Abstract

Planning known as precision irrigation in order to apply water by optimal amount and calendar is still in the development stages and requires a lot of research to evaluate its application. This thesis was implemented as one of the research priorities of the agriculture organization of Fars province in the Mianjangal Fasa farms during 2013-2014 years. The goal of this study was to compare the frequency of irrigations, the amount of water applied at the farms, the irrigation application efficiency and determination of yield per unit area on precision irrigation method and farmer's usual irrigation method. In this project both methods of irrigation were investigated in the statistical design of completely random design in each three farms with one hectare area and relatively similar conditions to the cultivation of region cropping pattern products including wheat, grain maize and tomato. In precision irrigation method optimum irrigation calendar by CROPWAT model was determined according to the ratio of three plants daily standard evaporatranspiration to olive daily standard evaporatranspiration in Iran's national water document in fasa plain and adjustment of these three plants daily water requirement by daily evaporatranspiration measurements of a intelligent irrigation system was installed in a olive garden in the region and also consideration of salinity and soil moisture changes. With regard to the lack of significant differences and surface irrigation model SIRMOD low irrigation duration simulation error on the basis of detailed field measurements and determination of the coefficients of the infiltration equation on the basis of two points advance method against of intelligent system automatic cut off times during 7 region olive garden irrigation, SIRMOD simulations in precision irrigation method were used to determination of the duration of irrigation operations in any following subunits farms. After accomplishment of irrigations, in accordance with calendar of both methods, the average designed application efficiency of 6 wheat precision irrigation was optimal number 74.7%, which is 3.2 times more than the average simulated farmer's application efficiency and is 23.7% more than the Iran's national water document target irrigation efficiency for fasa (51%). Also the average designed application efficiency of 16 grain maize precision irrigation was 52.3%, which is 1.78 times more than the simulated average farmer's application efficiency and is 1.3% more than target irrigation efficiency for fasa. The average designed application efficiency of 20 tomato precision irrigation was 62.6%, which is 2.1 times more than the simulated average farmer's application efficiency and is 11.6% more than target irrigation efficiency for fasa. 1.7 times growth of average irrigation water use efficiency (IWUE), 56.6% saving of the average irrigation water consumption in each hectare and 16.1% growth of average wheat yield, 70.7% growth of average water use efficiency of irrigation, 26.5% saving of the average irrigation water consumption in each hectare and 24.8% growth of average grain maize yield. 70.7% growth of average water use efficiency of irrigation, 36% saving of the average irrigation water consumption in each hectare and 33.5% growth of average tomato yield are main reasons for precision irrigation by optimal irrigation calendar and irrigation operation duration simulation success to solve two major Iran's fundamental agriculture problems including low irrigation efficiency and low irrigation water use efficiency. Therefore, precision irrigation demonstrates a positive outlook in ground water resources reduction, increasing of yield in each hectare and thus economic profitability toward Mianjangal Fasa farmers.

Key words: Precision irrigation, Intelligent systems, Iran's national water document, Irrigation efficiency, Water use efficiency, Mianjangal Fasa.

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Study of regional adjustment of Iran's national water document function based on intelligent systems on increasing of the irrigation efficiency and crops water use efficiency

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