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EXTENDED ABSTRACT

Simulating Barley Yield under Different Irrigation Levels by using AquaCrop Model

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Introduction

As the population grows and people's living standards rise, the global demand for freshwater is constantly increasing. Agriculture is not only the largest consumer of water in the world, but also one of the cheapest and least efficient consumers with the highest subsidy rates. Nowadays, optimal management of irrigation water is very essential issue and valuable tools calls irrigation management models to improve for this optimizing and Facilitating. For this purpose, the two-year 2004-2005 & 2005-2006 experiment to determine the accuracy of the simulation AquaCrop model calibration and AquaCrop indices barley crop was in Darab-IRAN. Many countries, especially those located in arid and semi-arid areas, need water to produce agricultural products, and many of our country's crops and gardens are also cultivated in the water.

Materials and Methods

In this research, at least two years of farm data are needed. If calibration and validation results are acceptable, then models can be used on a wide scale. Therefore, for the purpose of this study, the measured results of barley culture were used. In this research, there were 10 types of barley cultivars including: Eiza, Gachsaran, Walfajar, Karun in the desert, Basil, EB-79-4, EB-80-9, EB-80-7, South, and shoulder at the research station Bakhtajerd, located in Fars province, Darab city, 253 km of Shiraz highway, with a length of 54'1746 and a latitude of 28'47 028 and altitude of 1098 km, during two years of 1383-84 and 85- 2005 cultivated. The model was simulated through the comparison of results of field studies and measuring calibration of the model in the first year and second year were used for validation. The model output includes soil moisture content, evaporation from soil surface, transpiration from vegetation, dry matter and plant yield. To better analyze the results of the model, the statistical indicators d and NRMSE are used as follows. The first statistical indicator used to estimate the performance of the model is the agreement index (d).

Results and discussion

Plant foliage dry matter values estimated by the model with statistical indices d and NRMSE in the first year of cultivation were 0.982 and 0.094 and in the second year 0.935 and 0.198,

respectively. The amounts of estimated yield in the first years were 0.981 and 0.172 and in the second year were 0.992 and 0.103, respectively. Statistical analysis showed that the AquaCrop model has high accuracy. The value of the index d in the first and second years of cultivation is estimated to be 0.906 and 0.930, which indicates that the model has a good accuracy in the estimation of vegetation evapotranspiration in the first and second years of cultivation and the model in both years the amount of this The parameter is well estimated. The model in the first year of cultivation with NRMSE is equal to 0.151 and in the second year of cultivation with a value of 138%, a good estimate of plant evapotranspiration. The amount of evapotranspiration measured in relation to the estimated data is shown in Figures (3) and (4) in the first and second year of the first and second year respectively. The value of the index d in the first and second years of cultivation is estimated to be 0.906 and 0.930, which indicates that the model has a good accuracy in the estimation of vegetation evapotranspiration in the first and second years of cultivation and the model in both years the amount of this The parameter is well estimated (Tables (5) and (6)). The model in the first year of cultivation with NRMSE is equal to 0.151 and in the second year of cultivation with a value of 138%, a good estimate of vegetative evapotranspiration. The amount of plant evaporation-transpiration of the plant dry matter and the grain yield measured against the estimated data from line 1 to 1 in the first and second year of cultivation respectively are shown in Figures (3) to (8).

Conclusion

The results of this study showed that the AquaCrop model can simulate the amount of grain yield, evapotranspiration, transpiration and water use efficiency in most cases. The AquaCrop model needs less input and output parameters than other simulation models to simulate the water performance of the water. But this simplicity does not reduce the accuracy and capability of the model. Regarding the errors in the field measurements, the model errors and the values of the statistical indices, it can be stated that this model has high accuracy in simulation, but it is suggested for better and more accurate evaluation of the efficiency of the model. Its efficiency for other products is also examined, and the accuracy of the model in low, moderate and severe stresses is discussed separately. One of the reasons that can be highlighted for the high accuracy of the simulation in this plan is to create a complete plant information file by the user and to fully adapt the information in the model to the region's conditions. Therefore, attention to this point in other researches is also of great importance. In each region, considering the effects of climate on the growth and development of the product, the plant information file must be constructed in accordance with the cultivar and climate.