDA
Poaceae	*Bromus*	*diandrus ssp. rigidus*	0	USDA
Poaceae	*Bromus*	*sp.*	0	USDA
Asteraceae	*Encelia*	*farinosa*	0	USDA
Onagraceae	*Epilobium*	*ciliatum ssp. ciliatum*	0	USDA
Fabaceae	*Genista*	*monspessulana*	0	ENA NAK
Fabaceae	*Melilotus*	*albus*	0	USDA
Fabaceae	*Melilotus*	*officinalis*	0	USDA
Apiaceae	*Oenanthe*	*sarmentosa*	0	USDA
Poaceae	*Phleum*	*pratense*	0	USDA
Rhamnaceae	*Rhamnus*	*californica*	0	ENA NAK
Adoxaceae	*Sambucus*	*nigra subsp. canadensis*	0	NAK
Simmondsiadaceae	*Simmondsia*	*chinensis*	0	NAK
Solanaceae	*Solanum*	*lycopersicum*	0	USDA
Solanaceae	*Solanum*	*melongena*	0	USDA
Anacardiaceae	*Toxicodendron*	*diversilobum*	0	USDA
Lauraceae	*Umbellularia*	*californica*	0	USDA
Urticaceae	*Urtica*	*dioica*	0	USDA

(a): 0 below 1 000, 1 between 1 000 and 10 000, 2 between 10 000 and 100 000, 3 between 100 000 and 1 000 000, 4 above 1 000 000.

Table 10: Tree, shrub or perennial plant species reported hosts of *Xylella fastidiosa* by unknown type of infection ranked by trade flows

FAMILY	GENUS	SPECIES	Class of yearly global trade[(a)] Source ISEFOR	Sources for botanical traits
Apocynaceae	*Vinca*	*sp.*	4	NL NAK
Vitaceae	*Vitis*	*aestivalis*	4	NL, NAK, USDA
Vitaceae	*Vitis*	*girdiana*	4	NL, USDA
Rutaceae	*Citrus*	*maxima*	3	NAK
Rutaceae	*Citrus*	*medica*	3	NAK
Sapindaceae	*Acer*	*griseum*	2	NL NAK
Fabaceae	*Cercis*	*canadensis*	2	NAK
Oleaceae	*Fraxinus*	*americana*	2	ENA NAK
Fabaceae	*Gleditsia*	*triacanthos*	2	ENA NAK
Fabaceae	*Lupinus*	*aridorum*	2	USDA
Fabaceae	*Lupinus*	*villosus*	2	USDA
Myrtaceae	*Metrosideros*	*sp.*	2	NAK
Fagaceae	*Quercus*	*robur*	2	ENA NAK
Fagaceae	*Quercus*	*schumardii*	2	NL NAK
Ulmaceae	*Ulmus*	*crassifolia*	2	ENA
Vitaceae	*Ampelopsis*	*cordata*	1	USDA
Moraceae	*Morus*	*sp.*	1	ENA
Cannabaceae	*Celtis*	*occidentalis*	0	ENA NAK
Oleaceae	*Chionanthus*	*sp.*	0	NAK
Sapindaceae	*Koelreuteria*	*bipinnata*	0	NAK
Sapindaceae	*Sapindus*	*saponaria*	0	USDA

(a): 0 below 1 000, 1 between 1 000 and 10 000, 2 between 10 000 and 100 000, 3 between 100 000 and 1 000 000, 4 above 1 000 000.

Table 11: Annual or biennial herbs primarily seed propagated species reported hosts of *Xylella fastidiosa* by survey/natural infection ranked by ISEFOR trade flows

FAMILY	GENUS	SPECIES	Class of yearly global trade[(a)] Source ISEFOR	Source
Asteraceae	*Bidens*	*pilosa*	4	USDA
Euphorbiaceae	*Euphorbia*	*hirta*	4	USDA
Geraniaceae	*Geranium*	*dissectum*	4	USDA
Portulaceae	*Portulaca*	*oleracea*	4	USDA
Plantaginaceae	*Veronica*	*persica*	4	USDA
Plantaginaceae	*Veronica*	*sp.*	4	Expert judgement
Poaceae	*Avena*	*fatua*	3	USDA
Brassicaceae	*Brassica*	*sp.*	3	Expert judgement
Geraniaceae	*Erodium*	*botrys*	3	USDA
Geraniaceae	*Erodium*	*moschatum*	3	USDA
Geraniaceae	*Erodium*	*sp.*	3	Expert
Asteraceae	*Senecio*	*vulgaris*	3	USDA
Poaceae	*Brachiaria (Urochloa)*	*plantaginea*	2	USDA
Asteraceae	*Ambrosia*	*artemisiifolia*	1	USDA
Brassicaceae	*Capsella*	*bursa - pastoris*	1	USDA
Poaceae	*Echinochloa*	*crus-galli*	1	USDA
Poaceae	*Poa*	*annua*	1	USDA
Poaceae	*Setaria*	*magna*	1	USDA
Poaceae	*Cenchrus*	*echinatus*	0	USDA
Fabaceae	*Chamaecrista*	*fasciculata*	0	USDA
Apiaceae	*Conium*	*maculatum*	0	USDA
Asteraceae	*Conyza*	*canadensis*	0	USDA
Brassicaceae	*Coronopus*	*didymus*	0	USDA

FAMILY	GENUS	SPECIES	Class of yearly global trade[(a)] Source ISEFOR	Source
Poaceae	*Digitaria*	*horizontalis*	0	USDA
Poaceae	*Digitaria*	*sanguinalis*	0	USDA
Poaceae	*Eriochloa*	*contracta*	0	USDA
Poaceae	*Hordeum*	*murinum*	0	USDA
Asteraceae	*Lactuca*	*serriola*	0	USDA
Montiaceae	*Montia*	*linearis*	0	USDA
Amaranthaceae	*Salsola*	*tragus*	0	USDA
Brassicaceae	*Sisymbrium*	*irio*	0	USDA
Asteraceae	*Sonchus*	*oleraceus*	0	USDA
Asteraceae	*Sonchus*	*sp.*	0	Expert judgement
Urticaceae	*Urtica*	*urens*	0	USDA
Asteraceae	*Xanthium*	*spinosum*	0	USDA

(a): 0 below 1 000, 1 between 1 000 and 10 000, 2 between 10 000 and 100 000, 3 between 100 000 and 1 000 000, 4 above 1 000 000.

Table 12: Annual or biennial herbs primarily seed propagated reported hosts of *Xylella fastidiosa* by experiment ranked by ISEFOR trade flows

FAMILY	GENUS	SPECIES	Class of yearly global trade[(a)] Source ISEFOR	Source for botanical traits
Brassicaceae	*Brassica*	*nigra*	3	USDA
Geraniaceae	*Erodium*	*cicutarium*	3	USDA
Poaceae	*Festuca*	*megalura*	3	USDA
Asteraceae	*Helianthus*	*annuus*	3	USDA
Asteraceae	*Callistephus*	*chinensis*	2	USDA
Poaceae	*Phalaris*	*minor*	2	USDA
Poaceae	*Phalaris*	*paradoxa*	2	USDA
Fabaceae	*Trifolium*	*incarnatum*	2	USDA
Asteraceae	*Ambrosia*	*acanthicarpa*	1	USDA
Onagraceae	*Clarkia*	*amena*	1	USDA
Poaceae	*Eragrostis*	*pectinacea var. pectinacea*	1	USDA
Fabaceae	*Lathyrus*	*cicera*	1	USDA
Fabaceae	*Lathyrus*	*clymenum*	1	Expert judgement
Fabaceae	*Lathyrus*	*sativus*	1	USDA
Poaceae	*Setaria*	*pumila ssp. pumila (lutescens)*	1	USDA
Amaranthaceae	*Amaranthus*	*blitoides*	0	USDA
Asteraceae	*Ambrosia (Franseria)*	*acanthicarpa*	0	USDA
Boraginaceae	*Amsinckia*	*douglasiana*	0	USDA
Amaranthaceae	*Chenopodium*	*quinoa*	0	Expert judgement
Apiaceae	*Daucus*	*carota*	0	USDA
Onagraceae	*Epilobium*	*brachycarpum*	0	USDA
Poaceae	*Eriochloa*	*acuminata var. acuminata*	0	USDA
Poaceae	*Hordeum*	*vulgare*	0	USDA
Poaceae	*Lolium*	*temulentum*	0	USDA
Fabaceae	*Melilotus*	*indicus*	0	USDA
Asteraceae	*Sonchus*	*asper*	0	USDA
Poaceae	*Sorghum*	*sudanense (bicolor ssp. drummondii)*	0	USDA

FAMILY	GENUS	SPECIES	Class of yearly global trade[(a)] Source ISEFOR	Source for botanical traits
Fabaceae	*Vicia*	*faba cv.* Aquadulce	0	USDA
Fabaceae	*Vicia*	*monantha*	0	USDA
Asteraceae	*Xanthium*	*strumarium*	0	USDA

(a): 0 below 1 000, 1 between 1 000 and 10 000, 2 between 10 000 and 100 000, 3 between 100 000 and 1 000 000, 4 above 1 000 000.

Table 13: Annual or biennial herbs primarily seed propagated reported host of *Xylella fastidiosa* by unknown type of infection ranked by ISEFOR trade flows

FAMILY	GENUS	SPECIES	Class of yearly global trade[(a)] Source ISEFOR	Source
Asteraceae	*Ambrosia*	*trifida*	1	USDA
Asteraceae	*Iva*	*annua*	0	USDA
Asteraceae	*Pluchea*	*odorata*	0	USDA

(a): 0 below 1 000, 1 between 1 000 and 10 000, 2 between 10 000 and 100 000, 3 between 100 000 and 1 000 000, 4 above 1 000 000.

Table 14: Plant species reported host of *Xylella fastidiosa* by survey/natural infection ranked by the number of detection methods categories applied

FAMILY	GENUS	Species	Average number of detection classes	% of reports with at least 1 detection method	% of reports with at least 2 detection methods	% of reports with at least 3 detection methods
Fabaceae	*Acacia*	*saligna*	3,00	1,00	1,00	1,00
Fabaceae	*Albizia*	*julibrissin*	3,00	1,00	1,00	1,00
Asteraceae	*Baccharis*	*halimifolia*	3,00	1,00	1,00	1,00
Oleaceae	*Chionanthus*	*retusus*	3,00	1,00	1,00	1,00
Bignoniaceae	*Chitalpa*	*tashkinensis*	3,00	1,00	1,00	1,00
Apiaceae	*Conium*	*maculatum*	3,00	1,00	1,00	1,00
Aquifoliaceae	*Ilex*	*vomitoria*	3,00	1,00	1,00	1,00
Bignoniaceae	*Jacaranda*	*mimosifolia*	3,00	1,00	1,00	1,00
Myrtaceae	*Myrtus*	*communis*	3,00	1,00	1,00	1,00
Berberidaceae	*Nandina*	*domestica*	3,00	1,00	1,00	1,00
Poaceae	*Paspalum*	*dilatatum*	3,00	1,00	1,00	1,00
Arecaceae	*Phoenix*	*roebelenii*	3,00	1,00	1,00	1,00
Rosaceae	*Pyrus*	*pyrifolia*	4,00	1,00	1,00	1,00
Fagaceae	*Quercus*	*velutina*	3,00	1,00	1,00	1,00
Rhamnaceae	*Rhamnus*	*alaternus*	3,00	1,00	1,00	1,00
Fabaceae	*Spartium*	*junceum*	3,00	1,00	1,00	1,00
Ericaceae	*Vaccinium*	*corymbosum*	3,00	1,00	1,00	1,00
Magnoliaceae	*Magnolia*	*grandiflora*	2,67	1,00	1,00	0,67
Fabaceae	*Cercis*	*occidentalis*	2,33	1,00	0,67	0,67
Fagaceae	*Quercus*	*virginiana*	2,33	1,00	0,67	0,67
Apocynaceae	*Nerium*	*oleander*	2,32	1,00	0,76	0,52
Ginkgoaceae	*Ginkgo*	*biloba*	2,50	1,00	1,00	0,50
Lythraceae	*Lagerstroemia*	*indica*	2,50	1,00	1,00	0,50
Moraceae	*Morus*	*alba*	2,50	1,00	1,00	0,50
Polygalaceae	*Polygala*	*myrtifolia*	2,50	1,00	1,00	0,50
Lamiaceae	*Westringia*	*fruticosa*	2,50	1,00	1,00	0,50
Cyperaceae	*Cyperus*	*eragrostis*	2,00	1,00	0,50	0,50
Juglandaceae	*Carya*	*illinoinensis*	2,14	1,00	0,71	0,43
Oleaceae	*Olea*	*europaea*	2,00	1,00	0,63	0,38
Lamiaceae	*Rosmarinus*	*officinalis*	2,00	1,00	0,67	0,33

FAMILY	GENUS	Species	Average number of detection classes	% of reports with at least 1 detection method	% of reports with at least 2 detection methods	% of reports with at least 3 detection methods
Vitaceae	*Vitis*	*vinifera*	2,00	0,93	0,63	0,33
Apocynaceae	*Catharanthus*	*roseus*	1,67	1,00	0,33	0,33
Vitaceae	*Vitis*	*labrusca*	1,67	1,00	0,33	0,33
Rosaceae	*Prunus*	*dulcis*	1,81	0,95	0,43	0,29
Sapindaceae	*Acer*	*rubrum*	1,75	1,00	0,50	0,25
Rosaceae	*Prunus*	*avium*	1,75	1,00	0,50	0,25
Apocynaceae	*Vinca*	*minor*	1,75	1,00	0,50	0,25
Rubiaceae	*Coffea*	*arabica*	1,63	1,00	0,38	0,25
Rosaceae	*Prunus*	*cerasifera*	1,50	1,00	0,25	0,25
Altingiaceae	*Liquidambar*	*styraciflua*	1,80	1,00	0,60	0,20
Rutaceae	*Citrus*	*sinensis*	1,40	1,00	0,30	0,10
Rosaceae	*Prunus*	*persica*	1,18	0,91	0,18	0,09
Platanaceae	*Platanus*	*occidentalis*	1,38	1,00	0,31	0,08
Sapindaceae	*Acer*	*platanoides*	2,00	1,00	1,00	0,00
Sapindaceae	*Acer*	*saccharum*	2,00	1,00	1,00	0,00
Vitaceae	*Ampelopsis*	*arborea*	2,00	1,00	1,00	0,00
Lamiaceae	*Callicarpa*	*americana*	2,00	1,00	1,00	0,00
Fabaceae	*Chamaecrista*	*fasciculata*	2,00	1,00	1,00	0,00
Poaceae	*Coelorachis*	*cylindrica*	2,00	1,00	1,00	0,00
Fagaceae	*Fagus*	*crenata*	2,00	1,00	1,00	0,00
Moraceae	*Ficus*	*carica*	2,00	1,00	1,00	0,00
Malvaceae	*Hibiscus*	*schizopetalus*	2,00	1,00	1,00	0,00
Cupressaceae	*Juniperus*	*ashei*	2,00	1,00	1,00	0,00
Lamiaceae	*Lavandula*	*dentata*	2,00	1,00	1,00	0,00
Oleaceae	*Ligustrum*	*lucidum*	2,00	1,00	1,00	0,00
Verbenaceae	*Lippia*	*nodiflora*	2,00	1,00	1,00	0,00
Magnoliaceae	*Liriodendron*	*tulipifera*	2,00	1,00	1,00	0,00
Caprifoliaceae	*Lonicera*	*japonica*	2,00	1,00	1,00	0,00
Malvaceae	*Modiola*	*caroliniana*	2,00	1,00	1,00	0,00
Moraceae	*Morus*	*nigra*	2,00	1,00	1,00	0,00
Fabaceae	*Neptunia*	*lutea*	2,00	1,00	1,00	0,00
Lauraceae	*Persea*	*americana*	2,00	1,00	1,00	0,00
Arecaceae	*Phoenix*	*reclinata*	2,00	1,00	1,00	0,00
Pinaceae	*Pinus*	*taeda*	2,00	1,00	1,00	0,00
Fagaceae	*Quercus*	*imbricaria*	2,00	1,00	1,00	0,00
Fagaceae	*Quercus*	*macrocarpa*	2,00	1,00	1,00	0,00
Fagaceae	*Quercus*	*phellos*	2,00	1,00	1,00	0,00
Rosaceae	*Rubus*	*trivialis*	2,00	1,00	1,00	0,00
Poaceae	*Setaria*	*magna*	2,00	1,00	1,00	0,00
Vitaceae	*Vitis*	*mustangensis*	2,00	1,00	1,00	0,00
Vitaceae	*Vitis*	*rotundifolia*	2,00	1,00	1,00	0,00
Rosaceae	*Prunus*	*salicina*	1,86	1,00	0,86	0,00
Rosaceae	*Prunus*	*domestica*	1,60	1,00	0,60	0,00
Fagaceae	*Quercus*	*rubra*	1,44	0,89	0,56	0,00
Asteraceae	*Ambrosia*	*artemisiifolia*	1,50	1,00	0,50	0,00
Moraceae	*Morus*	*rubra*	1,50	1,00	0,50	0,00
Fagaceae	*Quercus*	*alba*	1,50	1,00	0,50	0,00
Fagaceae	*Quercus*	*coccinea*	1,50	1,00	0,50	0,00
Asteraceae	*Ratibida*	*columnifera*	1,50	1,00	0,50	0,00
Fagaceae	*Quercus*	*palustris*	1,40	0,90	0,50	0,00
Ulmaceae	*Ulmus*	*americana*	1,23	0,85	0,38	0,00
Oleaceae	*Fraxinus*	*pennsylvanica*	1,33	1,00	0,33	0,00
Fabaceae	*Acacia*	*longifolia*	1,00	1,00	0,00	0,00
Sapindaceae	*Acer*	*griseum*	1,00	1,00	0,00	0,00
Sapindaceae	*Acer*	*macrophylum*	1,00	1,00	0,00	0,00

FAMILY	GENUS	Species	Average number of detection classes	% of reports with at least 1 detection method	% of reports with at least 2 detection methods	% of reports with at least 3 detection methods
Sapindaceae	*Acer*	*negundo*	1,00	1,00	0,00	0,00
Poaceae	*Agrostis*	*gigantea*	1,00	1,00	0,00	0,00
Betulaceae	*Alnus*	*rhombifolia*	1,00	1,00	0,00	0,00
Amaranthaceae	*Alternanthera*	*tenella*	1,00	1,00	0,00	0,00
Asteraceae	*Ambrosia*	*trifida*	1,00	1,00	0,00	0,00
Vitaceae	*Ampelopsis*	*cordata*	1,00	1,00	0,00	0,00
Asteraceae	*Artemisia*	*vulgaris var. heterophylla,*	1,00	1,00	0,00	0,00
Poaceae	*Avena*	*fatua*	1,00	1,00	0,00	0,00
Asteraceae	*Baccharis*	*pilularis*	1,00	1,00	0,00	0,00
Asteraceae	*Bidens*	*pilosa*	1,00	1,00	0,00	0,00
Poaceae	*Brachiaria*	*decumbens*	1,00	1,00	0,00	0,00
Poaceae	*Bromus*	*diandrus*	1,00	1,00	0,00	0,00
Poaceae	*Bromus*	*diandrus ssp. rigidus*	1,00	1,00	0,00	0,00
Brassicaceae	*Capsella*	*bursa - pastoris*	1,00	1,00	0,00	0,00
Fabaceae	*Cassia*	*tora*	1,00	1,00	0,00	0,00
Celastraceae	*Celastrus*	*orbiculata*	1,00	1,00	0,00	0,00
Cannabaceae	*Celtis*	*occidentalis*	1,00	1,00	0,00	0,00
Poaceae	*Cenchrus*	*echinatus*	1,00	1,00	0,00	0,00
Fabaceae	*Cercis*	*canadensis*	1,00	1,00	0,00	0,00
Commelinaceae	*Commelina*	*benghalensis*	1,00	1,00	0,00	0,00
Convolvulaceae	*Convolvulus*	*arvensis*	1,00	1,00	0,00	0,00
Asteraceae	*Conyza*	*canadensis*	1,00	1,00	0,00	0,00
Cornaceae	*Cornus*	*florida*	1,00	1,00	0,00	0,00
Brassicaceae	*Coronopus*	*didymus*	1,00	1,00	0,00	0,00
Poaceae	*Cynodon*	*dactylon*	1,00	1,00	0,00	0,00
Fabaceae	*Cytisus*	*scoparius*	1,00	1,00	0,00	0,00
Apiaceae	*Datura*	*wrightii*	1,00	1,00	0,00	0,00
Poaceae	*Digitaria*	*horizontalis*	1,00	1,00	0,00	0,00
Poaceae	*Digitaria*	*insularis*	1,00	1,00	0,00	0,00
Poaceae	*Digitaria*	*sanguinalis*	1,00	1,00	0,00	0,00
Amaranthaceae	*Disphania*	*ambrosioides*	1,00	1,00	0,00	0,00
Verbenaceae	*Duranta*	*erecta*	1,00	1,00	0,00	0,00
Poaceae	*Echinochloa*	*crus-galli*	1,00	1,00	0,00	0,00
Asteraceae	*Encelia*	*farinosa*	1,00	1,00	0,00	0,00
Poaceae	*Eriochloa*	*contracta*	1,00	1,00	0,00	0,00
Geraniaceae	*Erodium*	*botrys*	1,00	1,00	0,00	0,00
Geraniaceae	*Erodium*	*moschatum*	1,00	1,00	0,00	0,00
Escalloniaceae	*Escallonia*	*montevidensis*	1,00	1,00	0,00	0,00
Myrtaceae	*Eugenia*	*myrtifolia*	1,00	1,00	0,00	0,00
Euphorbiaceae	*Euphorbia*	*hirta*	1,00	1,00	0,00	0,00
Rosaceae	*Fragaria*	*vesca subsp. californica*	1,00	1,00	0,00	0,00
Oleaceae	*Fraxinus*	*americana*	1,00	1,00	0,00	0,00
Oleaceae	*Fraxinus*	*dipetala*	1,00	1,00	0,00	0,00
Onagraceae	*Fuchsia*	*magellanica*	1,00	1,00	0,00	0,00
Geraniaceae	*Geranium*	*dissectum*	1,00	1,00	0,00	0,00
Fabaceae	*Gleditsia*	*triacanthos*	1,00	1,00	0,00	0,00
Araliaceae	*Hedera*	*helix*	1,00	1,00	0,00	0,00
Asteraceae	*Helianthus*	*annuus*	1,00	1,00	0,00	0,00
Rosaceae	*Heteromeles*	*arbutifolia*	1,00	1,00	0,00	0,00
Malvaceae	*Hibiscus*	*syriacus*	1,00	1,00	0,00	0,00
Poaceae	*Hordeum*	*murinum*	1,00	1,00	0,00	0,00
Hydrangeaceae	*Hydrangea*	*paniculata*	1,00	1,00	0,00	0,00

FAMILY	GENUS	Species	Average number of detection classes	% of reports with at least 1 detection method	% of reports with at least 2 detection methods	% of reports with at least 3 detection methods
Asteraceae	*Iva*	*annua*	1,00	1,00	0,00	0,00
Juglandaceae	*Juglans*	*californica*	1,00	1,00	0,00	0,00
Sapindaceae	*Koelreuteria*	*bipinnata*	1,00	1,00	0,00	0,00
Asteraceae	*Lactuca*	*serriola*	1,00	1,00	0,00	0,00
Poaceae	*Lolium*	*perenne ssp. multiflorum*	1,00	1,00	0,00	0,00
Poaceae	*Lolium*	*perenne*	1,00	1,00	0,00	0,00
Onagraceae	*Ludwigia*	*grandiflora*	1,00	1,00	0,00	0,00
Malvaceae	*Malva*	*parviflora*	1,00	1,00	0,00	0,00
Lamiaceae	*Marrubium*	*vulgare*	1,00	1,00	0,00	0,00
Fabaceae	*Medicago*	*polymorpha*	1,00	1,00	0,00	0,00
Lamiaceae	*Melissa*	*officinalis*	1,00	1,00	0,00	0,00
Montiaceae	*Montia*	*linearis*	1,00	1,00	0,00	0,00
Lamiaceae	*Origanum*	*majorana*	1,00	1,00	0,00	0,00
Anacardiaceae	*Pistachia*	*vera*	1,00	1,00	0,00	0,00
Plantaginaceae	*Plantago*	*lanceolata*	1,00	1,00	0,00	0,00
Asteraceae	*Pluchea*	*odorata*	1,00	1,00	0,00	0,00
Poaceae	*Poa*	*annua*	1,00	1,00	0,00	0,00
Polygonaceae	*Polygonum*	*arenastrum*	1,00	1,00	0,00	0,00
Polygonaceae	*Polygonum*	*lapathifolium*	1,00	1,00	0,00	0,00
Polygonaceae	*Polygonum*	*persicaria*	1,00	1,00	0,00	0,00
Portulaceae	*Portulaca*	*oleracea*	1,00	1,00	0,00	0,00
Rosaceae	*Prunus*	*angustifolia*	1,00	1,00	0,00	0,00
Rosaceae	*Prunus*	*armeniaca*	1,00	1,00	0,00	0,00
Rosaceae	*Prunus*	*cerasus*	1,00	1,00	0,00	0,00
Rosaceae	*Prunus*	*davidiana*	1,00	1,00	0,00	0,00
Rosaceae	*Prunus*	*mahaleb*	1,00	1,00	0,00	0,00
Rosaceae	*Prunus*	*serotina*	1,00	1,00	0,00	0,00
Fagaceae	*Quercus*	*falcata*	1,00	1,00	0,00	0,00
Fagaceae	*Quercus*	*incana*	1,00	1,00	0,00	0,00
Fagaceae	*Quercus*	*laevis*	1,00	1,00	0,00	0,00
Fagaceae	*Quercus*	*laurifolia*	1,00	1,00	0,00	0,00
Fagaceae	*Quercus*	*nigra*	1,00	1,00	0,00	0,00
Fagaceae	*Quercus*	*robur*	1,00	1,00	0,00	0,00
Fagaceae	*Quercus*	*schumardii*	1,00	1,00	0,00	0,00
Ranunculaceae	*Ranunculus*	*repens*	1,00	1,00	0,00	0,00
Anacardiaceae	*Rhus*	*diversiloba*	1,00	1,00	0,00	0,00
Rosaceae	*Rosa*	*californica*	1,00	1,00	0,00	0,00
Rosaceae	*Rubus*	*procerus*	1,00	1,00	0,00	0,00
Rosaceae	*Rubus*	*vitifolius*	1,00	1,00	0,00	0,00
Polygonaceae	*Rumex*	*crispus*	1,00	1,00	0,00	0,00
Amaranthaceae	*Salsola*	*tragus*	1,00	1,00	0,00	0,00
Lamiaceae	*Salvia*	*mellifera*	1,00	1,00	0,00	0,00
Adoxaceae	*Sambucus*	*cerulea*	1,00	1,00	0,00	0,00
Adoxaceae	*Sambucus*	*nigra subsp. canadensis*	1,00	1,00	0,00	0,00
Sapindaceae	*Sapindus*	*saponaria*	1,00	1,00	0,00	0,00
Anacardiaceae	*Schinus*	*molle*	1,00	1,00	0,00	0,00
Asteraceae	*Senecio*	*vulgaris*	1,00	1,00	0,00	0,00
Asteraceae	*Silybum*	*marianum*	1,00	1,00	0,00	0,00
Brassicaceae	*Sisymbrium*	*irio*	1,00	1,00	0,00	0,00
Solanaceae	*Solanum*	*americanum*	1,00	1,00	0,00	0,00
Solanaceae	*Solanum*	*elaeagnifolium*	1,00	1,00	0,00	0,00
Asteraceae	*Solidago*	*virgaurea*	1,00	1,00	0,00	0,00
Asteraceae	*Sonchus*	*oleraceus*	1,00	1,00	0,00	0,00

FAMILY	GENUS	Species	Average number of detection classes	% of reports with at least 1 detection method	% of reports with at least 2 detection methods	% of reports with at least 3 detection methods
Poaceae	*Sorghum*	*halepense*	1,00	1,00	0,00	0,00
Rubiaceae	*Spermacoce*	*latifolia*	1,00	1,00	0,00	0,00
Caryophyllaceae	*Stellaria*	*media*	1,00	1,00	0,00	0,00
Bromeliaceae	*Tillandsia*	*usneoides*	1,00	1,00	0,00	0,00
Fabaceae	*Trifolium*	*repens*	1,00	1,00	0,00	0,00
Ulmaceae	*Ulmus*	*crassifolia*	1,00	1,00	0,00	0,00
Urticaceae	*Urtica*	*gracilis*	1,00	1,00	0,00	0,00
Urticaceae	*Urtica*	*urens*	1,00	1,00	0,00	0,00
Verbenaceae	*Verbena*	*litoralis*	1,00	1,00	0,00	0,00
Plantaginaceae	*Veronica*	*persica*	1,00	1,00	0,00	0,00
Vitaceae	*Vitis*	*girdiana*	1,00	1,00	0,00	0,00
Asteraceae	*Xanthium*	*spinosum*	1,00	1,00	0,00	0,00
Asteraceae	*Xanthium*	*strumarium*	1,00	1,00	0,00	0,00
Fabaceae	*Medicago*	*sativa*	0,50	0,50	0,00	0,00

Table 15: Plant genera (undefined species) or hybrids reported host of *Xylella fastidiosa* by survey/natural infection ranked by the number of detection methods categories applied

FAMILY	GENUS	Species	Average number of detection classes	% of reports with at least 1 detection method	% of reports with at least 2 detection methods	% of reports with at least 3 detection methods
Brassicaceae	*Brassica*	*sp.*	3,00	1,00	1,00	1,00
Xanthorrhoeaceae	*Hemerocallis*	*sp.*	3,00	1,00	1,00	1,00
Rutaceae	*Citrus*	*sp.*	2,52	1,00	0,76	0,76
Rubiaceae	*Coffea*	*sp*	2,56	0,94	0,72	0,72
Vitaceae	*Vitis*	*Sp*	1,83	0,90	0,34	0,34
Rosaceae	*Prunus*	*Sp*	1,40	1,00	0,20	0,20
Apocynaceae	*Catharanthus*	*Sp*	2,00	1,00	1,00	0,00
Juglandaceae	*Juglans*	*Sp*	2,00	1,00	1,00	0,00
Platanaceae	*Platanus*	*Sp*	2,00	1,00	1,00	0,00
Sapindaceae	*Acer*	*Sp*	1,00	1,00	0,00	0,00
Sapindaceae	*Aesculus*	*hybrid*	1,00	1,00	0,00	0,00
Cyperaceae	*Carex*	*Sp*	1,00	1,00	0,00	0,00
Geraniaceae	*Erodium*	*Sp*	1,00	1,00	0,00	0,00
Fabaceae	*Melilotus*	*Sp*	1,00	1,00	0,00	0,00
Myrtaceae	*Metrosideros*	*Sp*	1,00	1,00	0,00	0,00
Moraceae	*Morus*	*Sp*	1,00	1,00	0,00	0,00
Rosaceae	*Prunus*	*hybrid (P.simonii x P.solicina x P.cerasifera x P.munsoniana)*	1,00	1,00	0,00	0,00
Fagaceae	*Quercus*	*Sp*	1,00	1,00	0,00	0,00
Rosaceae	*Rubus*	*Sp*	1,00	1,00	0,00	0,00
Salicaceae	*Salix*	*Sp*	1,00	1,00	0,00	0,00
Adoxaceae	*Sambucus*	*Sp*	1,00	1,00	0,00	0,00
Asteraceae	*Sonchus*	*Sp*	1,00	1,00	0,00	0,00
Ericaceae	*Vaccinium*	*Sp*	1,00	1,00	0,00	0,00
Plantaginaceae	*Veronica*	*Sp*	1,00	1,00	0,00	0,00

Table 16: Plant species reported hosts of *Xylella fastidiosa* by experimental infection via vectors transmission assay ranked by the number of detection methods categories applied

FAMILY	GENUS	Species	Average number of detection classes (beside vectors transmission)	% of reports with at least 1 detection method (beside vectors transmission)	% of reports with at least 2 detection methods (beside vectors transmission)	% of reports with at least 3 detection methods (beside vectors transmission)
Asteraceae	*Ambrosia*	*artemisiifolia*	4	1	1	1
Oleaceae	*Olea*	*europaea*	4	1	1	1
Polygalaceae	*Polygala*	*myrtifolia*	4	1	1	1
Rosaceae	*Prunus*	*cerasifera*	4	1	1	1
Apocynaceae	*Nerium*	*oleander*	3,5	1	1	1
Apocynaceae	*Catharanthus*	*roseus*	3	1	1	0,5
	Vitis	*vinifera*	1,571429	0,714286	0,571429	0,285714
Sapindaceae	*Acer*	*macrophylum*	2	1	1	0
Sapindaceae	*Aesculus*	*californica*	2	1	1	0
Asteraceae	*Ambrosia*	*acanthicarpa*	2	1	1	0
Poaceae	*Brachiaria*	*plantaginea*	2	1	1	0
Amaranthaceae	*Chenopodium*	*quinoa*	2	1	1	0
Rutaceae	*Citrus*	*sinensis*	2	1	1	0
Geraniaceae	*Erodium*	*moschatum*	2	1	1	0
Myrtaceae	*Eucalyptus*	*camaldulensis*	2	1	1	0
Asteraceae	*Helianthus*	*annuus*	2	1	1	0
Convolvulaceae	*Ipomoea*	*purpurea*	2	1	1	0
Malvaceae	*Malva*	*parviflora*	2	1	1	0
Solanaceae	*Nicotiana*	*glauca*	2	1	1	0
Rosaceae	*Prunus*	*dulcis*	2	1	1	0
Fagaceae	*Quercus*	*lobata*	2	1	1	0
Salicaceae	*Salix*	*laevigata*	2	1	1	0
Salicaceae	*Salix*	*lasiolepis*	2	1	1	0
Adoxaceae	*Sambucus*	*nigra*	2	1	1	0
Simmondsiadaceae	*Simmondsia*	*chinensis*	2	1	1	0
Anacardiaceae	*Toxicodendron*	*diversilobum*	2	1	1	0
Apiaceae	*Conium*	*maculatum*	1,5	1	0,5	0
Poaceae	*Echinochloa*	*crus-galli*	1,25	0,75	0,5	0
Asteraceae	*Lactuca*	*serriola*	1	0,5	0,5	0
Fabaceae	*Medicago*	*sativa*	1	0,5	0,5	0
Asteraceae	*Xanthium*	*strumarium*	1	0,5	0,5	0

FAMILY	GENUS	Species	Average number of detection classes (beside vectors transmission)	% of reports with at least 1 detection method (beside vectors transmission)	% of reports with at least 2 detection methods (beside vectors transmission)	% of reports with at least 3 detection methods (beside vectors transmission)
Sapindaceae	*Acer*	*negundo*	1	1	0	0
Betulaceae	*Alnus*	*rhombifolia*	1	1	0	0
Amaranthaceae	*Amaranthus*	*blitoides*	1	1	0	0
Asteraceae	*Artemisia*	*douglasiana*	1	1	0	0
Asteraceae	*Baccharis*	*pilularis*	1	1	0	0
Asteraceae	*Baccharis*	*salicifolia*	1	1	0	0
Convolvulaceae	*Convolvulus*	*arvensis*	1	1	0	0
Asteraceae	*Conyza*	*canadensis*	1	1	0	0
Cyperaceae	*Cyperus*	*eragrostis*	1	1	0	0
Myrtaceae	*Eucalyptus*	*globulus*	1	1	0	0
Oleaceae	*Fraxinus*	*latifolia*	1	1	0	0
Fabaceae	*Genista*	*monspessulana*	1	1	0	0
Salicaceae	*Populus*	*fremontii*	1	1	0	0
Portulaceae	*Portulaca*	*oleracea*	1	1	0	0
Fagaceae	*Quercus*	*agrifolia*	1	1	0	0
Rosaceae	*Rubus*	*ursinus*	1	1	0	0
Asteraceae	*Sonchus*	*oleraceus*	1	1	0	0
Lauraceae	*Umbellularia*	*californica*	1	1	0	0
Urticaceae	*Urtica*	*dioica*	1	1	0	0
Fabaceae	*Vicia*	*faba*	1	1	0	0
Vitaceae	*Vitis*	*rupestris*	1	1	0	0
Cyperaceae	*Cyperus*	*esculentus*	0,5	0,5	0	0
Araliaceae	*Hedera*	*helix*	0,5	0,5	0	0
Polygonaceae	*Rumex*	*crispus*	0,5	0,5	0	0
Poaceae	*Sorghum*	*halepense*	0,5	0,5	0	0
Apocynaceae	*Vinca*	*major*	0,5	0,5	0	0

Annex A – Electronic Excel database on *Xylella fastidiosa* host plants

(Downloadable from http://www.efsa.europa.eu/en/efsajournal/doc/4061ax1.xls)