

Climate change in Algeria and its impact on durum wheat

Nacira Chourghal (1), Jean-Paul Lhomme (2), Frédéric Huard (3), and Abdellah Aidaoui ()

(1) Université de Bordj Bou Arreridj, Laboratoire de Caractérisation et Valorisation des Ressources Naturelles, 34000 Algeria , (2) IRD (UMR LISAH), 2 Place Viala, 34060 Montpellier, France , (3) INRA (US AGROCLIM), Domaine Saint Paul, CS 40 509, 84914 Avignon, France , (4) ENSA, Laboratoire de Maîtrise de l'Eau en Agriculture, El Harrach, 16000 Algeria

According to IPCC reports, the Mediterranean basin and particularly the North African area are amongst the most vulnerable regions to climate change. However, the information concerning the North-African zone is very limited and studies on climate change have never been conducted in Algeria up to now. This paper aims at bridging this information gap and initiates a first research on the impact of climate change on durum wheat cropping, the most strategic commodity in the food system and in the national economy of Algeria. Climate projections for the distant future (2071-2100), obtained from the ARPEGE-Climate model of Météo-France run under the medium A1B SRES scenario, are introduced into a simple agro-meteorological crop model previously validated with field data. Two options for the sowing date are assessed: a dynamical date, chosen within the traditional sowing window by means of a rainfall criterion, or a prescribed date with supplemental irrigation on the same day. Crop development is modelled using thermal time and maximum yield is determined from the accumulation of solar radiation. A water stress index is inferred from a daily water balance model and actual yield is estimated from potential yield corrected by the water stress index. The model also takes into account the occurrence of dry periods during the growing season, which can induce partial or total failure of the crop cycle. Two stations, representative of two of the three agro-climatic areas where durum wheat is grown, were chosen: Algiers in the central northern region and Bordj Bou Arreridj in the eastern high plains. Climate change is not similar for both areas, but a tendency toward aridity is clear especially in spring. Future temperature and potential evapotranspiration increase in both regions with a maximum in spring and summer. In Algiers rainfall will decrease throughout the year and mainly in spring and summer. Conversely, summer precipitation in Bordj Bou Arreridj will increase significantly. In both regions the autumn rains will increase in the future climate, the possibilities of early sowing will be improved, crop cycle will be reduced and harvest will take place earlier. In Algiers, yields tend to decrease in the future climate, whereas in Bordj Bou Arreridj, a dynamical (earlier) sowing will tend to keep yields at their current level.