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## IAM - Interactions Arbres/Micro-organismes

Rapport Hcéres

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# HCERES

High Council for the Evaluation of Research  
and Higher Education

Department of Research Evaluation

report on research unit:

Tree-Microorganism Interactions

IAM

under the supervision of  
the following institutions  
and research bodies:

Institut National de la Recherche Agronomique – INRA

Université de Lorraine

# HCERES

High Council for the Evaluation of Research  
and Higher Education

Department of Research Evaluation

*In the name of HCERES,<sup>1</sup>*

Michel Cosnard, president

*In the name of the experts committee,<sup>2</sup>*

Christine Foyer, chairwoman of the  
committee

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Under the decree N°2014-1365 dated 14 november 2014,

<sup>1</sup> The president of HCERES "countersigns the evaluation reports set up by the experts committees and signed by their chairman." (Article 8, paragraph 5)

<sup>2</sup> The evaluation reports "are signed by the chairman of the expert committee". (Article 11, paragraph 2)

## Evaluation report

This report is the sole result of evaluation by the expert committee, the composition of which is specified below.

The assessments contained herein are the expression of an independent and collegial reviewing by the committee.

Unit name:	Tree-Microorganism Interactions
Unit acronym:	IAM
Label requested:	UMR
Current number:	UMR 1136
Name of Director (2016-2017):	Mr Éric GELHAYE
Name of Project Leader (2018-2022):	Mr Éric GELHAYE

## Expert committee members

Chair:	Ms Christine FOYER, University of Leeds, United Kingdom
Experts:	Mr Duncan CAMERON, University of Sheffield, United Kingdom Ms Elisabeth FOURNIER, Inra, Montpellier (representative of the Inra CSS BPE) Ms Véronique GRUBER, Université Paris Diderot (representative of the CNU) Mr Jan STENLID, Swedish University of Agricultural Sciences, Sweden Mr Frédéric SUFFERT, Inra, Paris-Saclay (representative of supporting personnel) Mr Philippe VANDENKOORNHUYSEC, Université de Rennes, Rennes
Scientific delegate representing the HCERES:	Mr Steven BALL
Representatives of supervising institutions and bodies:	Mr Andreas GUTSFELD, Université de Lorraine Mr Thierry CAQUET, Inra, EFPA
Head of Doctoral School:	Mr Stéphane DESOBRY, Doctoral school n° 410, "Science et Ingénierie Ressources Procédés Produits Environnement, RP2E"

## 1 • Introduction

### History and geographical location of the unit

The research unit under assessment “Tree-Microorganism Interactions” (IAM), composing of Inra and the University of Lorraine, was formed in January 2001 by merging the Inra Forest microbiology laboratory and the Henri Poincaré University (Nancy 1) Laboratory of forest biology. In January 2005, the Inra Laboratory of forest pathology was added to the IAM unit. The IAM unit is located across two sites roughly 20 kilometres apart, one at the Faculty of Sciences and Technology at the University of Lorraine in Vandœuvre-lès-Nancy with the second at the Inra Nancy-Lorraine campus in Champenoux. IAM's functional structure organizes research into three teams; two are located in Champenoux while the third is situated in Vandœuvre-lès-Nancy. IAM is also member of the Laboratory of Excellence (LabEx) ARBRE (Advanced Research on the Biology of Tree and Forest Ecosystems).

### Management team

The IAM unit is led by director, Mr Éric GELHAYE with Mr Pascal FREY as deputy director.

### HCERES nomenclature

Principal: SVE1 Agronomie, Biologie Végétale, Écologie, Environnement, Évolution

Secondaire: SVE2 Biologie Cellulaire, Imagerie, Biologie Moléculaire, Biochimie, Génomique, Biologie Systémique, Développement, Biologie Structurale

SVE3 Microbiologie, Immunité

### Scientific domains

The unit studies biotic interactions between trees and microorganisms at all scales including individual biochemical pathways, molecular interaction effectors, genomes, individuals, populations and ecosystems.

## Unit workforce

Unit workforce	Number on 30/06/2016	Number on 01/01/2018
N1: Permanent professors and similar positions	9	9
N2: Permanent researchers from Institutions and similar positions	10	10
N3: Other permanent staff (technicians and administrative personnel)	25	24
N4: Other researchers (Postdoctoral students, visitors, etc.)	9	
N5: Emeritus	1	
N6: Other contractual staff (technicians and administrative personnel)	5	
N7: PhD students	12	
<b>TOTAL N1 to N7</b>	<b>71</b>	
Qualified research supervisors (HDR) or similar positions	11	

Unit record	From 01/01/2011 to 30/06/2016
PhD theses defended	30
Postdoctoral scientists having spent at least 12 months in the unit	27
Number of Research Supervisor Qualifications (HDR) obtained during the period	5

## 2 • Assessment of the unit

### Global assessment of the unit

The IAM unit was created in 2001, and acquired its current form in 2005 through the fusion with the Forest microbiology laboratory and the Laboratory of forest biology from Nancy 1 University. The IAM unit has a long-lasting experience in the integrated study of interactions between trees and micro-organisms, and gathers scientists with complementary skills allowing inter-disciplinary approaches of common objects. Following the recommendation and a self-assessment (SWOT) evaluation conducted at mid-term of the evaluated period, the initial functional and scientific organization 5 teams was reorganized in 3 functional teams. The scope of the research is to understand the interactions occurring between microorganisms and trees within forest ecosystems. Three main objectives are targeted: understanding the molecular and ecological mechanisms governing the trees/microorganisms interactions, understanding the roles of interacting organisms in the functioning of ecosystems, and elucidating the processes controlling the evolution and adaptation of tree/microorganisms associations to anticipate forests dysfunctioning related to climate changes and anthropogenic impacts. Different disciplines and approaches are combined to achieve these objectives (biochemistry, structural biology, functional genetics, comparative and evolutionary genomics, meta-omics, systems biology, evolutionary biology and epidemiology). In addition to the interactions between poplar, rust (*Melampsora larici-populina*), and ectomycorrhiza (*Laccaria bicolor*), which form a central model, several other biological models are used, including *Arabidopsis* as a model plant, *Phanerochaete chrysosporium* and *Trametes versicolor* as lignolytic fungi, *Tuber melanosporum* as ectomycorrhizal fungus, *Burkholderia* and *Collimonas spp* as bacteria involved in mineral weathering, *Pseudomonas fluorescens* and *Streptomyces ambofaciens* as bacteria interacting with ectomycorrhizal fungi, *Phytophthora xalni*, *Erysiphe alphitoides*, *E. quercicola* and *Hymenoscyphus fraxineus* and invasive fungi causing serious disease on forest trees. The poplar/rust interaction has been considered as a central model upon which to build an inter-disciplinary project involving the three teams.