

# **SHORT TERM SCIENTIFIC MISSION (STSM) - SCIENTIFIC REPORT**

**COST STSM Reference Number:** COST-STSM-FP1401-31954

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**COST ACTION NUMBER:** FP1401

**HOST:** Dr. Rimvys Vasaitis, Department Forest Mycology and Plant Pathology of Swedish University of Agricultural Science, Uppsala, Sweden.

**STSM PERIOD:** from 2016-01-04 to 2016-02-29

**STSM TOPIC:** Preparation of an annotated checklist of the fungal pathogen of trees

## 1. Background

Nowadays new insects, pathogens and other non-indigenous pests are emerging in Europe due to growing global trade result in increasing new threats to forest health. New invasive diseases in forest ecosystems occur at an increasing rate affecting tree species with a widespread distribution in Europe.

The primary goals of this STSM was to start to create lists of the most important tree species and associated invasive and indigenous pathogens for following assessment of potential impacts of new harmful organisms and reliable risk evaluation.

The purpose of the STSM also was to become familiar with modern molecular techniques, while at the same time to learn from analyzing

obtained data. I should admit that this was one of the main reasons why I have chosen this University for my STSM-visit.

The specific scientific objectives of my Short Term Scientific Mission are

- to learn from the expertise of the host research team (Department Forest Mycology and Plant Pathology of Swedish University of Agricultural Science) in forest pathology and population genetic invasive pathogens;
- to learn from experiences of the host team in characterization and mapping to create database of invasive forest pathogen and their distribution;
- to start to create lists of the most important tree species and associated invasive and indigenous pathogens;
- to learn from experiences of the host team in the development of methodologies assessment survey data and work on database and literatures;

## 2. Methodology

The main activity focused on existing databases and publications, such as detailed database of invasive forest pathogens (IFPs) was developed in the EU project FORTHREATS (Santini et al., 2013), Delivering Alien Invasive Species In Europe (DAISIE), EPPO Lists of Invasive Species, EPPO database on quarantine pests, national lists of alien pathogens (NPPOs in Europe) etc.

Our work included the development of tree species list and main alien fungal pathogens which can be potentially dangerous for these trees.

In view of the fact that tree species can be damaged by different pathogens, there is a huge amount of information in all databases. During ongoing STSM we started to establish approximate list of main fungi

which are dangerous currently and potentially for the tree species list resulted from the last COST Action meeting hold on November 10-11, 2015.

### 3. Results

The results of this STSM demonstrates a great number of forest tree which a vulnerable for alien and indigenous pathogens. It was suggested that 18 genus and species could be used for creation lists of associated pathogens (Table 1-3). Moreover, within each genus the most vulnerable tree species will be clarified according data from European countries and national quarantine data during the next periods of COST Action FP1401.

According to existing European database and analyse of scientific papers, development of draft of annotated list of the most important or vulnerable native forest tree species in Europe and associated with them pathogens were carried out during this STSM. The wide distribution of these fungal species and their common association with the decline, dieback and other symptoms could indicate a serious threat to the forest.

Besides main tree species some ornamental tree species were detected as potentially important reservoirs for transfer invasive pathogens due to their wide prevalence in many European countries in forest and urban zones.

These species also are very popular trade objects for all continents and can be feasible source of alien infections. It is such plants as *Juniperus* spp., *Juglans nigra*, *Platanus* sp., *Thuja occidentalis*, *Chamaecyparis nootkatensis*, *Chamaecyparis lawsoniana*, *Juglans cinerea*, *Cupressus sempervirens* and *Cupressus arizonica* etc. Some invasive forest pathogens of these species were also included in list (separate table 3).

#### 4. Future collaboration with the Host Institution

Both institutes are in future collaboration concerning exchange of methods and experiences in identification and distribution of invasive pathogens data and using molecular based methods to identify invasive pathogens in collected samples at arboretum, nurseries and botanical garden in Ukraine. I believe that my further cooperation of my home institution with host institution is the most realistic.

Table 1. The annotated list of the main alien forest pathogen in Europe (condensed version; full version in Microsoft Excel format file included also areal, databases, reference etc)

	Notes	<i>Pinus spp.</i>	<i>Picea spp.</i>	<i>Abies spp.</i>	<i>Larix spp.</i>	<i>Pseudo- tsuga</i>	<i>Quercus spp.</i>	<i>Faga- cea</i>	<i>Fagus sylvatica</i>	<i>Betulaspp</i>	<i>Alnus spp.</i>	<i>Populus spp</i>	<i>Fraxinus spp.</i>	<i>Acer spp.</i>	<i>Tilia spp.</i>	<i>Salix spp.</i>	<i>Ulmus spp.</i>	Ta
<i>Apiognomoniaerrabunda</i>	leaf anthracnose				x		xx	x	x				xx					
<i>Atropellispinicola</i>	branch canker of pine	xxx																
<i>Atropellispiniphila (Cenangiumpiniphilum)</i>	branch canker of pine	xxx																
<i>Biscogniauxiamediterranea</i>	bark charcoal disease of oak						xxx											
<i>Biscogniauxianummularia</i>	bark charcoal disease of Euroean beech								xxx									
<i>Botryosphaeriaparva</i>	cancer oak diseases						xxx											
<i>Botryosphaeriastevensii</i>	oak cancer						xxx											
<i>Botryosphaeriaquercuum</i>	endophyte							xx										
<i>Botryosphaerialaricina</i>	shoot blight of larch				x													
<i>Cenangiumferruginosum</i>	pine dieback																	
<i>Ceratobasidiumbicorne</i>	root dieback disease on nursery	x	x															
<i>Ceratocystis fagacearum</i>	oak wilt						xxx											
<i>Ceratocystis laricicola</i>	Dieback and death of larch																	
<i>Ceratocystis virescens</i>	sapstreak disease of maple													xxx				
<i>Cercosporaalni</i>	leaf spot										xx							

<i>Chrysomyxaabietis</i>	spruce needle rust		xxx															
<i>Chrysomyxaledi</i>	spruce needle rust		xxx															
<i>Chrysomyxaarctostaphyli</i>	broom rust of spruce		xxx															
<i>Coleosporiumtussilaginis</i>	pine needle rust	xx																
<i>Cristularielladepraedans</i>	leaf spot of male												xxx					
<i>Cronartiumcoleosporioides</i>	stalactiform blister rust of pin	xxx																
<i>Cronartiumcomandrae</i>	comandra blister rust of pine	xxx																
<i>Cronartiumcomptoniae</i>	sweet fern blister rust	xxx																
<i>Cronartiumflaccidum</i>	cronatium pine rust	xx																
<i>Cronartiumfusiforme</i>	fusiform rust of pine and rust of oak	xx					xx											
<i>Cronartiumquercuum</i>	eastern gall rust of pine	xx					xx	x										
<i>Cryphonectriaparasitica</i>	blight of chestnut							x										
<i>Cryptoclinetaxicola</i>	needle and shoots blight																	xx
<i>Cryptodiaporthecastanea</i>	Canker of Asiatic Chestnut							x										
<i>Cucurbitariapiceae</i>		xxx																
<i>Cylindrosporiumcastaneae</i>	leaf-spot							x										
<i>Cytosporasp</i>	cancer						x			x	x		x					
<i>Davidiellapopulorum</i>	septoria canker of poplar										xx							

















<i>Perenniporiafraxinea</i>	Rot wood															
<i>Phellinus weirii</i>	white root rot									x			xx			x
<i>Polyporus sulphureus</i>	laminated butt rot of conifers	xxx	xx	xx	xx	xx										
<i>Polyporus adustus</i>	Rot heart															
<i>Polyporus hirsutus</i>	Rot wood															
<i>Polyporus versicolor</i>	Rot wood															
<i>Rigidoporus lineatus</i>	Rot wood															
<i>Serpulalacrymans</i>	white rot															
<i>Schizophyllum commune</i>	dry rot wooden buildings	xxx														
<i>Trechisporanivea</i>	Rot wood															
<i>Verticillium dahliae</i>	vascular wilt										x	xx	x		x	

Table 3. Continuation. The annotated list of the alien forest pathogen in Europe for other tree species

Pathogen	Note	Host
<i>Apiognomoniaveneta</i>	leaf blight and twig cankers	<i>Platanus x acerifolia</i> (Ait.) Willd
<i>Cylindrocladium buxicola</i>		<i>Buxus</i> spp
<i>Diaporthescabra</i>		<i>Platanus x acerifolia</i>
<i>Discula destructiva</i>	Dogwood anthracnose	<i>Cornus</i> spp.
<i>Geosmithia morbida</i>	cankers disease of Juglans	<i>Juglans nigra</i>
<i>Gymnosporangium asiaticum</i>	leaf rust of juniper	Cypress ( <i>Juniperus</i> spp)
<i>Gymnosporangium confusum</i>	rust	Cypress ( <i>Juniperus</i> spp)

<i>Gymnosporangiumcornutum</i>	rust	<i>Juniperus spp.</i> and on mountain-ash.
<i>Gymnosporangiumjuniperi-virginianae</i>	rust of juniper	<i>Juniperusspp</i>
<i>Gymnosporangiumsabinae</i>	rust	<i>Juniperusspp</i>
<i>Gymnosporangiumclavariiforme</i>	rust	<i>Juniperusspp</i>
<i>Gymnosporangiumtremelloides</i>	rust	<i>Juniperusspp</i>
<i>Gnomonialeptostyla</i>	leaf blots	<i>Juglans nigra</i>
<i>Hapalocystisberkeleyi</i>	dead thin twig	<i>Platanus spp., Ulmus spp.</i>
<i>Kabatinathujae</i>	dieback	<i>Thuja occidentalis, Chamaecyparis nootkatensis, C. lawsoniana, Cupressus sempervirens and C. arizonica</i>
<i>Kabatinajuniperi</i>	dieback	dieback of <i>Juniperus</i>
<i>Lepteutypacupressi</i>	cancer	<i>Platanus spp., Ulmus spp.</i>
<i>Ophiognomoniaclavigignenti-juglandacearum</i>	canker of butternut	<i>Juglans cinerea, Juglans nigra</i>
<i>Phomopsisjuniperivora and Sclerophomapityophila</i>		<i>Taxusbaccata</i>
<i>Phytophthorlateralis</i>	root rot of <i>Chamaecyparis</i>	<i>Cupressaceae</i>
<i>Seiridiumcardinale</i>	<i>Seiridiumcardinale</i>	<i>Cypress canker</i>
<i>Stigminathujina</i>	foliar blight	





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