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Quantifying the effect of Tmax extreme events on local adaptation to climate change of maize crop in Andalusia for the 21st century

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Extreme events of Tmax can threaten maize production on Andalusia (Ruiz-Ramos et al., 2011). The objective of this work is to attempt a quantification of the effects of Tmax extreme events on the previously identified (Gabaldón et al., 2013) local adaptation strategies to climate change of irrigated maize crop in Andalusia for the first half of the 21st century.

This study is focused on five Andalusia locations. Local adaptation strategies identified consisted on combinations of changes on sowing dates and choice of cultivar (Gabaldón et al., 2013). Modified cultivar features were the duration of phenological phases and the grain filling rate. The phenological and yield simulations with the adaptative changes were obtained from a modelling chain: current simulated climate and future climate scenarios (2013-2050) were taken from a group of regional climate models at high resolution (25 km) from the European Project ENSEMBLES (http://www.ensembles-eu.org/). After bias correcting these data for temperature and precipitation (Dosio and Paruolo, 2011; Dosio et al., 2012) crop simulations were generated by the CERES-maize model (Jones and Kiniry, 1986) under DSSAT platform, previously calibrated and validated.
Quantification of the effects of extreme Tmax on maize yield was computed for different phenological stages following Teixeira et al. (2013). A heat stress index was computed; this index assumes that yield-damage intensity due to heat stress increases linearly from 0.0 at a critical temperature to a maximum of 1.0 at a limit temperature. The decrease of crop yield is then computed by a normalized production damage index which combines attainable yield and heat stress index for each location.
Selection of the most suitable adaptation strategy will be reviewed and discussed in light of the quantified effect on crop yield of the projected change of Tmax extreme events.

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