Expertise of Dr. rer. silv. Thomas Jung

Research projects

04/1993 – 06/1997: 'The *Phytophthora* disease of European oak species', funded by the Allianz Foundation for the Protection of Environment.

01/1997 – 03/1999: Project F44 'Screening for *Phytophthora* in stands of pedunculate and sessile oak in Bavaria on the basis of the Assessment of Forest Condition 1994: attempted correlation with crown transparency, root damages and site factors', funded by the Bavarian State Ministry for Food, Agriculture and Forestry.

07/1997 – 06/2000: ARC Project 901 'Development of molecular diagnostics for detecting and identifying *Phytophthora* species involved in oak decline in Europe' (07/1997-06/1999), 'Development of molecular diagnostics for detecting and identifying oak and beech root pathogens *Phytophthora syringae* and *P. undulata*, and AFLP analyses of *P. quercina* isolates.' (prolongation period 07/1999-06/2000), funded by the Deutscher Akademischer Austauschdienst (DAAD) (British-German Academic Research Collaboration Program ARC).

01/1998 – 03/2001: Project PATHOAK, 'FAIR CT97 3926' 'Long term dynamics of oak ecosystems: Assessment of the role of root pathogens and environmental constraints as interacting decline inducing factors', funded by the European Commission.

04/1999 - 04/2000: Project F45 'Investigations on the *Phytophthora* disease of common alder and grey alder in Bavaria: occurrence of the alder pathogen in nurseries' funded by the Bavarian State Ministry for Food, Agriculture and Forestry.

06/1999 – 02/2001: Concerted Action 'FAIR 5 CT97 3615' '*Phytophthora* disease of alder in Europe: potential for damage; opportunities for limitation of pathogen spread, and for management and control', funded by the European Commission.

01/2001 - 06/2004: Project F45 II 'Development of a management concept for the *Phytophthora* disease of alders in Bavaria', funded by the Bavarian State Ministry for Agriculture and Forestry.

07/2004 - 03/2005: Project F47 'Damages on beech in Bavaria – investigation of selected stands on potential infections by *Phytophthora* and risk assessment of the danger of disease spread via infested nursery stock', funded by the Bavarian State Ministry for Agriculture and Forestry.

05/2005 – 12/2005: '*Phytophthora* disease of alder – distribution and disease intensity in alder stands in Vienna, Austria'. Federal Research and Training Centre for Forests, Natural Hazards and Landscape (BFW), Vienna, Austria.

06/2005 – 12/2007: 'Modelling the susceptibility of the US to *Phytophthora alni*.' Cooperation with the Forest Health Technology Enterprise Team, Forest Health Protection, USDA Forest Service, Fort Collins, Colorado, USA.

01/2006 – present: 'Control of the Phytophthora dieback of mature trees of European beech, oaks and lime trees with aerial and stem applications of potassium phosphite' in collaboration with the Bavarian Administration of Castles, Gardens and Lakes, the city of Augsburg and several German and international investors.

09/2006 - present: 'Identification and description of new *Phytophthora* species associated with the decline of European beech in southern Italy.' Dipartimento di Gestione dei Sistemi Agrari e Forestali, Università Mediterranea di Reggio Calabria, Reggio Calabria, Italy.

01/2007 – 06/2008: 'Investigation and description of *Phytophthora gallica* sp. nov.' Cooperation with the University of Konstanz, Germany.

01/2007 - present: Coordination Action '044436' 'European network on emerging diseases and invasive species threats to European Forest Ecosystems (FORTHREATS)', funded by the European Commission.

05/2007 – present: 'Control of the Phytophthora diseases of oaks, beech, apple and alder by the use of phosphite'. Cooperation with the University of Kiel, Germany.

05/2007 – present: External consultant of the research project 'Potential role of *Phytophthora* species in the decline of *Eucalyptus gomphocephala* (tuart forest)', Centre for Phytophthora Science and Management (CPSM), Murdoch University, Murdoch, Western Australia.

08/2008-12/2010: Project 'Complex disease of beech – root and stem diseases of beech in deciduous stands of Lower Austria after climatic extremes', Federal Research and Training Centre for Forests, Natural Hazards and Landscape (BFW), Vienna, Austria.

Since 08/2008: Project 'Survival mechanisms of *Phytophthora cinnamomi* in the Northern Jarrah forest and potential eradication techniques', Centre for Phytophthora Science and Management (CPSM), Murdoch University, Murdoch, Western Australia.

Scientific research in foreign countries

1995: Slovenia, Switzerland and Italy.

1997: Scotland.

1998: Scotland and France.

1999: Scotland and England.

2000: Luxembourg and Sweden.

2002: Sweden.

2004: Austria, Italy, Sweden and Switzerland.

2005: Austria, Netherlands.

2006: Switzerland and Italy.

2007: Australia, Italy.

2008: Australia, Austria.

External consultant and supervisor of the following projects:

Importance of *Phytophthora* spp. and nutrient availability for root vitality of pedunculate oak (*Quercus robur*). PhD student Ulrika Jönsson, University of Lund, Department of Plant Ecology, Forest Ecology, Lund, Sweden.

Investigations on fungal and fungal-like plant pathogenic microorganisms involved in oak decline in Saxony. Technical University of Dresden, Faculty of Forest Botany and Forest Zoology, Tharandt, Germany. Funded by the Saxon Ministry for Environment, Agriculture, Food and Forestry (SML).

Investigations on the new alder mortality in the biosphere reserve Spreewald (causes, distribution, implications and control. Technical University of Dresden, Faculty of Forest Botany and Forest Zoology, Tharandt, Germany. Funded by the Brandenburg Ministry for Agriculture, Conservation and Development.

Training and Supervision

Postgraduate supervision

PhD: 1 (current) 4 (past)

Honours: 5 (past)

Training of scientists

Between 1995 and 2007 I gave 18 seminars for PhD students, Post Doc Fellows, Senior Research Fellows and Professors from 18 research institutes in Europe, Australia and the USA in methods for the isolation, identification and testing of pathogenicity of *Phytophthora* species. Scientists of the following research groups attended these courses:

- University for Soil Science (BOKU), Vienna, Austria,
- Technical University of Dresden, Tharandt, Germany,
- University of Tuscia, Viterbo, Italy,
- University of Bari, Italy,
- University of Florence, Italy,
- Lund University, Lund, Sweden,
- Department of Forest Sciences, ETH Zurich, Switzerland,
- Oregon State University, Corvallis, USA,
- Cornell University, Ithaca, USA,
- Murdoch University, CPSM, Perth, Australia,
- Forest Research Station of Lower Saxony, Göttingen, Germany,
- Forest Research Station of Baden-Württemberg, Freiburg, Germany,
- Federal Research and Training Centre for Forests, Natural Hazards and Landscape (BFW), Vienna, Austria,
- INRA Nancy, Champenoux, France,
- Forestry Commission Research Agency, Alice Holt, UK,
- Scottish Crop Research Institute (SCRI), Dundee, UK,
- CNR, Florence, Italy,
- Slovenian Forestry Institute, Ljubljana, Slovenia.

Training of foresters and biologists

Between March 2001 and March 2002 I gave nine seminars and field exercises in order to train more than 250 foresters from almost all Forest Offices of the Bavarian State Forestry and 30 biologists from the river authorities in the detection of *Phytophthora* root and collar rot symptoms of alders, and in the biology, pathways and control of *Phytophthora alni*. These trainings were the basis for the Bavarian-wide survey of the disease in forest and riparian ecosystems performed between August 2001 and May 2002.

Training of practicioners

Between February 2007 and November 2007 I gave 9 seminars on the detection and management of Phytophthora diseases of trees for more than 300 practicioners from different German Garden and Environmental Authorities and nursery owner associations

Member of International Networks/Working Units

Built up of an inofficial network of forest *Phytophthora* researcher belonging to more than 30 research institutes in Europe and the USA,

IUFRO Unit 7.02.06 ‘Disease/Environment Interactions in Forest Decline’,

IUFRO Unit 7.02.09 ‘*Phytophthora* in Forests and Natural Ecosystems’,

IUFRO Unit 7.03.12 ‘Alien Invasive Species and International Trade’,

‘European network on emerging diseases and invasive species threats to European Forest Ecosystems (FORTHREATS)’.

COST Action FP 0801 Established and Emerging *Phytophthora*: Increasing Threats to Woodland and Forest Ecosystems in Europe.

State Centre of Excellence on Climate change and Woodland and Forest Health, Western Australia.

Reviewer of Journals

Forest Pathology,

Plant Pathology,

European Journal of Plant Pathology,

Journal of Phytopathology,

Plant Disease,

Mycological Research,

Mycologia,

FEMS Microbiology Letters

Annals of Forest Science

Scientific meetings

Meetings with published papers (see list of publications)

08/1995: International Colloquium on 'Bioindication of Forest Site Pollution: Development of Methodology and Training BIOFOSP', Slovenian Forestry Institute, Ljubljana, Slovenia.

09/1995: Eichensterben in Deutschland: Situation, Ursachenforschung und Bewertung (Oak decline in Germany. Situation, causes and evaluation.) Symposium at the Forest Research Station of Lower-Saxony in Göttingen, Germany (published in *Mitteilungen der Biologischen Bundesanstalt für Land- und Forstwirtschaft*, Berlin-Dahlem, Volume **318)**.

03/1998: Workshop of the IUFRO Working Party 'Disease / Environment Interactions in Forest Decline', Federal Forest Research Centre, Vienna, Austria.

05/1998: 3rd annual meeting of the working party 'experimental ecology of plants' of the Ecological Society, Bielefeld, Germany.

09/1998: 18th International IUFRO Meeting for Specialists in Air Pollution Effects on Forest Ecosystems, Heriot-Watt University, Edinburgh, UK.

09/1999: First International IUFRO Unit 7.02.09 Meeting on Phytophthora's in Forest and Wildland Ecosystems, Oregon State University, Grants Pass, Oregon.

11/1999: 4th Westdeutsche Baumpflegetage, Cologne, Germany.

10/2000: 52nd German Plant Protection Conference, German Phytomedical Society, Freising, Germany.

10/2000: Forstwissenschaftliche Tagung (Conference of Forest Science) 2000, Freiburg, Germany.

10/2001: Second International IUFRO Unit 7.02.09 Meeting on *Phytophthora* in Forests and Natural Ecosystems, Murdoch University, Albany, West-Australien.

10/2002: Forstwissenschaftliche Tagung (Conference of Forest Science) 2002, Göttingen, Germany.

05/2003: Conference „black alder tree of the year 2003", Burg im Spreewald, Germany (published in *Forst und Holz* **58)**.

05/2003: Conference „black alder - tree of the year 2003", Rott / Inn, Germany (published in Beiträge zur Schwarzerle, *LWF-Bericht* **42)**.

09/2004: Third International IUFRO Unit 7.02.09 Meeting on *Phytophthora* in Forests and Natural Ecosystems, Freising, Germany.

04/2005: 13th Augsburger Baumpflegetage (13th Augsburg Meeting on Arboriculture), Augsburg, Germany

11/2005: International Conference "Possible limitation of dieback phenomena in broadleaved stands through silvicultural and protective measures", Puszczykowo, Poland.

07/2006: First International IUFRO Unit 7.03.12 Meeting on Alien Invasive Species and International Trade, Jedlnia, Poland.

08/2007: Keyspeaker at the 4th International IUFRO Unit 7.02.09 Meeting on '*Phytophthora* in Forests and Natural Ecosystems' in Monterrey, California.

08/2008: 3rd International *Phytophthora*, *Pythium* and related genera Workshop, Turin, Italy.

08/2008: 9th International Congress of Plant Pathology, Turin, Italy.

Scientific meetings with summarizing reports

1998-2001: Four workshops of the EU project „Long term dynamics of oak ecosystems: Assessment of the role of root pathogens and environmental constraints as interacting decline inducing factors", (Project PATHOAK, „FAIRCT973926"), in Freising (Germany), Nancy (France), Viterbo (Italy) and Bordeaux (France).

06/2000: Meeting of Task Leaders of the EU Concerted Action "*Phytophthora* disease of alder", Stourport on Severn, UK.

11/2000: Meeting of Task Leaders of the EU Concerted Action "*Phytophthora* disease of alder", Gembloux, Belgium.

02/2007: First meeting of the 'European network on emerging diseases and invasive species threats to European Forest Ecosystems (FORTHREATS)', Uppsala, Sweden.

09/2007: Second meeting of the 'European network on emerging diseases and invasive species threats to European Forest Ecosystems (FORTHREATS)', Brno, Czech Republic (no talk presented).

05/2008: Third meeting of the 'European network on emerging diseases and invasive species threats to European Forest Ecosystems (FORTHREATS)', Vilnius and Palanga, Lithuania (no talk presented).

11/2008: Fourth meeting of the 'European network on emerging diseases and invasive species threats to European Forest Ecosystems (FORTHREATS)', Florence, Italy (no talk presented).

Non-published presentations on *Phytophthora* as invited speaker

1995: Institute of Specific Botany and Mycology, University of Tübingen, Germany.

1996: INRA Nancy, Champenoux, France.

Institute of Forest Protection and Dendrology, ETH Zürich, Switzerland.

1997: Scottish Crop Research Institute, Dundee, UK.

1998: Scottish Crop Research Institute, Dundee, UK.

1999: Forest Research Agency, Farnham, UK.

Plant Protection Service, Wageningen, Netherlands.

2000: Department of Plant Ecology, Lund University, Sweden.

2001: Institute of Forest Entomology, Forest Pathology and Forest Protection, University for Soil Science (BOKU), Vienna, Austria.

2002: Department of Plant Ecology, Lund University, Sweden.

Institute for Forest Botany and Forest Entomology, Technical University Dresden, Germany.

Forest Research Agency, Farnham, UK.

2003: 1. Göttinger Colloquium for Forest Protection, Forest Research Station of Lower Saxony, Göttingen, Germany.

Forest Research Station of Baden-Württemberg, Freiburg, Germany.

2004: Federal Office and Research Centre for Forests, Vienna, Austria.

University of Tuscia, Viterbo, Italy.

2005: University of Konstanz, Germany.

Annual Meeting of the Schutzgemeinschaft Deutscher Wald SDW, Ratzeburg, Germany.

2006: Bavarian State Institute for Agriculture, Freising, Germany.

2007: Murdoch University, Perth, Western Australia.

Australasian Plant Pathology Society, Perth, Western Australia.

Department of Forest Sciences, ETH Zurich, Switzerland.

2008: Christian-Albrechts-Universität, Kiel.

Forestry and Agricultural Biotechnology Institute (FABI), University of Pretoria, South Africa.

Department of Forest Sciences, ETH Zurich, Switzerland.

Scientific expertise

- Role of Phytophthora pathogens in tree declines,
- Root pathology of trees,
- Methods for detection, isolation and identification of *Phytophthora* and *Pythium* spp. from plant tissues, soil and water,
- Pathways, survival mechanisms, host specificity, aggressiveness and phylogeny of *Phytophthora* species,
- Management and control (including eradication) of Phytophthora diseases of trees and forest ecosystems,
- Coordination and practical realisation of large-scale field surveys on soil-borne and water-borne *Phytophthora* pathogens,
- **Role of infested nursery stock as primary pathway for *Phytophthora* diseases of trees**
  - detection methods
  - distribution of *Phytophthora* spp.
  - association between infested nursery stock and diseases in the field
  - control methods
  - management strategies
- ***Phytophthora*-mediated decline of oaks (*Quercus* spp.):**
  - distribution, aggressiveness and ecology of the involved soil-borne *Phytophthora* species,
  - relationships between site factors, *Phytophthora* population in the rhizosphere, crown condition and root condition of trees,
  - interaction between site factors, *Phytophthora* fine root damage and insect defoliation,
  - interaction with environmental constraints such as nitrogen input and drought.
- ***Phytophthora* root and collar rot of alders (*Alnus* spp.):**
  - distribution of the disease, dissemination of the alder *Phytophthora* and infection process, influence of site factors on disease incidence and progress,
  - role of infested nursery stock in disease distribution,
  - management and control,
  - variability of the alder *Phytophthora*.
- **Root and collar rot and aerial bleeding cankers of European beech (*Fagus sylvatica*) caused by *Phytophthora* spp.:**
  - etiology and symptomatology,
  - distribution, aggressiveness and ecology of the involved soil-borne *Phytophthora* species,

- relationships between site factors, *Phytophthora* population in the rhizosphere, crown condition and root condition of trees,
- effect of weather conditions on disease incidence,
- occurrence of *Phytophthora* spp. in beech fields of nurseries.

- **Involvement of *Phytophthora* root infections in the declines of linden (*Tilia* spp.), maple (*Acer* spp.) and birch (*Betula* spp.) trees.**
- **Littleleaf disease of *Pinus occidentalis* and *Pinus caribaea* in the Dominican Republic caused by *P. cinnamomi.***
- **Survival mechanisms of *Phytophthora* species in the Jarrah Forest of Western Australia.**
- Potential role of *Phytophthora* species in the **decline of *Eucalyptus gomphocephala*** (tuart forest)
- **Control of the Phytophthora dieback of mature trees of European beech, oaks and lime trees with aerial and stem applications of potassium phosphite**

Research interests

- Research on control of *Phytophthora* diseases and development of integrated management concepts.
- Development of management concepts for the production of non-infested nursery stock.
- Monitoring of seasonal and annual fluctuations of *Phytophthora* populations on different sites and in different ecosystems.
- Detection and description of new *Phytophthora* species in Europe and in other continents, and analysis of their potential host ranges among European tree and shrub species. Such investigations are urgently required in order to identify potentially harmful pests before they are introduced to Europe.
- Investigations on

- mechanisms of spread and pathways of *Phytophthora* diseases,
- factors triggering the onset of *Phytophthora* epidemics,
- effects of environmental constraints, i.e. nitrogen input into soils and altered temperature and precipitation patterns according to global change scenarios, on host-*Phytophthora*-pathosystems,
- the succession of ascomycetes and basidiomycetes in *Phytophthora* affected stands and the importance of the secondary disease cycle for the ecosystem damage,
- changes of tree species compositions in *Phytophthora* affected ecosystems,

- Molecular analyses of different populations of widespread *Phytophthora* species in order to get informations on their origins and potential pathways.
- Role of nurseries in the emergence of *Phytophthora* hybrids, the introduction of exotic *Phytophthora* species, and the dissemination of *Phytophthora* species and other pathogenic fungi.