

JOB POSITION

Post-doctorat Estimer le potentiel évolutif des forêts de chênes en combinant génétique quantitative et modélisation démogénétique

The French National Research Institute for Agriculture, Food, and the Environment (INRAE) is a public research establishment. It is a community of 12,000 people with more than 200 research units and 42 experimental units located throughout France. The institute is among the world leaders in agricultural and food sciences, in plant and animal sciences, and is 11th in the world in ecology and environment. INRAE's main goal is to be a key player in the transitions necessary to address major global challenges. In the face of the increase in population, climate change, scarcity of resources and decline in biodiversity, the institute develops solutions for multiperformance agriculture, high quality food and sustainable management of resources and ecosystems.

WORKING ENVIRONMENT AND ACTIVITIES

■ You will join the BIOGECO laboratory, a joint research unit comprising staff from INRAE and the University of Bordeaux. Your work will be part of the Horizon Europe OptFORESTS project (www.optforests.eu) under the supervision of Benjamin Brachi (BIOGECO) and Ivan Scotti (URFM, Avignon).

European white oaks account for 30% of France's forest cover. These forests provide important ecosystem services, including supporting biodiversity and economic activity. These forests are typically managed as even-aged stands with uniform age structure, following a 180-year management cycle that concludes with a natural regeneration phase. During this phase, seed trees are selected based on size and shape and maintained at a low density on the plots. These trees will produce the seedlings for the next rotation before being harvested.

■ Recent successive droughts and heatwaves have caused significant die-offs in these populations, raising concerns among forest owners and managers. This has led stakeholders to consider adaptive management actions, such as assisted gene flow, assisted migration and species diversification. The aim of all these strategies is to maintain ecosystem services, often at the expense of natural regeneration—the renewal of forests through the reproduction of local trees.

■ It is therefore essential to properly estimate the evolutionary potential of white oak forests over the next forest rotation, which will see the bulk of climate change.

■ In OptFORESTS, we generated whole-genome sequencing data for 50 provenances of *Quercus petraea* (10 individuals per provenance) from across the species range, as well as for three populations displaying extensive oak decline (80 trees per population). A postdoc in the group of Christian Rellstab at WSL, Switzerland, will investigate whether oak populations are locally adapted at a range-wide scale and how maladapted they might become in the context of climate change. This work will be carried out using genome-environment associations and genomic offset computations in combination with growth-related traits from tree rings.

■ The goal of the position is to model oak population evolution under climate change, in scenarios with and without assisted gene flow from other provenances. The ultimate goal is to inform the debate about how such strategies might influence the adaptive potential of these large and genetically diverse oak populations. We will first retrieve potentially adaptive alleles from Genome-Environment association analyses (GEA) performed by our colleagues from WSL. We will then leverage multiple datasets of fitness components collected in common gardens, such as growth or drought resistance, to estimate allelic effects for these alleles. This will allow computing expected relative fitness of trees in declining forests and simulate the range of potential phenotypes that will be generated in natural regeneration (given random

mating in the population). By applying various selective filters on this potential natural regeneration, we will characterize the adaptive potential of each population. Finally, we will model the introduction of genetic variation from other provenances and ask how assisted gene flow will influence the evolutionary trajectories of oak populations.

- OptFOREST funding covers one year of postdoctoral support, with additional funding already secured to prolong the contract for an additional year. One of these funding sources would come from a project focused on demo-genetic modelling of evolutionary processes in seedling cohorts and is directly relevant to estimating the evolutionary potential and the extent of genetic change that can be expected in response to climate change.

- Special conditions of activity: This position is mostly focused on data-analyses and modelling and will involve little field work. Participation to field work performed in the team is however possible and encouraged.

Work will be executed in close collaboration with colleagues in Switzerland, and therefore travel to meetings in European countries will likely happen multiple times a year.

INRAE'S LIFE QUALITY

By joining our teams, you benefit from (depending on the type of contract):

- until 30 days of annual leave + 15 days "Reduction of Working Time" (for a full time);
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- skills development systems: [training](#), [career advise](#);
- [social support](#): advice and listening, social assistance and loans;
- [holiday and leisure services](#): holiday vouchers, accommodation at preferential rates;
- [sports and cultural activities](#);
- collective catering.

TRAINING AND SKILLS REQUIRED

- Recommended training: PhD
- Knowledge required: A background in population genetics and/or ecological genomics is expected.
- Appreciated experience: Previous experience with demo-genetic modelling is important for the project and will be highly valued during the candidate selection.
- Skills sought: Previous experience in bioinformatics, version control, high performance computing, workflow management will be appreciated. Programming in bash, R and python (or another language) are required.

➤ Reception modalities

- Unit: UMR BIOGECO
- Postal code + city: 33610 CESTAS FRANCE
- Type of contract: Postdoc
- Duration of the contract: 12 months renewable
- Starting date: January or February 2026
- Remuneration: 3135,81€ gross monthly salary

➤ How to apply

Send a motivation letter and a CV to:

Benjamin Brachi

- [By e-mail](mailto:benjamin.brachi@inrae.fr): benjamin.brachi@inrae.fr

- [Par postal way](#): Benjamin Brachi

UMR 1202 BIOGECO

INRAE - Campus de recherche & Innovation Forêt-Bois

69 route d'Arcachon

33610 Cestas, FRANCE

	✖ Deadline for applications: 15/11/2025
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