Estimating of sesame crop water requirement in Sabzevar climate

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Extended Abstract

Introduction

Oilseeds after Cereals make up the second world food supply. Sesame is one of the oldest cultivated plants and possibly the world's oldest oil plants. Nowadays, sesame is used as a source of edible oil. Sesame home is warm and semi-warm areas, but its cultivation spread to temperate regions (Weise, 2000). To effectively and efficiently use the available water sources to meet the possible variation of cropping pattern, studies of crop water requirements for upland and paddy crops based on derived crop coefficient are crucial (Sheng et.al, 2006). Irrigation is a vital input in the agricultural productivity and agricultural growth. More than 80% of available water resources worldwide as well as in India are being presently utilized for irrigation purposes (Pradeep, 2015). World sesame cultivation in 2007 amounted to 3.7 million hectares and 3.3 million tons of production have been reported.

Research Methodology

Sabzevar City has expanded from 56° '04 to 58° '15 E and 35° '30 to 36° ' 58 N and has an elevation of 977 meters above sea level and with an area of 20502 square kilometers is located in West of Khorasan Razavi. To estimate crop water requirements (*CWR*) and irrigation water requirements (*IWR*) CROPWAT model was used. In this study, for the calculation of reference evapotranspiration, FAO - Penman-Monteith equation is used. To calculate the reference evapotranspiration using FAO-Penman-Monteith equation, climate data such as minimum and maximum air temperature, relative humidity, sunshine hours and wind speed is required. Other inputs of the model is cultivation pattern, the plant coefficient, the area under cultivation (1 to 100 percent of area), irrigation scheduling, soil type, the available soil moisture, root depth and water content in the soil.

Discussion and Results

According to the obtained results, the mountainous regions of northern Sabzevar in all phases have the lowest water requirement and southern regions have the greatest need of water. The results also showed that by moving from north to south, water requirement increases. Most of the irrigation requirement is related to the early and middle stages of growth. Soil moisture curve shows the least amount of soil moisture occur on the intermediate and final stages of product development. Results also showed that the crop coefficient in the middle stages of growth season is the highest value. The lowest water requirements occur in the final stages of growth season. The results indicated that the irrigation depth is occurred two to three months after the date of sesame cultivation.

Conclusion

Based on the results of the model, sesame crop water requirements in Sabzevar plain because of low rainfall and high temperature during the year and the long-term of the dry period shows a high level.

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The results showed that sesame plants to complete their growth needs to at least 20 times irrigation. It should be noted that to prevent soil crusting and emergence of a plant, round and deep of irrigation in the early stages of growth is low, but with the passage of time from planting date and getting to the middle phase of growth, both irrigation and water depth increases. Given that the final stages of development and ripening seeds in Sabzevar is consistent with the onset of the dry season, soil faced with moisture deficit and continuing of this process causing plant stress and lack of growth. Because the sesame plant is resistant to drought, in plain of Sabzevar produces good and economic products. In term of climatic conditions and compatibility of this product with environment, sesame can be cultivated but in the southern areas, it needs to repeat more frequently.

Keywords: Sabzevar plain, Sesame, water requirement, CROPWAT model.

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