The title (العنوان):

# Impact of temperature on agricultural drought occurrence under the effects of climate change



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**Abstract :** The frequency of drought events in the Mediterranean region has increased significantly in recent years, along with a substantial increase in their spatial and temporal extent. These events are associated with high temperatures and low precipitation. Our study presents a vision on the impact of temperature on agricultural drought frequency, severity, and temporal extent under future scenarios over seven vast plains located in the semi-arid region of the Mediterranean basin. A multivariate frequency analysis of both meteorological and agricultural drought characteristics is based using the copula theory. The return periods of past and future drought events are determined using the two drought indices standardized precipitation index and standardized precipitation evapotranspiration index. The projected drought events are determined based on climate simulations (monthly precipitations and temperatures) from the RCA4-MPI-ESM-LR model, and the projection period was forced by the two representative concentration pathway scenarios RCP4.5 and RCP8.5. Results showed that the frequency of drought events is much higher if only precipitation (SPI) is taken into account than if overall climate (precipitation and temperature, SPEI) is considered while their severity and duration are more intense using SPEI. The risk of drought is best estimated by multivariate frequency analysis where the unvaried return periods, considering the duration or severity, underestimate the recurrence of events. Drought events in the plains are likely to be more severe and to last longer, particularly during the hot season (between May and September) between 2021 and 2071 according to the two future scenarios. In addition, agricultural production is threatened by a spring agricultural drought (between February and April) between 2050 and 2100 under the RCP4.5 scenario, which can have serious consequences on agricultural income as well as food security.

**Key words :** Temperature ; Agricultural drought ; Climate change