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Climate change and irrigation in northern Italy, scenarios of adaptation from the Agroscenari project

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Agroscenari is an Italian project funded by Italian Ministry of Agricultural and Forest Policies (Mipaaf). The objective of the project is to identify adaptation strategies to climate change of the main Italian agricultural systems, assessing their sustainability. In the framework of this project, downscaled climatic scenarios for six Italian study areas were produced. These scenarios are referred to the period 2021-2050, based on IPCC emission scenario A1B, using output of 5 AOGCM from the European ENSEMBLES Project. A statistical downscaling technique applied to these outputs is used to reach this objective. The method consists of a multivariate regression, based on Canonical Correlation Analysis. The observational data set provided by CRA-CMA (Meteorological and climatologic research unit for agriculture) is composed by a reconstruction of daily minimum, maximum temperature and precipitation on a 30 km national grid for years 1951-2009.

This paper concentrates on research theme 5 of the project (Irrigation and climate change), more specifically on irrigation water need for kiwifruit orchards and tomato crops, well diffused in the two Agroscenari study areas (named Val Padana and Faenza) located in northern Italy. Climate change impacts on the irrigation water need were analyzed by means of the Criteria soil water balance model, developed by ARPA-SIMC.

From the analysis of the downscaled projections for the period 2021-2050, increases of temperatures in all seasons for both the study areas can be observed: the anomalies with respect to 1961-1990 reference period reach +2.0°C in summer. A precipitation decrease is expected in summer but increases in autumn and spring are projected, with stronger intensity in ValPadana area (+20%). As a consequence, the increase in evapotranspiration demand due to the temperature increase can be partially compensated by increase in spring precipitation and by storage effect of the soil at the beginning of the summer. Therefore a dramatic increase of water demand from irrigated crops is not expected, but only a higher frequency of years with high irrigation demand. Moreover in this study we tested a worst case scenario where the spring precipitation increase is excluded, with speculative heavier effects on irrigation.