

UC Davis Alfalfa/Forages Field Day, May 11, 2017

Deficit Irrigation Strategies & Alfalfa Variety Interactions

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Introduction: Although we have seen lots of rain this season, long-term there is likely to be periods when full water allocations for alfalfa are not possible. Exploring different irrigation systems and/or deficit irrigation strategies may be viable options to help with future uncertainties. The objectives of this trial were to determine interactions between varieties and several deficit irrigation strategies under drip irrigation.

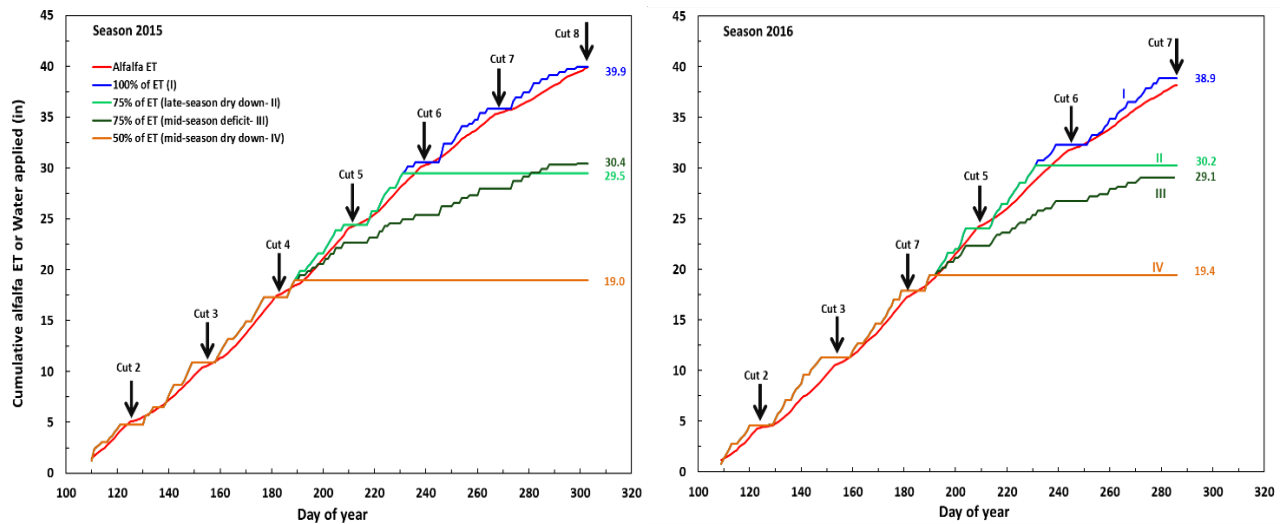


Figure 1. Cumulative alfalfa ET and applied water for each irrigation treatment for 2015 and 2016

UC Experiments: In 2014, fifteen commercial or newly released alfalfa varieties were established in the field in a split plot design with four replications using sprinkler irrigation. The soil profile was filled using sprinkler irrigation prior to any cuttings in 2014-15, while in the 2015-16 season seasonal rains were adequate to maintain a full soil profile. The trial was equipped with SDI, with driplines spaced 40” apart, at a 10” depth with emitters spaced 14” along the driptape. The driplines used on this trial are Netafim Typhon 875 series, with an inner diameter of 0.875” and a flowrate of 0.18 gph at 10 psi. The irrigation treatments include; 1)100% of crop ET_c, 2)75% of crop ET_c with a cutoff (cold turkey) on August 18th, 3) 75% (starvation diet) of seasonal ET_c (fully irrigated until 50% of seasonal ET was achieved on July_ and then ½ of normal irrigation for the remainder of the season), then 4) Fully irrigated until

50% of crop ETC is achieved with cutoff (cold turkey) on July. For the fully irrigated treatment, the summed Kc values over each cycle totaled approximately 0.85 of ETo from the Eddy Covariance measurements. Figure 1 shows water applications in the various treatments. Yields were measured in each plot, and analysis of variance performed to test the interactions between

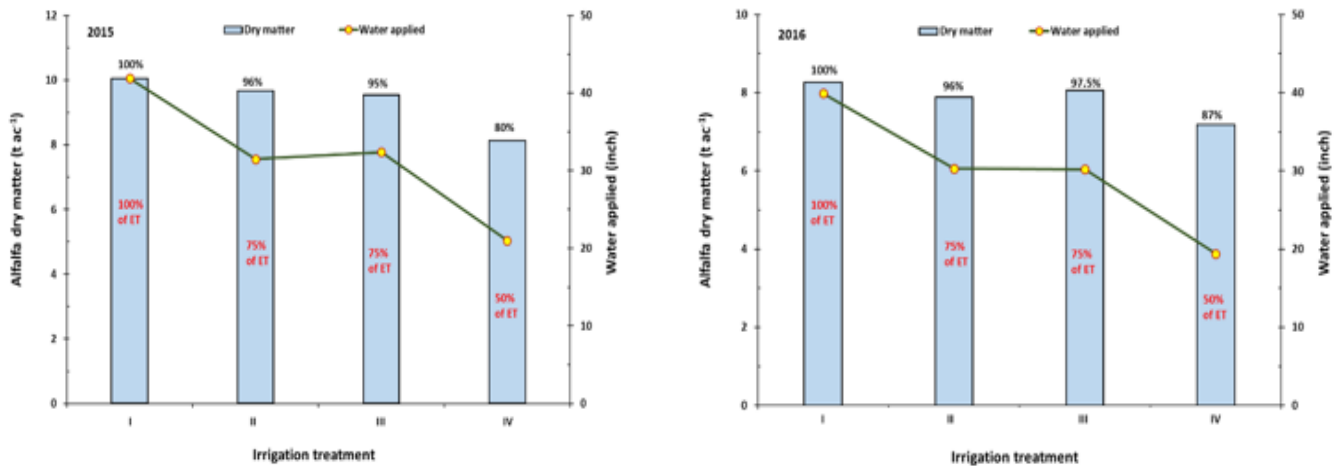


Figure 2. Average alfalfa dry matter of the 15 varieties over each growing season and the applied water for different irrigation treatments

variety and irrigation treatment.

Preliminary Conclusions:

- In first 2 years of study, yields averaged 80-85% of fully-irrigated plots at 50% water application, as a percentage of a fully-watered crop.
- Cutbacks of 25% of seasonal water demand resulted in about 95% of the yields under full irrigation under drip systems
- There appeared to be few interactions between 15 varieties and deficit strategies over first two years of production. That is, if varieties performed well or badly under full irrigation, they also mostly performed well or badly under deficits.
- Effect of stand persistence not fully known, but little effect of irrigation treatment on stand persistence has been observed to date.
- Late-season deficit irrigation strategies may be key to adjusting alfalfa to water uncertainties in the future – this crop is well-suited to these strategies.

