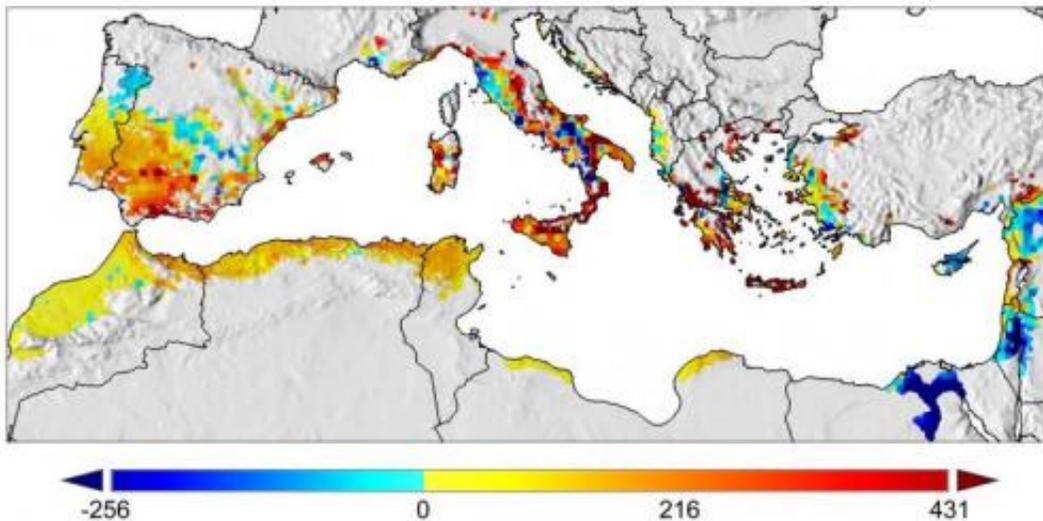


Study suggests global warming may be a boon to Mediterranean Basin olive growers

March 25 2014, by Bob Yirka



A model predicts which regions of the Mediterranean Basin may expect increased (yellow to red color range) or decreased (blue colors) profits (in euros per hectare) from olive crops after a 1.8°C increase in average temperatures.

Credit: Luigi Ponti

(Phys.org) —A team of researchers in Italy has built a model that they've used to predict the impact of global warming on the olive business in the Mediterranean Basin. In their paper published in *Proceedings of the National Academy of Sciences*, the team describes how they added the ability to factor in both weather changes and pest persistence in modeling a change of 1.8°C warming, to reflect forecasts of temperature increases in the region between 2030 and 2060.

Most predictions of the consequences of [global warming](#) have been dire—more flooding, draughts and the spread of disease. In contrast, an increase in temperature in a part of the planet responsible for producing 97 percent of the world's [olive oil](#) appears to portend an increase in production and profits—at least for growers in most of the region.

Historical evidence allows for predicting how well [olive trees](#) will grow under different weather conditions and of course, how productive those trees will be. To build their model, the researchers took account of factors such as average temperature, heat, humidity levels, etc. That's where most models stop, but in the Mediterranean Basin, that's not the end of the story, because olive production is also heavily impacted by the olive fruit fly which destroys olives. Prior studies have revealed which environments the flies prefer or not—the researchers added such information to their model as well. After crunching the data, the computer displayed a map of the entire area color-coded to clearly show what sort of impact global warming should have on olive production in various parts of the region over the next half century.

Olive trees can withstand draught and high temperatures, but the olive fruit fly cannot. That's why the map the model spit out shows increased tree growth and production in Southern Spain, Northern Africa and parts of Italy and Greece—but it also explains why some areas, such as the Middle East might see less production, because temperatures up till now have been too chilly for the olive fruit fly to survive.

Overall, the model projects the region will see an average 4.1 percent increase in crop yield along with a drop of 8 percent in olive fruit fly infestations. This will translate to an increase in profits of 9.1 percent, a very different scenario than what is expected to occur in many other parts of the world.

More information: Fine-scale ecological and economic assessment of

climate change on olive in the Mediterranean Basin reveals winners and losers, Luigi Ponti, *PNAS*, [DOI: 10.1073/pnas.1314437111](https://doi.org/10.1073/pnas.1314437111)

Abstract

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. Climate change will impact the interactions of olive and the obligate olive fruit fly (*Bactrocera oleae*), and alter the economics of olive culture across the Basin. We 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. These marginal farms are critical to conserving soil, maintaining biodiversity, and reducing fire risk in these areas. 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.

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