Risk mapping of the likelihood and impact of a *Xylella fastidiosa* outbreak in Scotland

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Policy Summary

Background

Scottish Government are preparing contingency measures for the possible arrival of the bacteria *Xylella fastidiosa*, which is perceived to be a threat to many sectors of the Scottish plant-based economy and a possible threat to the natural environment.

Following consideration of the evidence gaps and further scoping, the PHC commissioned three projects from partner organisations. The key objective of the current project was to use published evidence to create a Scottish risk map for *Xylella* to inform the broad-scale risk and inform the development of monitoring and control measures.

Mapping approach

The risk map illustrates the spatial extent of suitable climate, xylem feeding insect vectors and potential plant host species. The current UK climate was compared to climate thresholds for *Xylella* taken from published studies of Pierces's disease in Californian vineyards and *Xylella* infection of urban street trees in the USA. The bacterium is known to be transmitted by xylem-feeding insect vectors, including the common-meadow spittlebug (*Philaenus spumarius*) which was used as a model vector species. The extent and distribution of *P. spumarius* in Scotland was derived from the reported sightings in the National Biodiversity Network database. The CEH landcover map was used to determine the extent and distribution of vegetation likely to contain native species known to be susceptible to infection. The area in which suitable climate, insect vector and potential host species overlap defines the combined high-risk zone in which disease transmission is unlikely to be constrained by either climate or lack of insect vectors.

Xylella fastidiosa is currently not found in the UK. Therefore, to assess the likelihood of *X. fastidiosa* being introduced into Scotland, the relative risk of importation of infected plant material within the combined highrisk zone was considered. To assess the potential impact of *X. fastidiosa* infection on the Scottish economy and ecology, the extent and distribution of vulnerable host species with high economic value and ecological significance were mapped.

Main findings

The preliminary risk mapping identified a distinctive spatial pattern in the likelihood and impact.

1. The eastern coastal plain (from the Borders to Moray) and the Central Belt are identified as highest risk – based on suitable climate for pathogen and insect vector species and the likelihood of arrival (driven by human population density). Monitoring and control measures should be targeted within this region, perhaps

concentrating on vulnerable species within gardens (citizen science) and the horticultural trade (nurseries and garden centres).

2. The extent and distribution of potential host species in the native flora of the UK is highly uncertain. Key host plant species include *Prunus avium*, *Acer pseudoplatanus* and *Rosa cania,* which are all native woodland species in southern Scotland. In Europe, outbreaks of *Xylella fastidiosa* have occurred in species typical of southern Mediterranean countries such as olives, almonds, citrus, vines and ornamental species. Currently any significant economic risk in Scotland appears to be limited to the horticultural sector.

Caveats and priorities for further investigation

a) There is insufficient knowledge of which susceptible host species are vulnerable to infection in the UK climate. Consequently, the confidence in the spatial distribution of potential hosts (landcover) is low, which limits the reliability of the risk model.
b) Evidence suggests that in cool, moist conditions some host species are slow to develop symptoms. To develop effective monitoring and control measures this requires further investigation.
c) There is a lack a data on trade routes into and within the UK. The origin and direct sources of plant imports and the transport routes of imported stock within the country were not available. Improved information on the trade of imported plant material would improve the modelling of risk, potential infection initiation and spread.
d) There is a lack of detailed understanding of how microclimate changes (both spatial and temporal) affect insect vector behaviour. A better understanding of when xylem feeding insects behaviour in the UK climate and within controlled environment facilities, such as polytunnels, will refine the risk mapping and the targeting of surveillance.