

Abstract

The main purpose of this research was to investigate the effect of different levels of irrigation water and potassium fertilizer on Hibiscus tea (*Hibiscus sabdariffa*) and estimate production function, water depth index, and optimal depth and economic effects of the deficit irrigation on yield production. In the spring of 99-98 in the greenhouse of Zabol University (in a Chah Nimeh Zahak) for two years, in the form of split plots with four levels of irrigation water (40, 60, 80, and 100, percentage of plant water need), three levels of potassium (50, 70, and 100, percentage of potassium fertilizer need) was performed as a subplot. Finally, some quantitative and qualitative parameters of the plant were measured to investigate the effects of water and fertilizer stress on Hibiscus tea. The results showed that the simple effects of irrigation water and potassium fertilizer **p-values** (0.05, and **0.01**) on all measured parameters were significant. The highest yield was obtained in 100% potassium fertilizer and 80% water requirement treatments. The highest irrigation water efficiency was obtained in the treatment of 60% of water requirement and 100% of potassium fertilizer. Qualitatively, by reducing the irrigation water depth to 60% of the plant water requirement and reducing the consumption of potassium fertilizer, it was observed that the amount of anthocyanin, protein, carbohydrate and proline increased and chlorophyll a, and b and carotenoids decreased. Therefore, taking into account the water situation of the region and reducing water resources, using 80% of water needs will save water consumption and 75% of potassium fertilizer will increase the quality and moderate the damage caused by drought stress in Hibiscus tea. The best Hibiscus tea production function was also selected. The last production index with water depth and potassium fertilizer, the final ratio of technical the alternative rate for potassium fertilizer and water depth, the value of final production to water depth and potassium fertilizer were calculated and the quadratic function was selected as the superior function. The final production index was calculated in relation to the minimum and maximum water depth and fertilizer use. The results also showed that increasing potassium fertilizer to the level of 75%, saves more water use, so the use of potassium fertilizer can reduce the damage caused by dry stress in Hibiscus tea.

Keywords: Anthocyanin, Carbohydrate, Protein, Final production value, Final production index, Low Irrigation, Replacement rate ratio.



University of Zabol
Graduate school
Faculty of Water and Soil
Department of Water engineering

The Thesis Submitted for the Degree of M.Sc (in the irrigation and drainage)

Effect of different levels of potassium fertilizer and irrigation water on quantitative and qualitative characteristics of sour tea and determination of production function

Supervisors:

Dr. H. Piri

Advisors:

Dr. I. Khmer

By:

P. Rashki

January 2020