IRHS - Institut de recherche en horticulture et semences

Rapport Hcéres

HCERES

High Council for the Evaluation of Research and Higher Education

Research units

HCERES report on research unit:

Institut de Recherche en Horticulture et Semences

IRHS

Under the supervision of the following institutions and research bodies:

Université d'Angers - UA

AGROCAMPUS OUEST - Institut Superieur des Sciences Agronomiques, Agroalimentaires, Horticoles et du Paysage

Institut National de la Recherche Agronomique - INRA

Evaluation Campaign 2015-2016 (Group B)

HCERES

High Council for the Evaluation of Research and Higher Education

Research units

In the name of HCERES,[1]

Michel Cosnard, president

In the name of the experts committee,[2]

Mathilde Causse, chairwomen of the committee

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

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

[2] 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:	Institut de Recherche en Horticulture et Semences
Unit acronym:	IRHS
Label requested:	UMR
Current number:	1345
Name of Director (2015-2016):	Mr Jean-Pierre RENOU
Name of Project Leader (2017-2021):	Mr Jean-Pierre RENOU

Expert committee members

Chair:	Ms Mathilde CAUSSE, Inra, Avignon
Experts:	Ms Dawn ARNOLD, University of West of England, Bristol, UK
	Mr Jochem EVERS, Wageningen UR, The Netherlands
	Mr Jordi GARCIA-MAS, Center for Research in Agricultural Genomics, Barcelona, Spain
	Mr Inaki HORMAZA, IHSM, Malaga, Spain
	Mr Dominique JOB, CNRS
	Mr Jordi MARSAL, IRTA, Barcelona, Spain
	Mr Benoît MOURY, Inra, Avignon (representative of the CSS Inra)
	Mr Loïc RAJJOU, AgroParisTech (representative of CNECA)
	Mr René SMULDERS, Wageningen UR, The Netherlands
	Mr Bruno TOURAINE, Université de Montpellier (representative of the CNU)
Scientific delegate representing the HCERES:	
	Mr Steven BALL

Representatives of supervising institutions and bodies:

Ms Emmanuelle CHEVASSUS - LOZZA, Agrocampus-Ouest

Mr Guy RICHARD, Inra EA

Ms Dominique ROBY Inra SPE

Mr Peter ROGOWSKY, Inra BAP

Mr Jean-Paul SAINT-ANDRE, Université d'Angers

Head of Doctoral School:

Mr Bruno LAPIED, ED 495, VENAM « Végétal Environnement Nutrition Agroalimentaire Mer »

1 • Introduction

History and geographical location of the unit

The research unit named Institute of Horticulture and Seeds (IRHS) was created in Angers in january 2012, under the auspices of Inra, AGROCAMPUS OUEST and the University of Angers, from the merger of 4 pre-existing joint-research units. This large research unit counts 235 members, including 175 permanent staff (48 professors and associate professors, 20 Inra researchers and 106 other permanent staff) and 44 non-permanent staff (including 24 PhD students). The IRHS is a member of the SFR QuasSaV (SFR: Federation of Plant Biology Laboratory), and of the competitiveness cluster "Végépolys", which unites companies, research laboratories and institutions of higher education in Loire Valley joining their forces in innovative projects to enhance their competitiveness.

The IRHS teams develop integrated research projects by coordinating the efforts and expertise in genetics, genomics, breeding, pathology, physiology, biochemistry, ecophysiology, modelling, bioinformatics and statistics. The main objects of study are roses and other ornamentals, pome-fruits and vegetables, plant pathogens (bacteria and fungi), and seeds. The research unit comprises 13 teams, two support teams handling administration and greenhouse facilities and three genetic resource centers.

During the period, the main facilities have changed substantially: new greenhouses and laboratories have been built and delivered providing the IRHS with 8900 m^2 of laboratory surface at a single location. The new complex of greenhouses and growth chambers (5700 m^2), comprising all the levels of confinement (up to S3) is now close to the new laboratories. Other Plant Science laboratories of the same Research Federation (QuaSaV) and the Vegepolys laboratory are also located in this new building, bringing together all the forces working in Plant Science at Angers.

Most of the PhD students are registered at the Doctoral School ED 495 VENAM.

The global budget of the laboratory is around 2.7 million € per year (without permanent staff salaries), almost 75% provided by research contracts.

Management team

Since 2012, the IRHS has been directed by Mr Jean-Pierre RENOU as director and Ms Mathilde BRIARD, Mr François LAURENS and Mr Philippe SIMONEAU as deputy directors with the assistance of the group leaders within the direction team.

HCERES nomenclature

SVE2

SVE2_LS9

SVE1_LS2 et SVE1_LS3

Scientific domains

The laboratory develops integrated approaches by coordinating the efforts and expertise in genetics, genomics, breeding, pathology, physiology, biochemistry, ecophysiology, modelling, bioinformatics and statistics. The 13 scientific teams are organised around the three main objects of study (roses and other ornamentals, pome-fruits and vegetables and seeds). Ecophysiology and physiology approaches mainly concern rose architecture, fruit quality and seed germination and biology. Pathology and microbiology are focused on apple and seed pathogens.

Unit workforce

Unit workforce	Number on 30/06/2015	Number on 01/01/2017
N1: Permanent professors and similar positions	48 (23.4)	48 (23,4)
N2: Permanent researchers from Institutions and similar positions	17 (16)	20 (19)
N3: Other permanent staff (technicians and administrative personnel)	104 (85.54)	106 (88.44)
N4: Other professors (Emeritus Professor, on-contract Professor, etc.)	5 (2.05)	
N5: Other researchers from Institutions (Emeritus Research Director, Postdoctoral students, visitors, etc.)	8	
N6: Other contractual staff (technicians and administrative personnel)	17 (15.7)	
N7: PhD students	30 (25.05)	
TOTAL N1 to N7	**229 (175.74)**	
Qualified research supervisors (HDR) or similar positions	33	

Unit record	From 01/01/2010 to 30/06/2015
PhD theses defended	36
Postdoctoral scientists having spent at least 12 months in the unit	49
Number of Research Supervisor Qualifications (HDR) obtained during the period	10

2 • Overall assessment of the unit

Introduction

Since its creation in 2012, the institute has centered its research on horticultural crops (roses and other ornamentals, pome-fruits and carrots), and seeds of agricultural importance (notably legume seeds). To help in the discovery of the genes of interest as well as for reverse genetics purposes, some studies are also performed using the model plant species *Arabidopsis* and *Medicago*. The institute is also strongly involved in the study of plant pathogens (*Xanthomonas* spp, *Alternaria* spp and *Venturia* spp.), notably in relation with the studied plant systems. Hence, a main objective of the institute is to thoroughly characterize quality and health of the different plant systems investigated, which is achieved by coordinating efforts and expertise in genetics, genomics, breeding, pathology, physiology, biochemistry, ecophysiology, modelling, bioinformatics, phenotyping and statistics.

The research programs particularly focus on plant architecture and flowering, fruit texture and conservation, analysis and management of genetic diversity, resistance sustainability, evolutionary ecology of pathogens, disease emergence, seed-associated microbial communities, seed conservation and tolerance to desiccation, seedling emergence and response to stress.

Global assessment of the unit

The institute has gathered complementary skills from four research units which allowed it to carry excellent research focused on a few ornamental and horticultural crops, seed biology and host-pathogen interactions. This is highlighted by an increasing number of publications including some in excellent journals, several patents and its participation in European projects and international consortium. Original and integrated approaches were developed thanks to numerous interactions among teams. The institute is strongly involved in education and student training. Furthermore the projects benefit from large collections of genetic resources and excellent infrastructure, notably in relation with the SFR QuaSaV. The research unit has strong links with the industry and also benefits from a very strong financial support by the region Pays de la Loire. The organization of the institute is efficient and particularly adapted to its size.

Nevertheless, the expert committee noticed heterogeneity among teams in both scientific production and level of external collaborations and project funding.

The project proposed for the next period is mainly in continuity of the present project with a few novelties. Two teams will arise from the merging of four small size teams, which should help them gain in efficiency. A new team will exploit the potential in bioinformatics with a specific research project, and assist the training and implementation of bioinformatics in the other teams. Finally, a new team will focus on epigenetics thanks to a regional grant for the recruitment of a new team in the forefront of science.

Strengths and opportunities in the context

The topics of the research unit are quite specific and discriminating in the fields of horticulture, seed biology and pathogen-host interactions. The unit has gained leadership positions in many of these research themes. The Research Unit gathers skills in several complementary disciplines, allowing the development of research projects on agronomical questions with strong impact. This is highlighted by the increase in the quality of the publications and production of the research unit, but also by the increase in collaborations among teams.

New research topics in bioinformatics, epigenetics and genomics will be developed and will be supported by the new high throughput technologies and the genome sequences available. The research projects also benefit from large and recognized genetic resources in Bacteria, Rosaceae and Apiaceae.

The large number of professors and associate professors ensures strong links with education and student training, thus increasing the attractiveness of the research unit.

Thanks to a strong support by the region Pays de la Loire to Plant Sciences, the institute benefits now from excellent infrastructures and equipment (new buildings, greenhouses, platforms equipment). The region also contributes to the funding of many research projects of different sizes, which benefit to every team notably in the frame of The RFI (Research, Education and Innovation) projects.

The research unit also maintains strong relationships with the horticulture sector and seed companies, in addition to the presence of the competitiveness cluster Végépolys, which is one of the driving forces of the “Plant Ecosystem” of the region.

Weaknesses and threats in the context

- the quantity and quality of production has increased during the period, but the effort should continue to produce outstanding publications;

- the number of invitations to international conferences is still limited and should be improved;

- there is a relative heterogeneity among the teams regarding the scientific production and the international position;

- for some research themes, and globally for the institution, the visibility needs to be increased;

- globally, the number of ANR and European projects of the institute remains too low. The participation in large projects may permit opening of new PhD and postdoctoral positions and increase the institute visibility;

- some heterogeneity in team size and technical support may limit their progress;

- the research institute should better benefit from the connection with university and AgroCampus Ouest to increase the number of trained PhD;

- the size of administration team is insufficient given the size of the research unit and the complexity of its management.

Recommendations

The HCERES Panel recommends to the head of the institute to:

- continue encouraging the collaborations between team;

- pursue the effort to improve the quality of the teams' scientific production;

- reduce the heterogeneity among the teams in term of size and technical support;

- encourage researchers to participate to national and international networks to increase the institute visibility; this should help participating to and coordinating more ANR or EU projects;

- require from the teams to develop a SWOT analysis and define their strategic plans addressing research risks;

- explore new possibilities for partnerships with private companies to diversify the financial support.