



objectif
végétal

Research, Education and Innovation
in PAYS de la LOIRE



RESEARCH
EDUCATION
INNOVATION) in Pays
de la Loire
FRENCH REGION

PLANT HEALTH AND QUALITY RESEARCH CENTRE IN PAYS DE LA LOIRE-FRENCH REGION

The right partner for research collaboration

Campus du
végétal



Since September 2015, most of the horticulture and seed research forces are located in the new **Angers Plant Science Campus**: **24,8 million euros** of investments for **8,400 m²** of laboratories and offices, **6900 m²** of greenhouses and growth chambers (S1, S2, S3) and a new building housing the international French cluster VEGEPOLYS and Plante&Cité, the national center for landscape and urban horticulture.



THIS DOCUMENT PRESENTS THE RESEARCH AREAS OF THE FOLLOWING INSTITUTIONS:

AGROCAMPUS OUEST

Institute for Life, Food and Horticultural Sciences and Landscaping

A public scientific, cultural and professional institution under the authority of the Ministry of Agriculture. A triple vocation:

- training students to a high scientific level,
- conducting academic and applied research based on the sustainable development of resources and territories,
- transferring knowledge to socio-economic sectors.

ANSES

French Agency for Food, Environmental and Occupational Health & Safety

Plant health laboratory – Bacteriology, Virology, GMO's detection Unit. In the area of plant health, ANSES undertakes risk analyses, vigilance and alert missions for harmful organisms. As a national reference laboratory, it carries out research projects for developing detection methods of plant pests, and organizes interlaboratory comparison and proficiency tests.

ESA

Ecole Supérieure d'Agricultures

An institute of higher education and research for life sciences, under the authority of the French Ministry of Agriculture. A wide range of courses in 10 major sectors of activity over 50 different programs from undergraduate to PhD level: agriculture, agronomy and food sciences, landscape planning, environment, horticulture, viticulture, retailing, trade, agribusiness management.

GEVES

A French official organization which has a large expertise on the majority of the cultivated botanical species, which evaluates the varieties for their registration in the national list or for legal protection of plant breeders and which estimates the quality of seeds.

INRA

Europe's top agricultural research institute and the world's number two centre for the agricultural sciences. Its scientists are working towards solutions for society's major challenges.

The INRA Pays de la Loire research centre built its identity on the principles of sustainable management and quality production of agricultural products, foods and renewably sourced materials.

UNIVERSITY OF ANGERS

Built on a very long history of universities in the city, the University of Angers is made up of 7 Faculties, Schools and Institutes and is committed to seeking continual improvement in student success, teaching methods and research, relying on new technologies.

UNIVERSITY OF NANTES

Major higher education and research centre in Western France, is one of the rare French universities to promote interdisciplinarity.

All of them are grouped in the regional program **Objectif Végétal - Research, Education, Innovation in Pays de la Loire**, and members of the international French cluster **VEGEPOLYS**.

A REAL DYNAMIC FOR RESEARCH, EDUCATION AND INNOVATION

THE FEDERATIVE RESEARCH STRUCTURE ON PLANT QUALITY AND HEALTH «SFR QUASAV»

400 people in 9 research and experimental units

IRHS

Research Institute on Horticulture and Seeds

Pole 1: Roses and other Ornamentals: architecture, flowering and resistance to diseases
Pole 2: Quality and Health of Pome Fruits and Vegetables
Pole 3: Seeds, Stress and Pathogens

http://www.angers-nantes.inra.fr/irhs_eng



LBPV

Laboratory of plant biology and pathology

(Determinism of plant parasitism and host resistance)

http://www.sciences-techniques.univ-nantes.fr/91385/0/fiche___laboratoire/



UNIVERSITÉ DE NANTES

LEVA

Legumes, Crop Ecophysiology, Agroecology

<http://www.groupe-esa.com/leva-legumes-crop-ecophysiology-agroecology->



GRAPPE

Agro-food products and processes

<http://www.groupe-esa.com/grappe-research-unit-on-agro-food-products-and-processes->



SiFCIR

Intracellular Signalling Regulation of Ion Channels and Receptors (mode of action of insecticides, optimization of insecticide efficacy)

<http://www.univ-angers.fr/fr/recherche/unites-et-structures-de-recherche/pole-vegetal---environnement/rcim.html>



SONAS

Substances of natural origin and structural analogs

<http://www.univ-angers.fr/fr/recherche/unites-et-structures-de-recherche/pole-vegetal---environnement/sonas.html>



EPHOr

Physical Environment of Horticultural Plants

<http://www.agrocampus-ouest.fr/infogludeLive/en/homepage/research/research-units-labs/physical-environment-horticultural-plant>



BVO

Bacteriology – Virology - GMOs

<https://www.anses.fr/fr/content/laboratoire-de-la-santé-des-végétaux#onglet3-tab>



HORTI

Experimental unit for horticulture

<http://www.angers-nantes.inra.fr>



GEVES

Variety and Seed Study and Control Group



VEGEPOLYS

Research & Development Centre



THE FEDERATIVE RESEARCH STRUCTURE ON PLANT QUALITY AND HEALTH «SFR QUASAV»

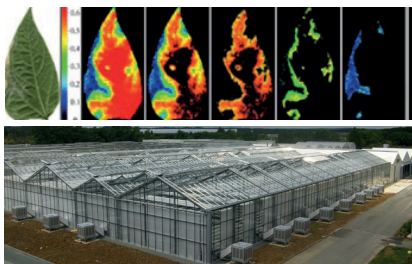
Cross disciplinary scientific animation

4 shared-access technical facilities:

cellular imaging, phytochemical analysis, genomics, collection of microorganisms

2 technological platforms, open to private companies

- « Phenotic » phenotyping of plants and seeds (special focus on plant-pathogen interactions) member of Emphasis European project and of the EPPN (European Plant Phenotyping Network).



- « SensoVeg »: sensory analysis of plants products.



In the heart of a major European horticultural and seed production basin in the « Pays de la Loire » region

- 4000 companies representing 30000 jobs, among which leader companies such as Agrauxine (Lesaffre), André Briant jeunes plants nursery, CESBRON, CMF, Détriché, Ernest Turc, Fleuron d'Anjou, HM Clause (Limagrain), Minier, Océane, PremierTech Horticulture, Richel, Syngenta, Terrena, Vergers d'Anjou, Vilmorin, Technisem.
- Several experimental institutes and trade unions.

Members of VEGEPOLYS, a cluster of companies, research centers and training organizations committed to a partnership approach aimed at creating synergies within jointly-run innovative projects.

Members of the « Objectif Végétal regional program » which aims to reinforce the visibility and attractiveness of basic research, to increase the attractiveness of the education Centre, to boost translational research and reinforce the processes of economic valorization of research findings.

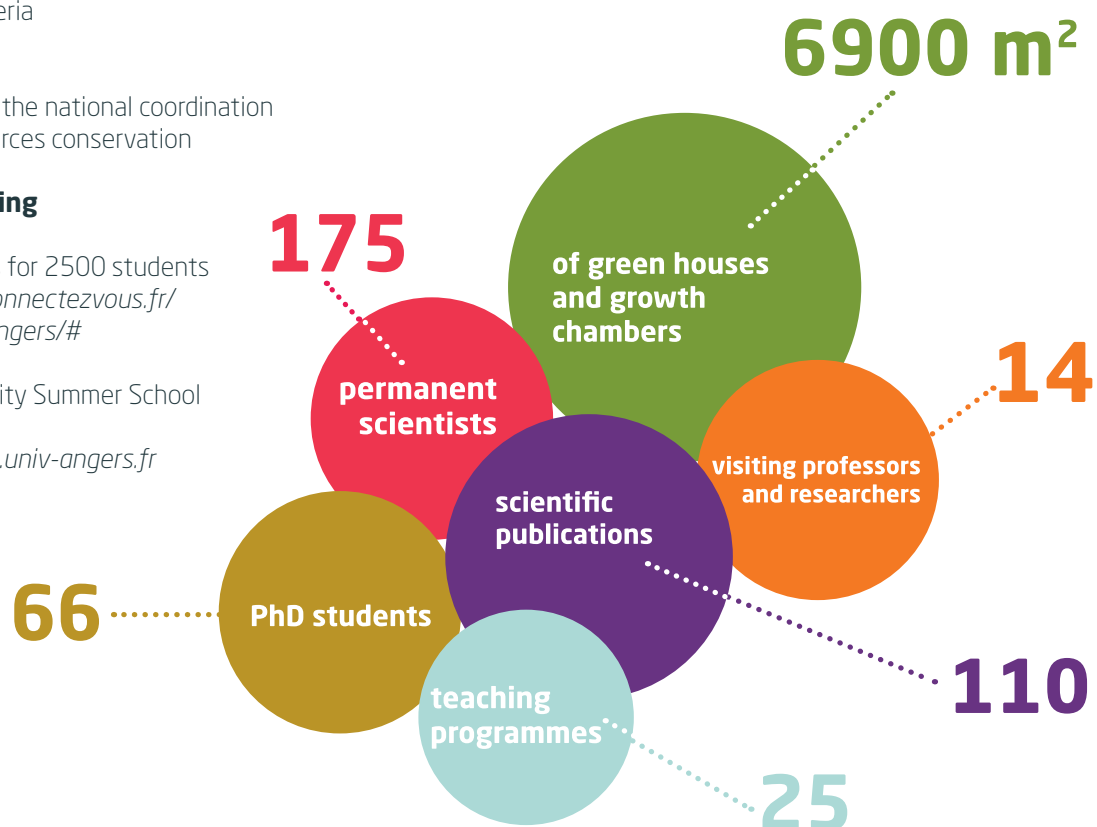
3 Genetic Resource Centres

- plant associated bacteria
- pome-fruits, roses
- edible Apiaceae
- GEVES is in charge of the national coordination of plant genetic resources conservation

Strong involvement in training

- 25 teaching programs for 2500 students <http://www.angers-connectezvous.fr/decouvrir/etudier-a-angers/#>
- Plant Health and Quality Summer School in Angers <http://summerschools.univ-angers.fr>

Key figures - 2016



3 RESEARCH PRIORITY AREAS IN HORTICULTURE AND SEED PRODUCTION

Fruits & vegetables, roses & ornamentals, seeds, pathogens



Sustainable management of plant health genetic diversity and breeding, resistance mechanisms, evolutionary ecology of pathogens, nitrogen use efficiency, insecticides, environmental evaluation of cropping systems by Life cycle analysis,

Seed biology, quality and health conservation and germination, seed borne diseases, seed tolerance to biotic and abiotic stresses,

Qualities and valorisation of horticultural products architecture and flowering, soil-plant-climate interactions, fruit texture and conservation, genetic and physiological basis of plant quality, phytochemistry, sensorial analysis, sensory preferences of the consumers.

Growing approaches and research topics

- High-throughput phenotyping,
- Epigenetics,
- Omics, modelling, big data,
- Integration of plants into urban and peri-urban areas.

40 new projects every year

A SELECTION OF KEY PROJECTS

BUNGEE (2017-2022) - Directed crop breeding using **jumping genes**

Etienne Bucher won a ERC Consolidator Grant for a project that aims to **accelerate plant breeding** by testing and implementing a revolutionary technology based on transposable elements for crop improvement. This project takes advantage of the natural evolutionary potential of plants to **breed crops resistant to stresses** that are currently amplifying due to climate change (e.g. heat, drought, salt).

One publication in Nature Genetics online 2017, doi:10.1038/ng.3886

Nicolas Daccord, Jean-Marc Celton, et al. High-quality *de novo* assembly of the apple genome and methylome dynamics of early fruit development.

Contact: etienne.bucher@inra.fr

<http://www.angers-nantes.inra.fr/en/All-the-news/ERC-grant-Etienne-Bucher>



DiverIMPACTS (2017 - 2022)

is a H2020 funded project gathering 34 public & private partners. DiverIMPACTS supports innovation actors, from farmers to consumers, in their dynamic development of sustainable agricultural systems. It aims at **diversification of cropping systems** through **rotation, intercropping, multiple cropping** promoted by actors and value chains towards sustainability.

Contact: g.hellou@groupe-esa.com

<http://www.cra.wallonie.be/en/the-projects/diverimpacts>

DIVERSify (2017 - 2021)

is a H2020 funded project gathering 23 public & private partners. DIVERSify will produce knowledge and tools to support the adoption of productive and resilient agricultural systems which capitalise on the benefits of **high plant species diversity**, enhance understanding of how **synergistic plant teams** can contribute to **yield stability, reduce yield losses** due to weeds, pests and diseases, and **increase resilience** against environmental fluctuations and management practices.

Contact: g.hellou@groupe-esa.com

<https://www.plant-teams.eu/>



GENIUS (2012-2019)

(Genome ENgineering Improvement for Useful plants of a Sustainable agriculture) – an ANR (The French National Research Agency) funded project gathering a consortium of 15 public & private partners.

Its aim is to provide French researchers and plant breeders with state of the art know-how and the biological material for **precise genome modifications** in a variety of crop species, laying the basis for high throughput functional genomics and efficient plant breeding. At IRHS, the work is focused on **apple** and on **rose**, to increase transformation efficiency and precision.

Contact: elisabeth.chevreau@inra.fr
<http://www.genius-project.fr>



Crédit : Olivier Leprince

EUCLEG (2017 - 2021)

is a H2020 funded project coordinated by INRA, bringing together 38 public & private partners to increase EU's and China's protein self-sufficiency. EUCLEG aims to identify and develop the best genetic resources, phenotyping methods and molecular tools to **breed legume varieties** with improved performance under **biotic and abiotic stresses** in the representative European and Chinese agro-ecological areas. The IRHS will contribute by **phenotyping** seed and seedling performance related to **crop establishment**.

Contact: julia.buitink@inra.fr
http://cordis.europa.eu/project/rcn/210489_fr.html

GENOME_ROSE & Rosascent (2016 - 2019)

The rose genome sequencing initiative gathering an international consortium of more than 20 teams with the objective to obtain a **high quality sequence of Rosa chinensis « Old Blush »**. This project is co-coordinated by RDP (Lyon) and IRHS (Angers). ANR funded project- aims to explore an **alternative route to produce scent** by employing an enzyme (RhNUDX1) of a completely unexpected family.

Contact: fabrice.foucher@inra.fr
http://www.actahort.org/books/1064/1064_19.htm
<http://www.angers-nantes.inra.fr/Toutes-les-actualites/ANR-ROSASCENT>



InnovaFruit

The IRHS has a long experience in **apple and pear breeding**. From 2010, it has been leading the Innovafruit project funded by INRA Biology and Plant Breeding division. Its objective is to progressively transfer INRA skills on fruit breeding to its partners CEP Innovation and Novadi for respectively pear and apple. This will allow IRHS to be more involved upstream the program in **prebreeding** and in the development of **new breeding technologies and methodologies**.

Contact: francois.laurens@inra.fr

Labcom ESTIM (2016-2019)

An ANR (The French National Research Agency) funded project with the aim to develop a joint laboratory between UMR IRHS (Inra-Agrocampus Ouest – Angers University), LARIS (Angers University) and Arexhor (applied research and experimental station for ornamental horticulture). Development of **new screening methods and decision support tools for Plant Resistance Inducers and biostimulants**.

Contacts: philippe.grappin@agrocampus-ouest.fr
marie-noelle.brisset@inra.fr
<http://www.angers-nantes.inra.fr/Toutes-les-actualites/Projet-ESTIM>



Sunflowers infected by *O. cumana*

miPEPiTO (2017-2019)

An ANR (The French National Research Agency) funded project gathering a consortium of 4 public & private partners. Its aim is to develop and use micropeptides (miPEPs) as natural molecules to **modulate specific gene expression** (without genetic transformation or mutation) both in the parasite and in the host plant for the **biocontrol of Orobanche, Phelipanche, and Striga parasitism**.

Contact: philippe.delavault@univ-nantes.fr



PONTE (2015-2019)

is a H2020 funded project gathering 25 public & private partners. The PONTE project aims at minimizing the risk of introduction or impact of **emerging pests** threatening EU agriculture and forestry, including *Xylella fastidiosa*. Concerning this pathogen, the studies will be focused on the Italian and French outbreaks, and will target its detection, genomic characterization and a better identification of its vectors. Pathogenicity tests and control methods will be conducted to decrease the impact of the pathogen of potential high socio-economic importance in agriculture, forestry and ornamentals.

Contact: marie-agnes.jacques@inra.fr

<http://www.ponteproject.eu>

Nature 4 Cities (2016-2020)

The objective of this H2020 funded project is to structure and to develop an **interactive platform for urban actors**, by proposing databases, decision tools and evaluation tools for **nature based solutions settlement** in urban areas.

Contact: patrice.cannavo@agrocampus-ouest.fr

<https://www.nature4cities.eu/>



UMT STRATÈge (2017-2021)

is a **multidisciplinary** project funded by the French Ministry of Agriculture and Food gathering 9 public and private partners, among them ASTREDHOR, the French Technical Institute of Horticulture. It aims at revitalizing the horticultural sector by promoting the **adaptation of the horticultural products** to the **urban market**. New **technical and marketing strategies** will be further designed and evaluated in order to help professionals to adapt to these market opportunities.

Contact: camille.li-marchetti@astredhor.fr ; philippe.morel-chevillet@inra.fr

www.umd-strategie.fr

Virasi (2013-2017)

ANSES funded project gathering 4 partners. The aim of this project is to use **insect viruses** as synergistic agent of insecticides for **insect-borne disease control**. The new strategy demonstrated during this project will then be transposed to the control of crop pests.

Contact: bruno.lapied@univ-angers.fr



Anopheles gambiae

VitiSmart (2016-2019)

is a project funded by the ERA-Net Co-fund FACCE SURPLUS gathering 25 public & private partners. The project aims to produce a **resilient viticultural system** able to speedily recover from biotic and abiotic stresses. This will be achieved by combining resilient cultivars with beneficial microorganism to acquire a natural cross tolerance while maintaining yield.

Contact: r.siret@groupe-esa.com

<http://facceturplus.org/research-projects/vitismart/>



Crédit : esa-71305_CAzimuths (4) ©

XF-ACTORS (2016 - 2020)

is a **multidisciplinary** H2020 funded project gathering 29 partners. It is the first research project in Europe entirely devoted to the bacterium *Xylella fastidiosa*. The main objective is to accomplish researches and innovation actions to improve the **prevention, early detection and control** of *Xylella fastidiosa* under different phytosanitary conditions.

Contact: marie-agnes.jacques@inra.fr

www.xfactorsproject.eu



You're looking for scientific collaborations, you would like to develop research projects, you're interested in joining the Horticulture and Seed research centre in Pays de la Loire?

a single point of contact to help you get in touch with the right expert:
tanegmart.redjala@univ-angers.fr

CALENDAR OF EVENTS HELD in the Region

Salon du végétal. Nantes.
June 19-21 2018

Summer School Plant Health and Quality. Angers.
July 2-18 2018

Symposium "Support for changes in practices for sustainable territories". Angers.
October 2018.

International Symposium on Plant Epi/genetics: from basic research to plant breeding. Angers.
October 29-31 2018

Plant event. « Demain, le végétal », évènement prospectif. Angers.
November 7-8 2018

#esaconnect4, connected agriculture meeting. Angers.
November 22 2018

Les 10èmes Rencontres du Végétal. Angers.
December 4-5 2018

SIVAL - International exhibition.
The World-class trade fair for plant production.
VEGEPOLYS Symposium.
VEGEPOLYS International Business Event - BtoB meeting.
Angers. **January 2019.**

Colloque Graines 2019. Angers.
May 2019

GREENSYS 2019 - International Symposium on Advanced Technologies and Management for Innovative Greenhouses. Angers.
June 16-20 2019.

IHC 2022 - 31st International Horticulture Congress. Angers.
August 14-20 2022



CONTACTS



www.agrocampus-ouest.fr



www.anses.fr



www.groupe-esa.com



www.geves.fr



www.angers-nantes.inra.fr



www.univ-angers.fr



www.univ-nantes.fr

UNIVERSITÉ DE NANTES



www.vegepolys.eu

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