CLIMATE SERVICES FOR THE OLIVE AND OLIVE OIL SECTOR

Olive and olive oil production is heavily affected by weather and climate, and is thereby highly vulnerable to climate change. MED-GOLD will use a range of tools to support decision-making in the olive and olive oil sector over a range of timescales, from months to decades. These tools will include climatic indices, numerical models, and agroecosystem analyses to turn climate and other data into customized products. This process of turning climate-related information into products with added value for decision-making is called climate service. Climate information underlying the services will be provided at higher spatial resolution and with less bias than currently available.

Olive and olive oil producers face a variety of climate-related challenges in the long, medium and short term that need to be tackled by climate-informed decision-making. Some of the main challenges are presented below, with an indication of how the related decisions can be optimized using appropriate climate services tools that support a long-term strategy as well as shorter-term agricultural and commercial management.

Time scale	Decision type	Challenges	MED-GOLD climate services tools	Benefits
Short-term (e.g., 30 days)	Agro-management	• Optimize pest treatments • Optimize irrigation planning	• Temperature • Precipitation • Numerical modelling of pests and evapotranspiration • Insolation	• Reduce pest damage while protecting the environment • Optimize the use of water resources
	Quality management	• Better estimate pest affectation and frost damages • Correct olive formation		• Optimize olive and olive oil quality
Mid-term (e.g., 6 months)	Agro-management	• Optimize fertilization planning • Optimize irrigation planning	• Temperature • Precipitation • Numerical modelling of productivity	• Sustainability • Optimization of the use of fertilizers
	Stock management	• Better estimation of olive production • Improve the selling process		• Improve stock and selling planning
Long-term (e.g.,10-20 years)	Long-term strategy	• Select production areas • Decide type of exploitation (traditional, intensive, etc.) • Select tree spacing, varieties, etc.	• Temperature and precipitation patterns • Bioclimatic indices (see glossary): - Mean summer max. temperature - Mean winter min. temperature - Num. of winter cold days - Num. of annual & spring heat days - Num. of summer heat days - Total annual, summer & winter precipitation - Num. of annual & winter dry days • Numerical modelling of pests and productivity	• Future productivity per geographical area • Regional recommendations for improved crop management strategy • Cost-benefit analysis per productivity area • Exploitation adaptation and investment evaluation

Control of olive fruit fly *(Bactrocera oleae)*

Olive fruit fly is the major pest of commercial olives worldwide and its dynamics is strongly linked to both olive fruit development and the local climate, with mild temperatures and medium to high air humidity being especially favorable. In Andalusia (Spain), adult flies first emerge in spring and attack olives remaining on trees from the previous season, but damage typically starts in summer (usually in mid-July). When pits begin to harden, fly eggs are laid in olive fruits, and larvae that hatch from these eggs cause direct damage by feeding on olive fruit pulp. Larval feeding also causes indirect damage by both inducing fruit drop and allowing microorganisms to invade the fruit, which results in increased acidity and lowered quality and value of olive oil (losses can be up to 80%).

Currently, olive producers advised by DCOOP (MED-GOLD's champion user for the olive sector) use traps with sex-pheromones or diammonium phosphate food bait to monitor olive fruit fly. To control this pest, they apply phytosanitary treatments as well as other less common methods such as biological control.

Advantages of having access to mid-term (seasonal) climate predictions:

1. **Identification of regions at risk for olive fruit fly attack.**
2. **Improved control of olive fly pest** through anticipation of pest attacks and application of treatments during early stages of the fly lifecycle.
3. **Efficient management of phytosanitary treatments,** by applying them when more effective and by avoiding them when not needed, thus reducing environmental damage.

Glossary

Agroecosystem analysis: holistic approach required to analyze the complexity of agricultural systems that considers aspects from ecology, sociology, economics and politics (e.g. in the form of agro-technical inputs, invasive species, climate change…)

Climate pattern: a calculated value or profile used to describe the state and changes in the climate system

Climate projections: probabilistic estimates of climate variables that extend well into the future (long-term), from decades up to the end of the century

Climate services: transformation of climate-related data and other information into customized products such as trends, economic analysis, advice on best practices, and any other climate-related service liable to benefit that may be of use for the society

Mean summer maximum temperature: average daily maximum air temperature during summer

Mean winter minimum temperature: average daily minimum air temperature during winter

Numerical modelling: a computer model that is designed to simulate and reproduce the mechanisms of a particular system

Number of annual and spring heat days: count of days with maximum temperature above 28ºC per year and in spring

Number of annual dry days: count of days with precipitation below 2 mm per year

Number of winter cold days: count of days with minimum temperature below -7ºC in winter

Seasonal predictions: probabilistic forecasts of climate variables for the next season (up to 6 months)

Total annual, summer and winter precipitation: total amount of rainfall per year, in summer and in winter

Weather forecasts: probabilistic forecasts of climate variables for the next hours and days (up to two weeks)

About MED-GOLD

MED-GOLD, Turning climate-related information into added value for traditional **MED**iterranean **G**rape, **OL**ive and **D**urum wheat food systems, is a 4-year project contributing to make European agriculture and food systems more resilient, sustainable and efficient in the face of climate change by using climate services to minimize climate-driven risks/costs and seize opportunities for added value

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