1 Content of the 'Topic Description' document

1.1 Topic area

Management of pest/vector.

1.2 Topic title

Role of weed hosts as pathogen reservoirs of insect vectored diseases.

1.3 Description of the problem the research should solve

A full depth of understanding of a pathogen including its crop hosts, vectors and native/weed hosts is required to develop effective monitoring and control strategies. Understanding pathogen/vector dynamics within weed reservoirs has significantly improved control strategies in many agricultural systems (i.e. *Lettuce necrotic yellow virus* and *Hyperomyzus lactucae*) but we still have a lot to learn about some emergent diseases, such as the bacterium '*Candidatus* Liberibacter solanacearum' (CaLsol), where a better understanding of potential vectors and natural reservoirs may help to anticipate/prevent outbreaks in new areas and mitigate the impact on crops in existing areas.

The bacterium '*Candidatus* Liberibacter solanacearum' was initially recorded in potato in Mexico in 1994, associated with 'Zebra Chip' symptoms in tubers. From there it has spread through much of Central and Northern America and also to New Zealand where losses of up to 16% of total yield with occasionally total crop abandonment (due to unmarketable tubers) are now being reported. Currently there are 5 described CaLsol haplotypes. Haplotype A has been found in Central and North America and New Zealand and haplotype B in Mexico and North America. A and B haplotypes are transmitted by *B. cockerelli* and present in solanaceous crops, and both the haplotypes and vector are regarded as A1 pests under EPPO Annex II. Haplotype C was first reported in carrot crops in Finland transmitted by *T. apicalis* and haplotypes D and E are associated with the psyllid *B. trigonica* and carrot and celery crops in mainland Spain and the Canary Islands. *Bactericera tremblayi* and *B. nigricornis* have both also been suggested as vectors in Spain and the Canaries and work is underway to determine their contribution to the spread of CaLsol. Very little is known about the differences between the haplotypes and any host/ vector specialisation, however both examples of transfer from carrot to potato given above involve the local CaLsol haplotype (E in Spain and C in Finland) and vector, indicating that European haplotypes are capable of infecting both solanaceous and non-solanaceous hosts if a suitable vector is present. The origin of all three European haplotypes has not been established. One current hypothesis is that these are not new introductions of Calsol but historic infections in weed host(s) which have only transferred to commercial crops (carrots, etc.) when vector populations have reached a critical threshold point. In the case of Scandinavia populations of *T. apicalis* were noted to have increased significantly on carrot prior to the finding of CaLsol. Work in Scotland has identified an additional possible vector *T. anthrisci* which like *T. apicalis* has several commonly occurring weed hosts all of which require investigation.

In addition, recent work at SASA looked at aphids, which as phloem feeders might pick up CaLsol and therefore could be used as an alternative system for monitoring CaLsol infection in areas where psyllids are scarce. Using specimens from a Swedish suction trap Calsol was detected at very low levels in *Cavariella archangelicae* and *Cavariella aegopodii* both of which feed on Apiaceous hosts. Whilst this work needs to be repeated to confirm the findings and haplotype the Calsol, if proven, it suggests that Calsol may be widespread in the environment. NB: We are not considering aphids as a potential alternative vector of Calsol, however this should be confirmed at some point.

This project proposes to work on this aspect and it will be divided in four work packages:

- Collect potential Apiaceae weed hosts including Cow Parsley, Hogweed, hairy chervil and Angelica from a number of locations in regions with significant carrot production.

- Identification of psyllids from suction / field traps and screening of vector / potential vector species for CaLsol.
- Develop a robust method of testing to verify the presence of CaIsol in aphid species *Cavariella archangelica* and *Cavariella aegopodii*, *Myzus persicae* (green bridge) and *Rhopalosiphum padi* (outgroup).
- Screen a number of aphid species (*Cavariella archangelica, Cavariella aegopodii* and other *Cavariella* spp.) from a range of for the presence of CaIsol.

1.4 Description of the expected results

The main expected result of this project is the identification of weed hosts of CaLsol and an understanding of their implications on disease management and risk assessment and mitigation.

1.5 Beneficiaries of this research product

The results of the project will benefit to National and Regional Plant Protection Organisations and to policy makers.

1.6 Research funders and research contribution/ distribution

Funding organisation	Research activity and researchers involved
1. Science and Advice for Scottish Agriculture, United Kingdom David Kenyon: David.Kenyon@sasa.gsi.gov.uk	-Screening potential Apiaceae weed hosts for the presence of CalSol. -Psyllid sampling and screening for CaLsol. -Detection of CaLsol in selected aphid species . Contact person: David Kenyon E.mail address: david.kenyon@sasa.gsi.gov.uk Contact person: Emma Back E.mail address: Emma.Back@sasa.gsi.gov.uk
2. Ministry of Agriculture and Forestry, Environment and Water Management, Austria Programme manager: Austrian Agency for Health and Food Safety, Austria Sylvia Blümel: sylvia.bluemel@ages.at	-Monitoring of the presence of psyllid and aphid species as potential vectors of Ca. L. solanacearum on different host plants, esp. Apiaceae, in Austria. -Validation of a molecular method, among the published ones, to detect CaLsol in plant tissues and vectors. -Participation to TPS (if organised). -Distribution of CaLsol in Austria, testing symptomatic crops and potential vectors in infected fields. Contact person: Christa Lethmayer E.mail address: christa.lethmayer@ages.at Contact person: Richard Gottsberger E.mail address: richard.gottsberger@ages.at
3. The State Plant Service under the Ministry of Agriculture, Lithuania Arunas Beniusis: arunas.beniusis@vatzum.lt	-Screening potential Apiaceae weed hosts for the presence of CalSol. -Psyllid sampling and screening for CaLsol. -Detection of CaLsol in selected aphid species.

Funding organisation	Research activity and researchers involved
Silvija Pupeliene silvija.pupeliene@vatzum.lt	Contact persons: Arunas Beniusis arunas.beniusis@vatzum.lt Silvija Pupeliene silvija.pupeliene@vatzum.lt
4. Administration for Food Safety, Veterinary Sector and Plant Protection, Slovenia Erika Oresek erika.oresek@gov.si	-Contribution to be detailed Contact persons: tbd

1.7 Research project partnership outside Euphresco

Euphresco funding ensures a certain level of transnational collaboration among Euphresco member countries. It is possible, if the funding consortium is interested, to contact funding organisations or research groups outside the geographical area covered by Euphresco members. The Euphresco coordinator could advertise the research topic in order to have an enlarged collaboration. If funders are interested in this possibility, please check the case below:

☐ The funding consortium of the topic mentioned in section 1.2 requires to advertise the topic outside the Euphresco network.

Information to sharpen the profile of sought partners could be useful (but not mandatory): country/region (if there are preferences), skills/expertise required, etc.

1.8 Any other relevant information on content

2 Euphresco management aspects of the project

2.1 Indication of the topic budget

Funding organisation [a]	Mechanism [b]	Total Budget [c]
1. SASA (GB)	NC	€ 99 000
2. AGES (AT)	NC	€ 31 990
3. VATZUM (LT)	NC	€ 20.000
4. MKGP (SI)	NC	€ 12 000
total		€ 162 990

2.2 Expected duration of the project (only for non-competitive topics)

24 months.

2.3 Identification of project coordinator

Has the research project coordinator been identified?
☒Yes
☐No

2.4 Any other relevant information on topic organisation and management

None.

[a] First member is project coordinator. A minimum of two partners are necessary for each proposal. Add lines as needed.
[b] Please indicate the preferred mechanism (e.g. real pot RP; virtual pot VP; non-competitive NC), or several mechanisms if there is flexibility.
[c] Optional, as this amount can still change in the next phase. In-kind contribution should also be indicated in this column.