

ClimOliveMed

Diversity of varieties and farming systems as an asset of Mediterranean oleiculture in a global change setting

ABSTRACT

Olive (*Olea europaea* L., Oleaceae) is an iconic fruit tree species for human societies in the Mediterranean area. It is considered as a structural element of many Mediterranean agroecosystems and is currently a major global source of edible oil, whose demand is sharply increasing due to its high nutritional value. Nowadays, olive growing is still highly diversified since more than thirty varieties are cultivated in the Mediterranean Basin (MB hereafter). Olive orchards are characterized by a diversity of cropping systems, ranging from extensive and diversified agroecosystems to super-intensive. World olive oil production is estimated at 3 million t/year (~75% in European Union countries) and markets are highly diversified ranging from a mass market with standard products to niche markets for products with signs of quality and high value. ClimOliveMed project will address two pivotal questions: i) how the diversity of varieties, cropping systems can be mobilized to strengthen the sustainability of Mediterranean olive growing; and how the invaluable asset of the rich olive agrobiodiversity can serve as an insurance to face climatic change.

ClimOliveMed is structured into three work packages. The first and second ones correspond to disciplinary research lines, while the third is devoted to the collective action between academic and sector actors through workshops to share knowledge and perspectives and design sustainable olive tree production trajectories.

Focusing on the diversity of olive varieties within the worldwide collection (Porquerolles and Marrakech), the first pillar aims at identifying the most relevant and easy-to-measure phenotypic traits and genomic markers. The objective is to characterize local genetic resources with respect to chilling requirements on the one hand and drought tolerance on the other hand, in order to identify olive genotypes adapted to different facets of climate change. Three aspects of olive biology will be studied: i) biological processes of olive flowering linked to winter cold temperature, ii) phenotypic traits to provide a broad view as to how olive trees cope with drought, iii) genomics of local adaptation of wild olive and genomic association to phenotypic traits of cultivated olive.

Keywords : Olive tree, Climate change, Agrobiodiversity, Trait phenotyping, Genomic variation, Adaptation, Farm management, Value chain, Policy process, Knowledge sharing, Interdisciplinary research, Olive, *Olea europaea* L., Oleaceae, Morocco, France

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Flagship project : no

Project leader : Selim Louafi

Project leader's institution : CIRAD

Project leader's RU : AGAP

Budget allocated : 430000 €

Total budget allocated (including co-financing) : 1640000 €

Funding : Labex

GOAL

ClimOliveMed aims to increase understandings on biological, economic and social factors for enhanced resilience and sustainability of Mediterranean olive growing in face of climate changes and to open new public spaces for increased awareness and collaboration among actors to design and manage adaptation strategies. Two main pivotal research questions will be addressed: i) how the invaluable asset of the rich olive agrobiodiversity can serve as a risk-mitigation strategy to face climatic change? ii) How the diversity of cropping systems and markets can serve as a factor for enhanced resilience and sustainability of Mediterranean olive growing?

ACTION

- 1) Focusing on olive tree adaptation to climate change, the first objective aims to define the most relevant and easy-to-measure phenotypic traits and genomic markers for characterizing local genetic resources regarding (i) chilling requirements and the related flowering times and (ii) regarding drought tolerance in order to identify olive genotypes adapted to climate change
- 2) The second main objective of ClimOliveMed is to understand to what extent olive producer and actors of the value chains will be able to mobilize the genetic and phenotypic potential of olive trees to respond to climatic changes challenges. More precisely, we aim to: i) look at how olive growers manage agrobiodiversity in relation to climatic changes or other drivers (market forces, landscape management); ii) focus on how value chains governances consider olive tree biodiversity as an asset to support the adaptation process of the sector to observed or anticipated effects of climate change.
- 3) As the issues of climate change adaptation of olive-growing systems and olive tree varieties involve the management of complex socio-ecological systems in a context of pervasive uncertainty and plurality of values and perspectives, the third objective of ClimOliveMed is to open new deliberative spaces with all interested parties to reflect on the diversity of strategies for coping with climate change, and make explicit the differences in representations of the collective action problems. This objective will be achieved at the level of the consortium itself, at the territorial levels (France and Morocco), and at the global policy level.