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Simulation of winter wheat yield and its uncertainty band; A comparison of two crop growth models

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In this study, we used the WOFOST and AquaCrop crop growth simulation models to examine crop yield responses to a set of plausible scenarios of climate change in Mashhad region, located in Ghareghom basin, northeast of Iran up to 2040. We selected winter wheat as an indicator crop. Also six AOGCMs including GFCM21, HADCM3, INCM3, IPCM4, MPEH5 and NCCCSM under A2 and B1 emission scenarios are used. LARS-WG statistical method for downscaling is utilized. In the present research, using 7-year observed crop data, the crop models were calibrated and then validated. Evaluation of WOFOST and AquaCrop models confirmed the models are able for simulating the yield of wheat grown in the study area. The results showed that average potential yield of wheat ranged from 3.43 to 8.42 and 2.76 to 6.49 ton.ha-1, in AquaCrop and WOFOST models, respectively. Finally, the uncertainty band due to the six AOGCMs for estimating crop yield is drawn and investigated. These bands show possible changes for the yield in the future period to the past one. It can be concluded the positive effects of climate warming and elevated CO_2 concentrations on the production in the studied region.