Effects of Precision Irrigation on Productivity and Water Use Efficiency of Alfalfa under Different Irrigation Methods in Arid Climates

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Abstract:

A field experiment comparing different irrigation methods (Sprinkler Irrigation [SPI], surface drip [DI] and sub-surface drip [SDI]) were precisely controlled for alfalfa productivity and water use efficiency. The experiment was conducted at the Agricultural Experimental Station of King Abdel-Aziz University. The design of the experiment was Randomized Complete Block Design (RCBD) with four replicates, consists of three irrigation method. Water Electronics Module (WEM) technology was used to fully controlled the irrigation methods. The results revealed SDI increase growth parameters (plant length, number of tillers and leave to stem ratio) compared with DI and SPI. The least water supply was recorded in SDI followed by DI and SPI respectively while the highest IWUE obtained from SDI followed by DI and the least IWUE was recorded in SPI. SDI and DI saved 35.7% and 29.2% of irrigation water compared with SPI. In spite of decreasing water supply under SDI and DI high dry yield was obtained. The increase in dry yield was 45% in SDI and 15.9% in DI compared with SPI. The results of experiment especially soil moisture data proved that WEM is a practical tool to precisely supplied irrigation water when needed and can be recommended for efficiently controlled different automated irrigation systems.

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