Maximizing productivity and water use efficiency of alfalfa under precise sub-surface drip irrigation in arid regions

41. Ismail S. M. and Almarshadi M.H. 2013

Abstract:

A field experiment studying the effect of water stress on alfalfa (Medicago sativa) productivity and water use efficiency was conducted at the Agricultural Experimental Station of King Abdelaziz University. The design of the experiment was randomized complete block design (RCBD) with four replicates. It consisted of three treatments, namely: field capacity treatment (FC) as a control, 85% FC and 70% FC as stress treatments. The irrigation water for all treatments was precisely supplied using recent technology known as the water electronics module (WEM). Results indicated that decreasing water supply decreased fresh and dry yield of alfalfa but increased irrigation water use efficiency (IWUE). As a result, 13 and 27% of irrigation water were saved from 85% FC and 70% FC treatments respectively in each cut compared with the FC treatment. The reduction of water supply resulted in a yield reduction of 12 and 21.7% for 85% FC and 70% FC, respectively. The results also proved that WEM is a practical tool to precisely supply irrigation water and can be used effectively to control deficit irrigation. Copyright © 2013 John Wiley & Sons, Ltd.

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