

1. Content of the 'Topic Description' document

1.1. Topic area

Remote Sensing.

1.2. Topic title

The Applications of Remote Sensing in Plant Health.

1.3. Description of the problem the research should solve

We routinely observe the Earth's surface using satellites, piloted aircraft and drones. Images from these sources can be inspected by eye to identify plant health risks, but this places a burden on resources. This pressure has been reduced by improvements to the resolution and geographic coverage of such images, but the emergence of computer-based techniques for automatic assessment could become beneficial. For example, research is under way that could be used to map the locations of tree species that host pests and diseases. This knowledge could help us assess the risk of outbreaks and patterns of spread across the country. It could also improve the country's inventory of tree species and their distribution.

Remote sensing may also help us to assess the health of plants without visiting a site in person. For example, reflected colour observed from space can be used as a proxy for plant stress and may indicate the presence of a pest or disease. For example, aberrations to reflected canopy cover observed from space may indicate plant stress and thus the presence of pests or diseases. Such information could help focus resources and contain outbreaks.

This short project aims to explore the benefits and limitations of remote sensing applications in plant health such as pest and pathogen detection, outbreak monitoring, surveillance and host mapping.

In the first phase, the project will bring together key remote sensing experts from across Europe and the US to map and review current work in this area and identify research requirements and gaps. The idea is to forge new working collaborations and build enthusiasm for these new technologies.

In the second phase the project will aim to work collaboratively to advance the research being done to (a) identify host trees remotely and (b) to pin point diseased trees. A UK group has recently demonstrated their ability to identify ash and oak species over a relatively small geographical area. An Italian group developed and is officially applying algorithms for the monitoring of *Citrus tristeza virus* and for the automatic counting of citrus trees.

Can this identification be improved with further work in the accuracy of detection and on larger areas including geographical and species variations? Also, can more tree species be identified and automatically counted? The goal of this work is to be able to better target disease/infection surveillance and provide data for mitigation responses.

1.4. Description of the expected results

- A workshop to bring experts together to forge working collaborations and produce a review of current work and research needs and gaps
- Advancements to current research on host tree and diseased tree identification

1.5. Beneficiaries of this research product

- National and EU policy makers
- National Plant Protection Services, especially inspectorates,

- Risk managers and evidence and analysis specialists
- EPPO and its members
- Industry and other stakeholders - NGOs, forest managers, parks and gardens managers, general public, etc.

1.6. Research funders and research contribution/ distribution

Funding organisation	Research activity and researchers involved
<p>1. CIHEAM-Istituto Agronomico Mediterraneo of Bari, Italy</p> <p>Anna Maria D'onghia donghia@iamb.it</p>	<p>-Project Coordination. -Identification and quantification of citrus and olive trees suspected to be infected by quarantine pathogens (e.g. <i>Xylella fastidiosa</i>, <i>Citrus tristeza virus</i>) using satellite and aerial images.</p> <p>Contact person: Anna Maria D'onghia donghia@iamb.it</p>
<p>2. Department for Environment Food and Rural Affairs, United Kingdom</p> <p>Belinda Phillipson belinda.phillipson@DEFRA.GSI.GOV.UK</p>	<p>-Arrange remote sensing workshop. -Advance work on tree and disease identification and counting.</p> <p>Contact person: Paul Brown paul.brown@fera.co.uk</p>
<p>3. Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria, Italy</p> <p>Luca Riccioni luca.riccioni@crea.gov.it</p>	<p>-Contribution to be detailed</p> <p>Contact: Luca Riccioni luca.riccioni@crea.gov.it</p>
<p>4. US Department of Agriculture, Animal and Plant Health Inspection Service, United States of America</p> <p>Laurene Levy Laurene.Levy@aphis.usda.gov</p>	<p>-We have conducted research to evaluate the utility of VNIR Hyperspectral Image (HSI) datasets to map green ash and stressed green ash infected with emerald ash borer. Ground truth provided locally adapted detection filters that could be tuned for nearly 100% accuracy locally. These filters were not regionally extendable into the larger HSI datasets. Overall, the ground truth and field spectra do not always provide unique differentiation of green ash from all tree species. Current interests include utilization of Unmanned Aircraft Systems for remote sensing applications in pest management programs, such as boll weevil eradication efforts, for finding host plants.</p> <p>Contact person: David Bartels david.w.bartels@aphis.usda.gov</p>
<p>5. Terrasystem, Italy</p> <p>Gaia Laurin gaia.vl@unitus.it</p>	<p>-To be detailed</p> <p>Contact person: Gaia Laurin gaia.vl@unitus.it</p>
<p>6. European Commission, Joint Research Centre</p>	<p>-Contribution to be detailed</p>



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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. CIHEAM (IT)	NC	€ 10 000
2. Defra (GB)	NC	€ 15 000
3. CREA (IT)	NC	€ 1 000
4. APHIS (USA)	NC	€ 5 750
5. Terrasystem (IT)	NC	€ 1 000
6. EC-JRC	NC	In-kind
total		€ 32 750

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

12 months.

2.3. Any other relevant information on topic organisation and management

^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.