Strategies for Reducing Consumptive Use of Alfalfa

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Abstract. Competition for limited water resources in the Western U.S. becomes strained; need for limited irrigation strategies for crop production are emerging. Alfalfa is recognized as a crop of high water savings using limited irrigation system. The objective of this study was to evaluate potential water saving strategies for alfalfa in the Front Range, Colorado. A field study evaluated four irrigation strategies: Full irrigation (FI), stop irrigation after 2nd Cutting (S2), spring and fall irrigation (SF), and stop irrigation after 1st cutting (S1). Changes in yield, consumptive water use (ET), water-use efficiency (WUE), stand density, and forage quality were measured. Results of study showed yield decreased with ET in a fashion similar to previous research. Over two years period, average yields were reduced by 3.1, 3.5 and 6.5 Mg ha^{-1} compared to the FI treatment for the S2, SF, and S1, when average ET was reduced by 28.2, 27.2, 48.2 cm for the S2, SF, and S1 treatments, respectively. WUE increased as irrigation decreased, indicating a more efficient use of soil moisture with an average WUE of 0.251, 0.327, 0.311, and 0.351 Mg ha^{-1} cm^{-1} for the FI, S2, SF, and S1 treatments, respectively. Also, the number of crowns m^{-2} was higher in S2 and S1 treatments compared to FI and SF treatments. Finally, forage quality increased as ET decreased, helped economically offset of reduced yield. The limited irrigation of alfalfa is an approach to conserve agricultural water to meet changing water demands while sustaining irrigated agricultural production.