



Mediterranean agriculture: More efficient irrigation needed to compensate increases in future irrigation water requirements

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Irrigation in the Mediterranean is of vital importance for food security, employment and economic development. Our research shows that, at present, Mediterranean region could save 35% of water by implementing more efficient irrigation and conveyance systems. Some countries like Syria, Egypt and Turkey have higher saving potentials than others. Currently some crops, especially sugar cane and agricultural trees, consume in average more irrigation water per hectare than annual crops (1).

Also under climate change, more efficient irrigation is of vital importance for counteracting increases in irrigation water requirements. The Mediterranean area as a whole might face an increase in gross irrigation requirements between 4% and 18% from climate change alone by the end of the century if irrigation systems and conveyance are not improved. Population growth increases these numbers to 22% and 74%, respectively, affecting mainly the Southern and Eastern Mediterranean. However, improved irrigation technologies and conveyance systems have large water saving potentials, especially in the Eastern Mediterranean, and may be able to compensate to some degree the increases due to climate change and population growth. Both subregions would need around 35% more water than today if they could afford some degree of modernization of irrigation and conveyance systems and benefit from the CO₂-fertilization effect (1).

However, in some scenarios (in this case as combinations of climate change, irrigation technology, influence of population growth and CO₂-fertilization effect) water scarcity may constrain the supply of the irrigation water needed in future in Algeria, Libya, Israel, Jordan, Lebanon, Syria, Serbia, Morocco, Tunisia and Spain (1). In this study, vegetation growth, phenology, agricultural production and irrigation water requirements and withdrawal were simulated with the process-based ecohydrological and agro-ecosystem model LPJmL ("Lund-Potsdam-Jena managed Land") after a large development that comprised the improved representation of Mediterranean crops (2).

References: (1) Fader, M., von Bloh, W., Shi, S., Bondeau, A., Cramer, W. (2015) : Mediterranean irrigation under climate change : More efficient irrigation needed to compensate increases in irrigation water requirements. HESSD 12, 8459–8504. (2) Fader, M., von Bloh, W., Shi, S., Bondeau, A., Cramer, W. (2015) : Modelling Mediterranean agro-ecosystems by including agricultural trees in the LPJmL model. Geosci. Model Dev., 8, 3545-3561, 2015.