POSTDOCTORAL POSITION DESCRIPTION

Assessing vulnerability of olive tree in face of a changing climate:
a genomic perspective

The postdoctoral researcher will work on assessment vulnerability of olive tree in face to climate change as part of a large project *ClimOliveMed* (2021-2025).

Context

Olive tree (*Olea europaea* L., subsp *europaea*) is an iconic tree from the Mediterranean. In its native form, olive tree is found from the eastern (Turkey) to the western part (Spain, Morocco and Portugal) of the Mediterranean basin and up into the northern latitude to the south of France. Its cultivated form is thought to have been domesticated in the eastern part of the wild range before spreading in all the Mediterranean basin, with possible gene flow with local wild relatives (Besnard *et al*., 2018; Gros-Balthazard *et al*., 2019; Khadari & El Bakkali, 2018).
Climate change is expected to have an impact on the olive culture through two major identified effects: first, the increase in amplitude and frequency of severe drought events can dramatically reduce the yield and affect the quality of the production (Alfieri *et al*., 2019); second, the increase of winter temperatures can lead to locally not fulfill the chilling requirements needed to initiate flowering and thus participate to yield reduction (Haberman *et al*., 2017). These fundamental aspects of the tree phenology are moreover exacerbated by the perennial nature of the plant that can lead to multi-annual consequences of such events. In a large collaborative research project involving scientific teams from four different Mediterranean countries (Morocco, Spain, France and Italy) and associating professional actors of olive production, the project goal is to investigate the local adaptation to environment of olive tree populations and to predict how these populations could be impacted by climate change in the future. These studies will be conducted on both cultivated and wild olive.

Objectives and research subject

This postdoc position will focus on estimating the vulnerability of olive trees using two main approaches. First, using niche ecological modeling approaches, the postdoctoral researcher will establish the putative range of cultivation and predict its change in the future climate conditions. To do this, he/she will benefit from occurrence data of the cultivated varieties all over the Mediterranean and from publicly available climate datasets. These occurrences together with their growing conditions will help to model the niche of the cultivated species and thus the prediction of the cultural range both under present and future conditions. Anticipated tools to be used in this section include machine learning or maximum likelihood based approaches that can model the suitable range of a species given its occurrence data. Data on wild stands from the western part of the Mediterranean where wild trees are expected to have evolved without cultivated introgression will be available to enable niche modeling of the wild compartment and comparison with the cultivated one.
In a second part, the postdoctoral researcher will assess the genomic vulnerability (also referred to as "genetic offset") of the olive tree cultivated varieties. Using a whole genome sequencing dataset obtained from a reference set of 200 cultivated varieties, he/she will use machine learning approaches (for instance gradient forest; Bay *et al*, 2018; Rhoné *et al*, 2020) to model the relationships between current climate conditions and allelic composition turnouts. Then, based on future climate projection, he/she will identify the regions of the cultural basin that are in greater threat regarding future climate conditions. As well as in the first part, a comprehensive genomic dataset will be generated for wild populations in the western Mediterranean (through a capture experiment in a Pool-seq design) in the frame of a PhD position. The postdoctoral researcher will be associated to the bio-informatics analysis of this dataset and will use it to assess the wild olive tree genomic vulnerability.

Environment and interactions

The postdoctoral researcher will be recruited by **CIRAD** (French Agricultural Research Centre for International Development) in **Montpellier, France**.
He/She will be hosted at the Joint Research Unit (JRU) **AGAP Institut** (https://umr-agap.cirad.fr/en) with the following advisors : B. Khadari (AGAP Institut), B. Rhoné (AGAP Institut) and P. Cubry, IRD, (JRU DIADE, http://diade.ird.fr/). Regular exchanges and reports with different scientists and stakeholders are anticipated. As part of a collaborative effort, the postdoc is expected to interact and possibly mentor graduate students. Large interactions will be expected with two PhD students (Lison Zunino and Laila Aqbouch, 2020-2023) working on the same collaborative network.

Competences required

The postdoc is expected to have knowledge in population genetics as well as in ecology or ecological genomics. Skills in command line (bash/linux) are required, as well as knowledge of at least one programming/statistical language (Python, R). Basic bio-informatics skills would be appreciated.

Duration and dates

The postdoc should start no later than **December 2022**, for a period of **24 months**.

Remuneration

Remuneration: **from €2,147 net per month (from €62,800 gross /year)**
The candidate will benefit from the French Social Security system.

Travel costs Italy-France will be covered by CIRAD, as hosting institution.

Deadline for submission

30 September 2022, 11.59 PM

Submission process

The candidate must apply onto the Agropolis Fondation plateform:
https://agropolis.jotform.com/221932186908058

Documents required: Detailed CV + cover letter + support letter from an Italian academic or research institution + one or two referees's contact details (scientists)

Contact

Administrative contact:

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