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INRAE AgroParisTech cnrs université PARIS-SACLAY

UMR0320

INRAE, AGROPARISTECH, CNRS, UNIVERSITÉ PARIS-SACLAY

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

Management

Christine Dillmann, director
Karine Alix, deputy director
Alain Charcosset, deputy director

Key figures

- 27 researchers and teacher-researchers
- 3 emeritus
- 29 permanent ITA (of which 6 IR) + 16 non-premanent
- 17 doctoral
- 5 postdoctoral students

- 1 quantitative proteomics facility (PAPPSO)
- 1 technical platform for sequencing long DNA fragments

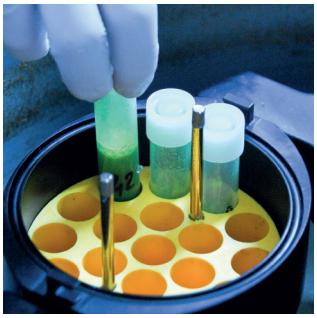
Mission and objectives

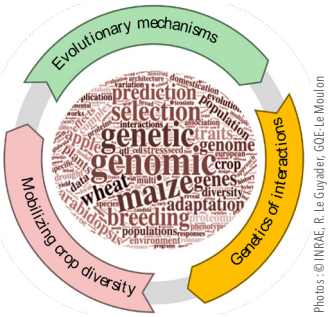
Quantitative Genetics and Evolution - GQE-Le Moulon is a founding member of Institut Diversité, Ecologie, Evolution du Vivant (IDEEV).

Our specificity is to mix experimental and theoretical approaches to produce knowledge about the genetics and evolution of quantitative traits. We have a special interest on cultivated plants in relation with agriculture.

Altogether, our research covers a wide range of disciplinary fields in Biology (including theoretical and evolutionary biology), Agronomical sciences, Mathematics (biostatistics and mathematical modeling) and Bioinformatics. In such a multidiciplinary environment, our specificity is *population genetics and genomics for quantitative traits observed at different integration levels in contrasted environments* : molecular phenotypes, architectural or developmental traits, yield components and adaptive traits. Our scientific production is recognized worldwide.

We contribute to the agro-ecological transition though the valorization of cultivated diversity in wheat (participatory breeding), maize (marker-assisted selection and genomic selection), and by conceiving varietal or species mixtures.





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Five research teams contribute to scientific reflexions.

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UMR**0320**

- Plant Science, Diversity, Health & Biotechnology
- Agroecosystems & Environment
- Digital Sciences & Systems Modelling

Topics

Research

Evolutionary genomics

Scientific animation is organized around three main axes. Research teams are involved in the different axes at a degree represented by the colored bars. The objective is to encourage discussions and research projects between the teams. It is also to gain into generality and foster interdisciplinarity by mobilizing the variety of different skills within the research teams.

Axe 1 : Understanding and shedding light on evolutionary mecanisms

Our research contribute to a better understanding of the *sources of genetic and epigenetic variations that shape phenotypic diversity*. We also develop experimental and mathematical approaches to better understand *genotype-phenotype relationship and the evolution of life-history traits*.

Axe 2 : Understanding and predicting the genetic bases of interactions

Our skills in quantitative genetics are used to question biological interactions at different scales, from *genetic interactions* (dominance, epistatis) to *biotic interactions* (between individuals from different species). In between, we are interested in *genotype by environment interactions* (GxE) and *plant-plant interactions* (GxGxE) measured at the individual or at the settlement scales. We develop integrative system's genetics approaches.

Axe 3 : Understanding and mobilizing cultivated diversity to provide solutions for agriculture and its actors

Our operational knowledge on the genetic resources of cultivated plants and our skills in selection methods for allogamous or autogamous plant species are used to meet the diversification challenges of the agroecological transition. Our specificities are the mastering of *participatory plant breeding, genomic selection*, and *breeding for diversification* (new plant traits, varietal and/or 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 andprofessors 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, genomics, integrative biology, biomathematics (approximately 2500h/years).

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