Geophysical Research Abstracts
Vol. 19, EGU2017-14196, 2017
EGU General Assembly 2017

Impact of climate change on irrigation management for olive orchards at southern Spain

Ignacio Lorite (1), Clara Gabaldón-Leal (1), Cristina Santos (1), Angjelina Belaj (1), Raul de la Rosa (1), Lorenzo Leon (1), and Margarita Ruiz-Ramos (2)

(1) IFAPA – Alameda del Obispo, Córdoba, Spain, (2) CEIGRAM, Technical University of Madrid, Madrid, Spain

The irrigation management for olive orchards under future weather conditions requires the development of advanced tools for considering specific physiological and phenological components affected by the foreseen changes in climate and atmospheric [CO_2]. In this study a new simulation model named AdaptaOlive has been considered to develop controlled deficit irrigation and full irrigation scheduling for the traditional olive orchards located in Andalusia region (southern Spain) under the projected climate generated by an ensemble of 11 climate models from the ENSEMBLES European project corresponding to the SRES A1B scenario.

Irrigation requirements, irrigation water productivity (IWP) and net margin (NM) were evaluated for three periods (baseline, near future and far future) and three irrigation strategies (rainfed, RF, controlled deficit irrigation, CDI, and full irrigation, FI). For irrigation requirements, a very limited average increase for far future compared with baseline period was found (2.6 and 1.3%, for CDI and FI, respectively). Equally, when IWP was analyzed, significant increases were identified for both irrigation strategies (77.4 and 72.2%, for CDI and FI, respectively) due to the high simulated increase in yield. Finally, when net margin was analyzed, the irrigation water cost had a key significance. For low water costs FI provided higher net margin values than for CDI. However, for high water costs (expected in the future due to the foreseen reduction in rainfall and the increase of the competence for the available water resources), net margin is reduced significantly, generating a very elevated number of years with negative net margin.

All the described results are affected by a high level of uncertainty as the projections from the ensemble of 11 climate models show large spread. Thus, for a representative location within Andalusia region as Baeza, a reduction of irrigation requirements under full irrigation strategy was found for the ensemble mean (equal to 0.5%). However, when the individual projections from the 11 climate models were considered the variation of irrigation requirements for far future compared with baseline period ranged from increases of 8.5% to reductions of 10.7%. This fact demonstrates the necessity to consider ensembles of climate models for identifying averaged impacts and the range of variability of these impacts, quantifying the uncertainty in the estimates related with water management in the future.

The study concludes that the promotion of controlled deficit irrigation strategies is an excellent adaptation strategy. However, this strategy must be supported with the enhance of farmers' training by the implementation of local or regional irrigation advisory services.