



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

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

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Summary:

These results presented are from the third-year (2020) of alfalfa trial established in 2018. 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 water regime environments: rainfed, 50% evapotranspiration (50ET), and 100% evapotranspiration (100ET).

As expected, yield increased significantly with increase in water availability (from rainfed to irrigation). However, there was an observed interaction with the alfalfa varieties and total water availability (Figure 1). For example, FSG229CR - an FD 2, outperformed the other varieties under rainfed condition. Also, the less dormant Cisco II- an FD 6, performed better under both irrigated conditions. However, another less dormant FD 6 – Hi gest 660 (low-lignin variety) did not perform well compared with its counterpart FD-6 (Cisco II) and the rest of the varieties across moisture regime this year. Total yield of Maxi graze- an FD 2 decreased by 11.5%, while its counterpart FD-2 (FSG229CR) increased by 5.4% under full irrigation condition compared with deficit 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 (50ET) consistently showed the highest water use efficiency (aka water productivity) shown in Table 2.

Table 1. Management information

Planted:	5/21/2018	Field Location:	R7
Emerged:	5/28/2018	Cutting dates (2020):	6/27-28 (1 st cut); 7/30-31 (2 nd cut); 9/4, 9/11, 9/115 (3 rd cut)
Seeding rate:	25 seeds/ft ²	Total irrigation (50 ET):	4.8 inches
Previous crop:	Barley	(100 ET):	9.95 inches
Herbicide:	7/2: Pursuit	Total precipitation:	9.7 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 ₂ O ₅ , K ₂ O lb/A):	4/29/20: 100 lbs K ₂ O on 50 and 100 ET blocks

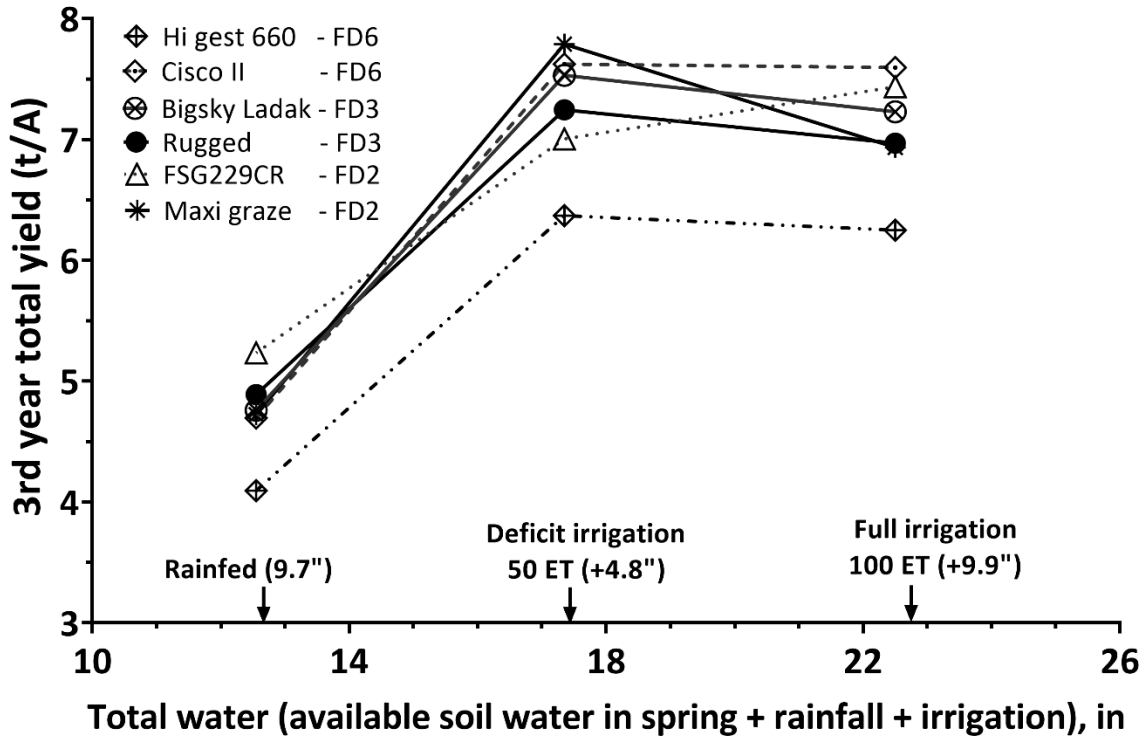


Figure 1. Moisture regime interaction with alfalfa varieties. Irrigation application in the 50% evapotranspiration (50ET) occurred at the same time with the 100ET. Specifically, the 50ET received half of what was applied under 100ET per irrigation event.

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	Applied irrigation water
	-----tons/inch water-----	
Rainfed	0.37	-
Deficit irrigation	0.41	0.52
Full irrigation (100ET)	0.32	0.24
Mean	0.37	0.38