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PARIS-SACLAY



UMR0320

INRAE, AGROPARISTECH, CNRS, UNIVERSITÉ PARIS-SACLAY

Quantitative Genetics and Evolution – Le Moulon (GQE–Le Moulon)

Management

Christine DILLMANN, head
Alain CHARCOSSET, deputy head
Maud TENAILLON, deputy head
Karine ALIX, project manager
for teaching

Key figures

- 28 researchers and teacher-researchers
- 20 PhD and postdoctoral students
- 20 engineers
- 16 technicians and administrative staff
- 1 quantitative proteomics facility
- 100 m² greenhouse
- 25 ha field experiments
- 10 m² culture rooms

Mission and objectives

GQE-Le Moulon is a founding member of the "Institut Diversité, Ecologie, Evolution du Vivant" (IDEEV). We perform researches to understand environmental and genetic bases of complex trait variation, within and between species to predict their evolution. A special focus is given to the adaptation of cultivated plants to their biotic and abiotic environment. We develop system's biology approaches to integrate different scales, from molecular phenotypes to multidimensional fitness landscapes. We deal with societal challenges like predicting the ability of populations/species to face climatic changes and developing innovative breeding methods for the agriculture of the future, that can rely on participatory sciences.



Photos: © INRAE, R. Le Guyader, GQE Le Moulon

Our scientific excellence relies on multidisciplinary skills, from the production of genomic data to mathematical modeling, the production of innovative plant material, and the existence of original shared infrastructures. The UMR hosts the PAPPSO proteomics facility. The ABI team handles different aspects of bioinformatics like systems support, databases and information systems management, and dedicated bioanalysis. The ACEP team provides genotyping and genetic mapping services.

Several research teams are involved in crop mating, seeds production and field-scale crop yield assessment or under more controlled conditions in partnership with the Versailles-Saclay experimental unit.



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Plant Science, Diversity,
Health & Biotechnology



Agroecosystems
& Environment



Digital Sciences &
Systems Modelling

Topics

Research

Evolutionary genomics

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Predictive Biology

Integrating different levels of variation, including genomic, cellular, or developmental levels to characterize varietal performances under different agricultural management systems.

We study genotype-phenotype relationships and integrate molecular phenotypes (omics) to predict hybrid vigour and genotype-environment interactions. Our strength is the management of informatics and bioinformatics infrastructures dedicated to the treatment of big-omics data.

Environmental adaptation

We develop experimental and mathematical approaches with strong ecophysiological/epidemiological building blocks and our statistical approach is based on quantitative genetics. Our models are drought tolerance (maize), varietal or mixed crops (wheat/pea, maize/bean), and plant-pathogen interactions (maize/lepidoptera, apple-tree/aphid).

New breeding methods

Sustaining the development of genomic and participatory selection in plant breeding, This includes methodological for the prediction of varietal performances within or between-species mixtures.

Collaboration

Beyond numerous national and international academic collaborations, leading partners in civil society are Promaïs, Réseau Semences Paysannes, Arvalis, and the local association Terre & Cités..

Teaching

The 13 associate-professors and professors from the UMR are strongly involved in the education and lectures at the "Université Paris-Saclay" (AgroParisTech, Faculté des Sciences d'Orsay). We share responsibilities in the BIP master ("Biologie Intégrative et Physiologie"), and set-up the newly undergraduate "Mathématiques et Biologie" course. We develop teaching programs in Licence, Master and engineer courses in population genetics, quantitative genetics, integrative biology, biomathematics (approximately 2500h/years).



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