

1. Content of the 'Topic Description' document

1.1. Topic area

Pest risk analysis.

1.2. Topic title

Lecanosticta -Brown spot disease of pines- spread in European forest ecosystems: impact on pines, predisposing and contributing factors, control (BROWNSPOTRISK).

1.3. Description of the problem the research should solve

Brown-spot (needle blight) disease, caused by the fungal pathogen *Lecanosticta acicola* (LA), is a needle cast of various pine species likely indigenous to North and Central America. The pathogen is persistent on infected individuals and therefore can cause decline of trees. Having invaded Europe several decades ago, it merely affected pines on urban sites, more rarely trees growing in bogs, and very rarely trees in managed and unmanaged forests. Consequently, its status in plant protection is 'under eradication', since in urban areas removal of infected trees is performed. However in infested forests, measures have been limited to avoidance of spread to neighboring stands. In recent years, records of LA considerably increased in number, especially in Northern European and some Central European countries: this refers not only to urban sites, but also to forest pine stands and bogs, which provide most conducive climatic conditions for the spread of LA.

Especially in Scandinavia and Russia there is a lack of information regarding this disease. In Estonia, which is the northernmost distribution range of the disease in Europe, Brown Spot Needle Blight disease's area is rapidly growing and particularly in exotic pines. The risk for pine forests is unknown and the fungus has been found in *Pinus sylvestris* (growing in the nature). In Austria, LA was reported in 2015 from pines in the Tyrolean Alps, where the infestation severely endangers protection forests on steep rocky sites.

Facing this increase in number and impact, efficient management strategies are urgently needed. These require detailed knowledge on epidemiology, biology and pathogenicity, which shows gaps regarding the European strains of LA. This project will focus on key questions on the pathogens' spread in Europe, its biology, its effects on the host in relation to climatic and site conditions and other biotic factors. The main objective is to provide research outputs to support contingency planning, impact and risk management of the pathogen. The key overall question that the research should address is:

How can we best manage the risks of further spreading and impacts of LA on European pines?

The specific outcomes that should be considered within this include:

- a) Spread of LA in forest ecosystems in Europe
- b) Efficient methodology to demarcate infestation areas
- c) Rates of natural spread and prediction of spread
- d) Abiotic and biotic factors favoring spread
- e) Preconditions for a tree decline caused by LA
- f) Susceptibility of forest ecosystems and tree species
- g) Genetic differences among strains of LA in Europe in relation to differences in pathogenicity
- h) Strategies to control disease (including biological measures) and prevent epidemics

The starting point is to identify and prioritise gaps of knowledge in biology and epidemiology of LA with specific reference to the situation in Europe.

The project will draw on expertise in countries already affected by LA (Switzerland, Spain, Germany, Italy, Austria, Slovenia, Estonia, France, USA). It will analyse their management approaches. The project outputs will inform policy-making at national and EU levels and will

draw on experience with similar pests or pathogens (e.g. Redband disease, Ash dieback etc.) and have links to, or build on:

FORTHREATS: an EU-funded project on identifying threats to European forests by invasive fungal pathogens.

ISEFOR: an EU-funded interdisciplinary project aiming to increase the sustainability of European forests.

PRATIQUE: an EU-funded project to enhance PRA techniques.

International Plant Sentinel Network (IPSN): an EUPHRESKO project promoting the use of sentinel plants in botanic gardens and other plant collections as early warning systems for new pests and pathogens.

GLOBAL WARNING: a EU-funded COST Action focusing on the potential roles of sentinel plants in improving pest detection in international trade.

DIAROD: an EU-funded COST Action on Redband disease of pines.

PINESTRENGTH: an EU-funded COST Action on the pitch canker disease of pines.

Nationally-funded research projects, which will be mapped early in the project.

1.4. Description of the expected results

The output of this project will fit within the following two categories:

- Knowledge on epidemiology and pathology of LA enabling risk prediction and development of management strategies
- Improved tools and approaches to predict spread and impact and to support decisions on policy and management options, including models, cost-benefit analysis, control methods and detection methods.
- Decision tools for authorities and forest managers to manage spread of LA in bogs and other protected areas, replace declining trees in montaneous Alpine protection forests and prevent spread of LA from the existing outbreak sites to forests, in Austria specifically to the subalpine mountain pine (*Pinus mugo*) belt.

1.5. Beneficiaries of this research product

- National Plant Protection Services
- Industry and other stakeholders - NGOs, forest managers, parks and gardens managers, general public, etc.
- National and EU policy makers
- EPPO and its members

1.6. Research funders and research contribution/ distribution

Initial project outline

We propose that the project is set out in six workpackages and that all partners contribute, even at minimal levels. The research consortium will provide further detail of workpackage leads and workpackage tasks as the detailed work plan is developed.

Workpackage 1 – Project Management and Coordination

Establish a framework for coordination and cooperation within the consortium and with external collaborators and stakeholders.

Initiate kick-off meeting and any subsequent meetings.

Produce minutes and interim communication pathways (meetings, video and telephone conferences, website, email exchange).

Coordinate and produce interim and final reports.

Workpackage 2 – Review evidence gaps relating to improved understanding of risks, impacts and how to mitigate them

Review and map current research/evidence and expertise.

Review management approaches and their effectiveness, including biological control options
Identify and prioritise research and evidence needs (e.g. by analysis of existing state of the art and via a question-response tree) in the context of available funding and complementary on-going work.

Workpackage 3 - Demarcation of infested areas and spread assessment

Demarcate infestation foci in forests (bogs, protection forests, managed forests) by improved assessment systems (e.g. aerial photography, unmanned aerial vehicles) and assess the rate of the pathogens' natural spread. Elaborate optimized detection and assessment tools for plant protection services. Special interest is coming from the US-group: since in the USA this disease is not currently subject to regulatory action and therefore specific assays to detect this forest pathogen are lacking. The US group is interested in participating in ring tests of protocols, and in evaluation of assays that others have developed.

The UK group is interested in RAL Space, to see if spectral imaging can be of use in detecting *Lecanosticta* infection. The technology was elaborated for *Dothistroma* Redband Disease and the expertise might be useful to this project. <http://www.ralspace.stfc.ac.uk/RALSpace/> (e.g. daniel.gandolfo@stfc.ac.uk).

Workpackage 4 – Disease-environment-interactions and impact

Define the climatic factors (temperature, precipitation, moisture) and site (soil) conditions favoring establishment of the pathogen and spread from tree to tree, define the role of other biotic agents (i.e. *Dothistroma* spp., insects etc.) as contributing factors (including vectors), elaborate the conditions, under which LA becomes lethal to the tree, identify differences in susceptibility among tree species and the most endangered forest ecosystems.

Workpackage 5 – Genetically based differences among strains of LA

Molecular characterisation of European strains by population analysis (UK group) and mutual differences in pathogenicity.

Workpackage 6 – Pest management

Develop cost-effective prevention and management (i.e. hygienic or silvicultural) tools (including biological control).

Communicate results, especially detection methods and management strategies to stakeholders (plant protection services, local authorities, forest nurseries, policy makers, woodland owners and managers, academia and the public, plant importers).

The UK group, experienced in *Dothistroma* red band disease research and monitoring by annual surveys, is interested in establishing surveillance protocols in the field, providing symptoms guides to nursery/forest managers (they contribute(d) these to DIAROD and PINESTRENGTH/F. circinatum project) and testing fungicide efficacy research in epidemiology of LA.

Funding organisation	Proposed research component
1. Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft, Austria (BLFUW) Elfriede Fuhrmann Elfriede.fuhrmann@bmlfuw.gv.at	-Participate in all 6 workpackages, lead workpackage 1 and 4 (and potentially others). Contact person: Thomas L. Cech Thomas.cech@bfw.gv.at
2. National Institute for Agricultural and Veterinarian Research, Portugal Leonor Cruz leonor.cruz@iniav.pt	To be detailed Contact person: Helena Braganca helena.braganca@iniav.pt

<p>3. Forest Research, United Kingdom</p> <p>Joan Webber Joan.webber@forestry.gsi.gov.uk,</p>	<p>-Participate in workpackages 3, 5 and 6 -RAL Space technique for detection of LA-infections by spectral imaging. -Population analysis of LA. -Surveillance protocols.</p> <p>Contact person: Joan Webber Joan.webber@forestry.gsi.gov.uk</p> <p>Contact person: Kath Tubby Katherine.Tubby@forestry.gsi.gov.uk</p>
<p>4. Science and Advice for Scottish Agriculture, United Kingdom</p> <p>David Kenyon david.kenyon@sasa.gsi.gov.uk</p>	<p>-To follow the project developments, exchange information.</p>
<p>5. United States Department of Agriculture, Animal and Plant Health Inspection Service, United States of America.</p> <p>Laurene Levy laurene.levy@aphis.usda.gov</p>	<p>-Participate in workpackage 3: in ring tests of protocols and in evaluation of assays developed by others.</p> <p>Contact person: Kurt Zeller Kurt.A.Zeller@aphis.usda.gov</p>
<p>6. Mendel University in Brno, Czech Republic</p> <p>Libor Jankovsky Jankov@mendelu.cz</p>	<p>-Contribution to be detailed</p> <p>Contact person: Libor Jankovsky Jankov@mendelu.cz</p>
<p>7. Suleyman Demirel University, Isparta, Turkey, Faculty of Forestry</p> <p>Tugba Dogmus tugbadogmus@sdu.edu.tr</p>	<p>-Participate in workpackage 3.</p> <p>Contact person: Tugba Dogmus tugbadogmus@sdu.edu.tr</p> <p>Contact person: Funda Oskay fundaoskay@karatekin.edu.tr</p>

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.

The project consortium would specifically like to approach potential collaborators in North and Central America and South Africa to assess prospects of joint work. There would also be value

in collaborating with the COST Action Global Warning which includes the named pests in its terms of reference.

1.8. Any other relevant information on content

2. Euphresco management aspects of the project

2.1. Indication of the topic budget

Member ^a	Mechanism ^b	Total Budget ^c
1. BLFUW (AT)	NC	€ 47 000 to be confirmed
2. INIAV (PT)	NC	€ 20 589
3. FR (GB)	NC	
4. SASA (GB)	NC	€ 0
5. APHIS (USA)	NC	€ 9 080
6. MENDELU (CZ)	NC	€ 15 000
7. SDU (TK)	NC	
Total		€

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

36 months.

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.