



Fine-scale ecological and economic assessment of climate change on olive in the Mediterranean Basin reveals winners and losers

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The Mediterranean Basin is a climate and biodiversity hot spot, and climate change threatens agro-ecosystems such as olive, an ancient drought-tolerant crop of considerable ecological and socioeconomic importance. A 2 °C increase in average temperature is a widely used metric for assessing risks associated with global warming and as a policy reference, and this level of

warming will likely occur in the Basin between 2030 and 2060 with unknown biological and economic impact on major crop systems.

We here estimate the effects of climate change on the dynamics and interaction of olive and the fly using physiologically based demographic models in a geographic information system context as driven by daily climate change scenario weather.

A regional climate model that includes fine-scale representation of the effects of topography and the influence of the Mediterranean Sea on regional climate was used to scale the global climate data. The system model for olive/olive fly was used as the production function in our economic analysis, replacing the commonly used production-damage control function. Climate warming will affect olive yield and fly infestation levels across the Basin, resulting in economic winners and losers at the local and regional scales.

At the local scale, profitability of small olive farms in many marginal areas of Europe and elsewhere in the Basin will decrease, leading to increased abandonment.

Our fine-scale bioeconomic approach provides a realistic prototype for assessing climate change impacts in other Mediterranean agro-ecosystems facing extant and new invasive pests. This kind of approach will be used also in the wider framework of the activities of EU project IMPACT2C