1. *Content of the 'Topic Description' document*

1.1. Topic area

Diagnostics, field detection, surveillance

1.2. Links to the Euphresco Strategic Research Agenda

The topic addresses the following objective(s) of the 2017-2022 Euphresco Strategic Research Agenda:
☒ Objective 2017-R-1.1: to improve knowledge on the biology, epidemiology and ecology of priority invasive and (re)emerging pests
☒ Objective 2017-R-1.2: to support taxonomic research for the unambiguous identification of pests
☒ Objective 2017-R-2.2: to expand knowledge on transmission of disease and pathogens for healthy planting material
☒ Objective 2017-R-3.2: to develop models to summarise the understanding of the spread, establishment and impact of pests??
☒ Objective 2017-R-4.1: to validate risk-based sampling methodologies for phytosanitary inspections
☒ Objective 2017-R-4.4: to test and validate the use of environmental DNA (eDNA) analysis in inspection and surveillance activities
☒ Objective 2017-R-6.1: to test and validate methods for in situ detection and identification of pests
☒ Objective 2017-I-1.3: to build a network of collections that fulfil minimum quality standards??
☒ Objective 2017-I-2.2: to contribute to databases for plant pests identification and diagnostics
☒ Objective 2017-C-3.1: to favour knowledge exchange and support common initiatives with relevant players

1.3. Topic title

Survey of pathotypes of *Globodera pallida* occurring in Europe

1.4. Description of the problem the research should solve

Potato Cyst nematodes (PCN), are obligate root parasites that cause significant economic damage and are difficult to control. The juveniles of the potato cyst nematode *Globodera pallida* invade host roots, establish a feeding site and develop into a mature female or male. Females remain sedentary, while males leave the root and migrate to search for a female. Females are polyandrous and each female may mate with multiple males. Once fertilized, the body of the female dries in a hard cyst containing dormant eggs. Encysted eggs can remain dormant in the soil for up to 20 years and may be dispersed by soil movement or machinery. *Globodera rostochiensis and G. pallida* are present in EPPO and EU quarantine lists and are of agronomic importance in potato growing regions. Deployment of the H1 resistance gene has been highly effective in controlling *G. rostochiensis*. However, this has led to strong selection of *G. pallida*, which has subsequently increased in prevalence and is now present in approximately 92% of the potato fields in UK infested with potato cyst nematodes. Development of effective resistance to *G. pallida* has been challenging and commercially acceptable potato varieties with high levels of resistance have only recently become available. Different *G. pallida* pathotypes exist which differ in their ability to overcome various sources of resistance. Therefore cultivar choice, one of the most effective control measures for potato

cyst nematodes, must be based on reliable identification of the present *G. pallida* pathotypes (Eves-van den Akker, Molecular Ecology 2015[1]).
The focus of this project is to gain insights into the distribution and occurrence of *G. pallida* pathotypes in Europe and to compare and align the standard test populations in European countries.

1.5. Description of the expected results

The project will be structured into 5 workpackages:
WP1: Collection and/or overview of *G. pallida* cultures across Europe
WP2: Compilation of existing knowledge on the presence and distribution of *G. pallida* pathotypes in Europe over time
WP3: Comparison of the present standard test populations in European countries used for official resistance testing to determine if they differ in virulence.
WP4: Survey of existing material (e.g. from previous surveys) on pathotypes using DNA markers (e.g. Eves-van den Akker, Molecular Ecology 2015) or other (molecular) techniques
WP5: A mini symposium to share results and knowledge

The project will provide a map of the presence and distribution of pathotypes in Europe over the time. New standard test populations will be chosen and made available.

1.6. Beneficiaries of this research product

The outputs of this project will benefit EPPO member countries, NPPOs including policy makers, risk analysts and diagnosticians. The project will also benefit farmers, growers and potato traders.

1.7. Research funders and research contribution/ distribution

Funding organisation	Research activity and researchers involved
1. Aarhus University, Denmark Mogens Nicolaisen mn@agro.au.dk	-Sampling soil and plants to be tested for *Globodera* spp., either in Denmark or in one of the collaborating laboratories; -Collecting and recording information on field infestation history; -Molecular analysis to establish species identity and to allow differentiation of the populations; Contact person: Mogens Nicolaisen E. mail address: mn@agro.au.dk Contact person: Mette Vestergård E. mail address: mvestergard@agro.au.dk Contact person: Lars Bødker E. mail address: lab@seges.dk
2. Netherlands Food and Consumer Products Safety Authority, The Netherlands	-To gather information from different countries about the standard resistance

[1] https://onlinelibrary.wiley.com/doi/full/10.1111/mec.13434

Martijn Schenk M.Schenk1@nvwa.nl	tests and compare virulence of the used standard test populations; -To share data of potato varieties added to the Dutch national list screened against the standard *G. pallida* test populations; -If molecular tests become available, characterization of material from previous years; -To perform molecular studies on survey or existing material of *G. pallida* populations to establish species identity and allowing the differentiation of the populations; -To help with organizing a mini-symposium; Contact person: Evelyn van Heese E. mail address: E.y.j.vanheese@nvwa.nl
3. National Institute for Agricultural and Veterinarian Research, Portugal Leonor Cruz leonor.cruz@iniav.pt	-Resistance assays with several potato cultivars to *G. pallida* populations, ideally from different sites in the country, to ascertain pathotypes ; -Molecular characterization aiming to establish species identity and allowing the differentiation of the populations; Contact person: Maria L. Inácio E. mail address: lurdes.inacio@iniav.pt
4. Department for Environment, Food and Rural Affairs, United Kingdom Iain Dummett Iain.Dummett@defra.gov.uk	-Collection and/or overview of *G. pallida* cultures across Europe; -Molecular characterization of pathotypes using DNA markers; -Participation in the mini symposium; Contact person: Thomas Prior E. mail address: Thomas.Prior@fera.co.uk
5. Science and Advice for Scottish Agriculture, United Kingdom Fiona Highet Fiona.Highet@sasa.gov.scot	-To investigate whether there is a link between mitotype and pathotype to establish the potential for a rapid screening of PCN populations in relation to the resistance that is present in commercial potato cultivars; Contact person: Jon Pickup E. mail address: Jon.Pickup@sasa.gov.scot
6. Dutch General Inspection Service for Agricultural Seed and Seed Potatoes, The Netherlands	-To gather information from different countries about the standard resistance tests and compare virulence of the used standard test populations;

Miriam Kooman M.Kooman@nak.nl	-To share data of potato varieties added to the Dutch national list screened against the standard *G. pallida* test populations; -If molecular tests become available, characterization of material from previous years; -To perform molecular studies on survey or existing material of *G. pallida* populations to establish species identity and allowing the differentiation of the populations; -To help with organizing a mini-symposium; Contact person: Miriam Kooman E. mail address: M.Kooman@nak.nl
7. Wageningen University, The Netherlands Geert Smant geert.smant@wur.nl	-To gather information from different countries about the standard resistance tests and compare virulence of the used standard test populations; -To share data of potato varieties added to the Dutch national list screened against the standard *G. pallida* test populations; -If molecular tests become available, characterization of material from previous years; -To perform molecular studies on survey or existing material of *G. pallida* populations to establish species identity and allowing the differentiation of the populations; -To help with organizing a mini-symposium; Contact person: Geert Smant E. mail address: geert.smant@wur.nl
8. University of Coimbra, Portugal Isabel L. Conceição isabelluci1964@gmail.com	-Contribution to be detailed; Contact person: Isabel L. Conceição E. mail address: isabelluci1964@gmail.com
9. University of Minho, Portugal Maria Clara Santos mcvs@sapo.pt	-Contribution to be detailed; Contact person: Maria Clara Santos E. mail address: mcvs@sapo.pt

1.8. 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 that the topic is advertised outside the Euphresco network

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

1.9. Any other relevant information on content

N.A.

2. *Euphresco management aspects of the project*

2.1. Indication of the topic budget

Funding organisation [a]	Mechanism [b]	Total Budget [c]
1. AU (DK)		€
2. NVWA (NL)		€
3. INIAV (PT)		€
4. Defra (GB)		€
5. SASA (GB)		€
6. NAK (NL)		€
7. WUR (NL)		€
8. UoC (PT)		€
9. UoM (PT)		€
total		€

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

36-48 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

N.A.

[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.