Potential insect vectors of *Xylella fastidiosa* in the United Kingdom

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efsa European Food Safety Authority
UIB Universitat de les Illes Balears
European Commission
PONTE Pest Organisms Threatening Europe
XF ACTORS
Euphresco

VECTORS OF *XYLELLA FASTIDIOSA* (XF)

- Need to determine the vectors to monitor the spread and for the management of Xf
- All xylem-feeding auchenorrhyncha bugs ('hoppers') are potential vectors of Xf bacterium
- In the UK there are only 18 xylem-feeding potential vectors in four families
- Phloem-feeding insects can occasionally feed on the xylem and may become potential vectors e.g. *Euscelis lineolatus* in olive orchards in Italy. There are four *Euscelis* species present in the UK.
- Other large-bodied species of the Deltocephalinae could potentially ingest Xf bacteria
- Ingesting the bacteria does not mean that the bug is a vector
- Only *Philaenus spumarius* (meadow spittle bug) has been confirmed as a vector in Europe. Why?

POTENTIAL VECTORS OF XF IN THE UK

- **Aphrophoridae** – 9 spp.

  Aphrophora alni, *A. major, A. pectoralis, A. salicina, Neophilaenus campestris, N. exclamationis, N. lineatus, N. longiceps, Philaenus spumarius*

- **Cercopididae** – 1 sp.

  Cercopis vulnerata

- **Cicadellidae** – 7 + 4 spp.

  Anoterostemma ivanoffi, Cicadella lasiocarpae, C. viridis, Evacanthus acuminatus, E. interruptus, Graphocephala fennahi, Ledra aurita; Phloem feeders in the genus *Euscelis* - *E. incisus, E. lineolatus*, *E. ohausi*, *E. venosus*

- **Cicadidae** – 1 sp.

  Cicadetta montana

POTENTIAL VECTORS OF XF IN THE UK

Aphrophora alni ©Jon Law

Aphrophora major © Joe Botting

Aphrophora pectoralis © Tristan Bantock

Aphrophora salicina © Tristan Bantock

Neophilaenus campestris © Joe Botting

Neophilaenus exclamationis © Tristan Bantock

POTENTIAL VECTORS OF XF IN THE UK

Neophilaenus lineatus © Michael Talbot

Philaenus spumarius © Jonathon Michaelson

Cercopis vulnerata © Shane Farrell

Anoterostemma ivanoffi © James N. Zahniser

Cicadella viridis © Tristan Bantock

Euscelis incisus © Tristan Bantock

POTENTIAL VECTORS OF XF IN THE UK

Euscelis lineolatus © Joe Botting

Evacanthus acuminatus © T. Bantock

Evacanthus interruptus © Brian Kilford

Graphocephala fennahi © T. Bantock

Ledra aurita © Tristan Bantock

Cicadetta montana © NaturePhoto-CZ.com

WHICH SPECIES ARE MOST LIKELY TO BE IMPORTANT VECTORS IN THE UK?

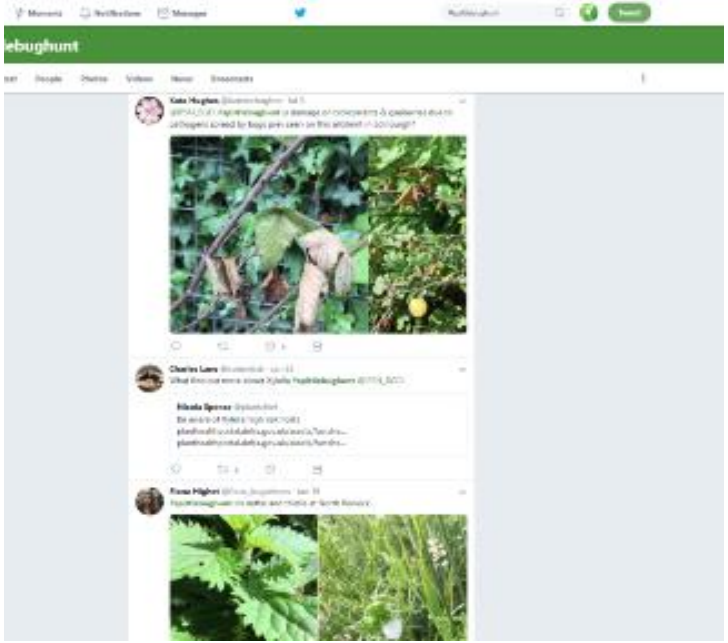
- The known distribution, abundance, habitat and host range of each species was assessed
- Most xylem-feeding auchenorrhyncha bugs in the UK are restricted to species-rich grasslands and marshes
- There is a high degree on uncertainty regarding host plant range for several species in the UK. Adults may feed on a much wider range of plants than the nymphs.
- Climatic conditions influence what the hoppers feed on. In dry conditions herbaceous-feeding species may switch to woody plants
- Common and widespread species include *Aphrophora alni*, *Neophilaenus campestris*, *N. lineatus* and *Philaenus spumarius*
- *Philaenus spumarius* is the most common, widespread and polyphagous species in the UK, occuring in a wide range of habitats, including anthropogenic

SPITTLEBUG SURVEY IN THE UK

- Much of the information published on *Philaenus spumarius* in the UK is largely based on old collecting data
- Defra commissioned the International Plant Sentinel Network (IPSN) to carry out a citizen science survey of spittle bugs
- The aim was to collect records of spittle bug distribution and host plants
- Tweets @IPSN_BGCI of photo, location and plant name #spittlebughunt
- Emails with the same data were sent to Defra
- Samples of bugs were submitted to Fera and preserved in ethanol for sequencing

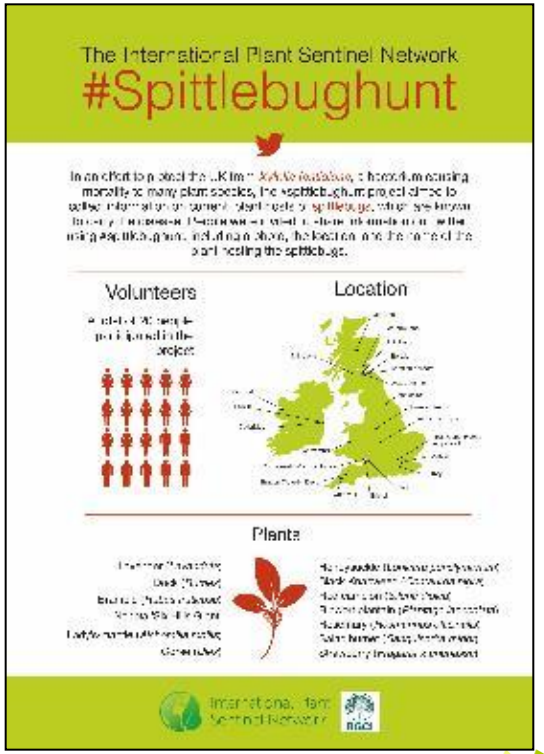
ISPN SPITTLEBUG SURVEY - RESULTS

- 65 tweets with photos from 20 participants from all over the UK and Republic of Ireland
- 78 records by email, most with photos, from 7 participants from England
- Sightings from 5th April to 21st June
- Validation can be a problem with citizen science but the plants were identified/confirmed from photos by specialists in botanical gardens
- 30+ samples of nymphs are being sequenced to confirm their identity



ISPN SPITTLEBUG SURVEY - RESULTS

- Most of the 143 records were from botanical gardens and urban areas
- 55 different plant species in 24 families were recorded including suspected new UK host records for *Philaenus spumarius*
- The families containing the most host genera were Asteraceae, Lamiaceae and Rosaceae
- *Rosmarinus officinalis* was the most common host
- This is a rapid and cost-effective way of gathering biological data AND of engaging and educating the public and other stakeholders



FUTURE RESEARCH PLANNED

- Fera is a partner in the EUPHRESCO project on *X. fastidiosa* and its insect vector
- Capacity building – testing for Xf in vectors
- Vector detection - i) non-destructive DNA extraction, ii) development of assays for vector species, iii) improved LAMP detection in vectors
- Build library of reference sequences from identified specimens
- Develop morphological and molecular diagnostic protocols
- Culturing of *Philaenus spumarius* to study vector transmission
- Survey high risk commercial sites with the Plant Health and Seeds Inspectorate; locate sites with potential vectors by visual inspection for spittle and adults, and trapping with sticky traps; followed by more intense collecting with sweep nets and pooters
- Wider environment survey by 'professional-amateur' entomologists

ACKNOWLEDGEMENTS

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- Dominic Eyre of Defra collated the results submitted by email
- Jennifer Hodgetts of Fera is sequencing the spittlebug samples
- Defra funded the work