Project Title: Assessing alfalfa yield and quality under different irrigation strategies to increase production efficiencies

Objective: To evaluate yields of alfalfa of various fall dormancy under differing moisture

Personnel: J.A. Torrion, Amanda Shine

Summary:

These results presented are from the second year of alfalfa establishment. Specific management information is provided in Table 1. The six alfalfa varieties of three fall dormancies (FD): 2, 3, and 6, were managed under three moisture regime environments: rainfed, 50% evapotranspiration (50ET), and 100% evapotranspiration (100ET).

As expected, as the water availability was increased, there were also yield increases. However, there was an observed interaction with the alfalfa varieties and moisture availability. For example, FSG229CR - an FD 2, outperformed the other varieties under rainfed condition (Fig. 1). Also, the less dormant Cisco II- an FD 6, performed better under irrigated condition. However, another less dormant FD 6 – the High-gest660 (low-lignin variety) did not perform well compared with its counterpart FD-6 (Cisco II) and the rest of the varieties under irrigation.

The cultivar-specific yield response to water regimes this year means that each variety does have different water productivity values. Overall, the deficit irrigation treatment consistently showed the highest water use efficiency (aka water productivity) as shown in Table 2.

Table 1. Management information

Planted:	5/21/2018	Field Location:	R7
Emerged:	5/28/2018	Cutting dates:	6/17-6/19; 7/23-7/25 9/6 & 9/16
Seeding rate:	25 seeds/ft^2	Total irrigation (50 ET):	6.4 inches
Previous crop:	Barley	(100 ET):	12.7 inches
Herbicide:	None	Total precipitation:	6.9 inches (4/15-9/25)
Insecticide:	None	Soil type:	Creston silt loam
Fungicide:	None	Soil residual nutrient (NO_3-, P, K lb/A):	23-20-190 (fall, 2018)
Weed control:	Manual weeding	Nutrient fertilizer applied (N, P_2O_5, K_20 lb/A):	None in 2019

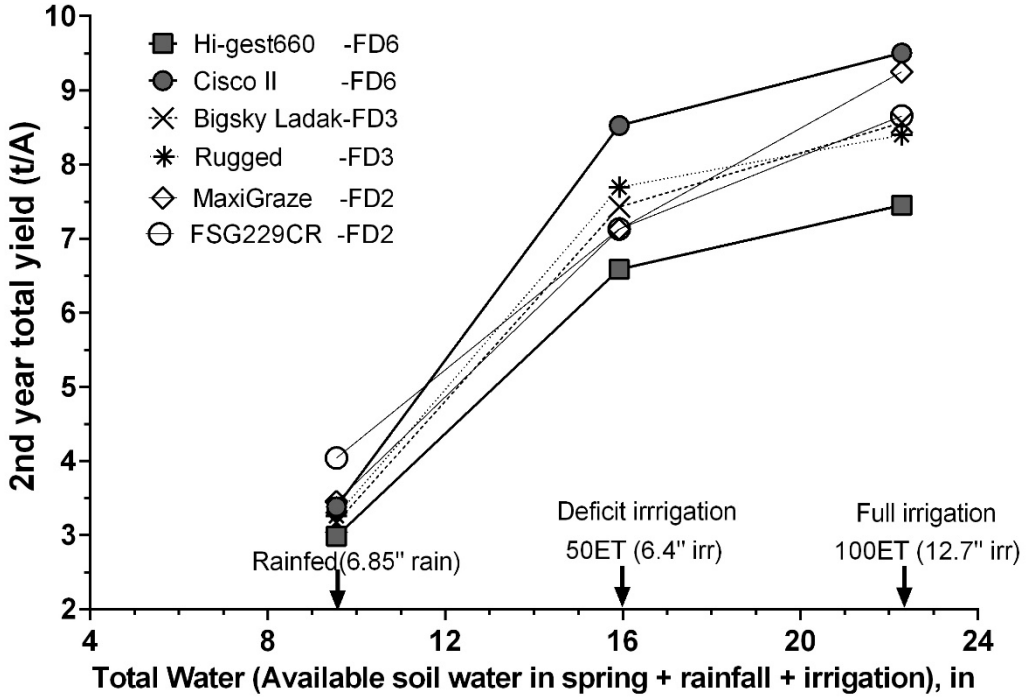

Figure 1. Moisture regime interaction with alfalfa varieties. Irrigation application in the 50% evapotranspiration (50ET) occurred at the same time with the 100ET. Specifically, the 50ET received half of what was applied under 100ET per irrigation event.

Table 2. Water productivity of the rainfed and the irrigated treatments based on evapotranspiration demand (ET). Total water productivity includes initial soil moisture in spring + rainfall + irrigation.

Water regimes	**Total water productivity**	**Applied irrigation water productivity**
	----------tons/inch water----------	
Rainfed	0.35	-
Deficit irrigation (50ET)	0.46	0.6
Full irrigation (100ET)	0.38	0.4
Mean	**0.40**	**0.5**