

# HCERES

High Council for the Evaluation of Research  
and Higher Education

Research units

HCERES report on the research unit:

Plant ecophysiology, agronomy and nutrition

EVA

Under the supervision of  
the following institutions  
and research bodies:

Université de Caen Basse-Normandie - UCBN

Institut National de Recherche en Agronomie - INRA

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and Higher Education

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

Michel Cosnard, president

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

Urs FELLER, chairman 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:	UMR INRA-UCBN 950 Écophysiologie Végétale, Agronomie & nutriments NCS
Unit acronym:	EVA
Label requested:	UMR
Current number:	950
Name of Director (2015-2016):	Ms Marie-Pascale PRUD'HOMME
Name of Project Leader (2017-2021):	Ms Marie-Pascale PRUD'HOMME

## Expert committee members

Chair : Mr Urs FELLER, Institute of Plant Sciences, University of Bern, Switzerland

Experts : Ms Catherine ROUMET, Center of Functional and Evolutive Ecology  
Mr Bruno TOURAINE, University of Montpellier (representative of the CNU)

Scientific delegate representing the HCERES :

Mr. Serge DELROT

Representatives of supervising institutions and bodies:

Mr. Guy RICHARD, INRA

Mr. Pierre SINEUX, University of Caen Basse-Normandie

Head of Doctoral School :

M. Patrice LEROUGE, Doctoral school n°497, « École Doctorale Normande Biologie Intégrative, Santé, Environnement »

## 1 • Introduction

### History and geographical location of the unit

The EVA unit (Ecophysiologie Végétale, Agronomie & nutrition NCS, Plant Ecophysiology, Agronomy and NCS Nutrition) is a Mixed Research Unit (UMR) under the double supervision of the University of Caen Basse-Normandie (UCBN) and of the INRA Environment Agronomy Division. It is located in campus N° 1 of the University of Caen Basse-Normandie. It was created in association with the INRA in 1992. It was initially a UA (Associated Unit), renewed in 1996, and then it was labelled an UMR in 2000, later renewed in 2003, 2007 and 2012. The unit hosts 15 UCBN lecturers-researchers with various skills in plant science (ecology, physiology, agronomy, biochemistry, molecular biology), plus an INRA researcher in ecophysiology and modelling since 2010. Technical support is provided by 5 INRA ITA staff members and 6 UCBN BIATSS staff members.

### Management team

The director of the laboratory is Ms. Marie Pascale PRUD'HOMME, assisted by a deputy director, Mr. Philippe LAÏNÉ (associate professor). The laboratory includes 3 teams: Influx (head: Mr. Philippe ETIENNE); C-defoliation (head: Ms Annette MORVAN-BERTRAND); Grassland Ecology (head: Mr. Jean-Bernard CLIQUET). These teams share 4 technical platforms: Plant Resources and physical measurements; Analytical platform, Isotopic Mass spectrometry, Molecular biology and proteomics.

### HCERES nomenclature

Subdomain: SVE2

Main scientific subdomain : SVE2\_LS9

Secondary subdomain : SVE2\_LS8

### Scientific domains

The research project addresses the physiology and ecophysiology of cultivated and grassland plant species at various scales and with various scientific and methodological approaches:

- Agronomy;
- Ecology;
- Ecophysiology;
- Plant Physiology.

## Unit workforce

Unit workforce	Number on 30/06/2015	Number on 01/01/2017
N1: Permanent professors and similar positions	4 [2]	4 [2]
N2: Permanent researchers from Institutions and similar positions	12 [6.5]	11 [6]
N3: Other permanent staff (technicians and administrative personnel)	9 [8.8]	7 [6.6]
N4: Other professors (Emeritus Professor, on-contract Professor, etc.)	1* [0.4]	
N5: Other researchers (DREM, post-docs)		
N6: Other contractual staff (technicians and administrative personnel)	5 [4.8]	
N7: PhD students	8 [8]	
TOTAL N1 to N7	39 [30.5]	
Qualified research supervisors (HDR) or similar positions	8	

\*Invited Professor

Unit record	From 01/01/2010 to 30/06/2015
PhD theses defended	9
Postdoctoral scientists having spent at least 12 months in the unit	3
Number of Research Supervisor Qualifications (HDR) obtained during the period	

## 2 • Overall assessment of the unit

## Introduction

The research activities developed by three research teams focus on nitrogen and sulfur fluxes (Team E1; "INFlux"), on fructan metabolism and accumulation in grasses (Team E2; "C-Defoliation") and on the performance of grassland ecosystems (E3; "Grassland Ecology"). Abiotic stresses are considered in the various projects, especially in the context of global change. The approaches are relevant, some of them original, and based on suitable experimental techniques. The use of stable isotopes is powerful for such investigations. Mass spectrometry and HR ICP-MS allow a deeper insight into the uptake, assimilation and transport of mineral nutrients (especially nitrogen and sulphur) as well as of CO<sub>2</sub> assimilation products. The quality of the products can also be addressed with these techniques.

### Global assessment of the unit

The unit is well managed. Research in the three teams is complementary and addresses highly important aspects in the context of plant productivity and stress responses. Responses to abiotic stresses related to global change (e.g. drought, heat) are considered. The research topics include nitrogen and sulphur acquisition (especially in Brassicaceae), interactions between these two elements, carbon dynamics in grasses (especially fructan metabolism in forage grasses) and the performance of grasslands (especially under abiotic stress conditions). The unit has a strong scientific potential, and unit members have complementary skills, from ecophysiology to isotope labelling through plant physiology. The methods used are state of the art. The research focus and the analytical techniques evolved positively during the past five years. Numerous PhD and Master students were supervised. The results were published in a large number of papers in peer-reviewed international journals, and were well received by the community. Some articles were written for a broader readership and, together with oral presentations, provided a basis for interactions with stakeholders. The three teams present interesting plans for the next period, but they probably need to be more focused and interactive. In some instances, more risky projects might also have been envisaged (e.g. more detailed studies of metabolic regulation mechanisms, including gene expression, or of interactions between organs with stable isotopes). The size of the three teams is quite unequal, but their scopes are scientifically sound. More intense interactions between these teams and also with research group abroad could help to enhance the international visibility of this unit with high standards.

### Strengths and opportunities in the context

Research of the three teams in the unit is complementary and covers highly relevant aspects of plant physiology and ecology. Especially, the consideration of altered environmental parameters as a consequence of global change is timely and of practical relevance for stakeholders. The progress made during the past five years is very good.

Results from research during the past five years were published in a good series of papers in international journals. The journals for the publication of the findings were well chosen and are highly ranked in this research domain. The numbers of citations of these papers clearly indicate that the work of the unit is well appreciated by the international scientific community.

The approaches and methods used are state of the art. Furthermore, there was a suitable adaptation and extension of the methods initiated during the years 2010 - 2015 (e.g. expression of chloroplast proteins, long-distance translocation of heavy metals, characterization of a sucrose : fructan 6-fructosyltransferase and of sucrose transporters). The use of functional genomics may allow the unit to investigate the regulatory mechanisms and identify their molecular bases.

### Weaknesses and threats in the context

The unit contains three teams with unequal numbers of scientists and, as a consequence, also with unequal outputs. This may represent a challenge for interactions between the teams. The international visibility of the unit might be improved (especially with respect to participation and leadership in international research programs and involvement in editorial work). This weakness, which might be in part explained by the relative isolation of the unit, results in a low international attractiveness.

### Recommendations

More intense interactions with research groups in other countries in Europe and in other continents are desirable, since this would allow to making even better use of the scientific potential present in this unit and help to improve international visibility. Investigations based on more interactions between the three teams could be beneficial for the unit and help to make optimal use of the high scientific potential in research as well as in teaching.

A stronger commitment towards functional genomics and molecular physiology may also improve the attractiveness of the research unit.

Abiotic stress phases and the subsequent recovery phases are important for the overall performance of annual crops and of pastures. The unit has a good basis to address such aspects and may envisage studying them with respect to limiting nutrients and/or abiotic stresses such as drought or elevated temperature.