

Winter Canola Response To Simulated Grazing In The Southern High Plains

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Introduction

- Large dairy and beef industries in the Southern High Plains require large quantity of high quality forage.
- Ogallala aquifer, which supplies irrigation water for the highly productive agriculture in the region, is declining fast and sustainability of irrigated agriculture is threatened.
- Dual purpose alternative crops that produce higher quality forage and with less water are needed.
- Research conducted in the past several years has established better adoptability of Winter Canola to the region.
- Limited research on forage potential of winter canola in the US and Australia has shown promise to use it in the region to alleviate forage shortage.
- It is also a great rotational crop with winter wheat offering a number of rotational benefits including weed control.
- More information is needed in managing winter canola for dual purpose production.

Objectives

- To compare seasonal patterns of forage production and quality of three winter canola (WC) cultivars with winter wheat (WW) under limited irrigation.
- To assess the effect of simulated grazing on seed and oil yield of winter canola and compare with winter wheat.

Materials and Methods

Location: Agricultural Science Center at Clovis, NM

Planting Date: Sept 5, 2012 (canola) and Sept 12, 2012 (wheat)
 Sept 5, 2013 (canola and wheat; on going)

Fertilizer: 50 : 25 : 0 and 7.7 N:P2O5:K2O and Sulfur lb ac-1

Treatments:

Canola Cultivars: Griffin (KSU) Simulated Grazing (Harvest) Treatments
 Safran (DL Seeds) 1. November End (Fall freeze)
 DKW-44-10 (Monsanto) 2. Mid February
 3. Mid March
 4. Mid April
 5. November End & Mid April
 6. No Harvest (Control)

Wheat Cultivar: TAM-111

Experimental Design: Randomized Complete Block Design (4 reps)

Irrigation: Center pivot irrigation (Total 518 mm in 2012-13)

Precipitation: 154 mm (Total for the season)

Forage Harvest: 3 meters of 6 rows with a sickle mover

Grain Harvest: 1 m² within the harvested plots

Forage quality: (Ward's lab)

Results

Table 1. Dry Forage yield and quality of dual purpose use winter canola and wheat during 2012-13 growing seasons at NMSU-Agricultural Science Center at Clovis, NM.

	Dry Matter (lbs/ac)	CP	ADF (% of DM)	NDF	RFV	RFQ	Nitrate [†] (ppm)
Fall harvest (11/29/2012)							
DKW44-10	4617a	25.4b	20.9ab	22.7c	298.6a	344.9a	2430.5a
Griffin	5301a	24.9b	21.5ab	23.5bc	287.4ab	336.9a	2713.4a
Safran	4705a	25.1b	22.2ab	24.5b	274.0b	323.4a	2173.9a
Wheat	3069b	26.8a	20.8b	38.9a	174.0c	127.0b	288.3b
Winter harvest (02/13/2013)							
DKW44-10	6190a	19.4ab	21.9b	22.6c	299.8a	292.5a	1603.5a
Griffin	5969a	17.8c	21.9b	22.5c	302.0a	296.5a	1354.8a
Safran	6238a	18.1bc	24.6a	24.9b	260.8b	264.3a	1554.8a
Wheat	2889b	20.4a	24.2a	40.2a	162.3c	169.5b	46.5b
Spring harvest (03/13/2013)							
DKW44-10	7869a	16.9b	24.9bc	25.2c	271.0a	285.0a	1291.0a
Griffin	6762a	17.5b	23.5c	23.8c	289.5a	307.3a	1031.8a
Safran	7599a	15.6b	27.8a	28.2b	230.3b	248.5b	1553.8a
Wheat	5158b	20.0a	25.8b	43.4a	147.8c	164.3c	77.3b
Spring harvest (04/17/2013)							
DKW44-10	11240a	20.3ab	25.4ab	25.8b	249.5a	287.3a	1189.0a
Griffin	10312a	20.7ab	23.7b	24.1b	271.3a	333.3a	741.5a
Safran	9663a	21.3a	25.2ab	25.5b	274.0a	331.5a	1057.3a
Wheat	10244a	16.5b	26.9a	46.8a	135.0b	160.5b	80.0b
Second cut from fall harvest (04/17/2013)							
DKW44-10	2352a	20.4ab	23.2a	25.2b	263.0b	302.0b	291.5a
Griffin	3208a	19.2b	23.6a	24.4ab	269.0ab	325.0ab	210.8a
Safran	2382a	22.2a	22.5a	23.0b	290.8a	349.8a	516.8a

Means followed by the same letter within the same column and harvest are not significantly different at P < 0.05.

- Preliminary results indicated that in spite of differences in plant architecture and growth duration, differences in seasonal patterns of forage production and quality were smaller in WC varieties compared to differences between WC and WW (Table 1).
- Mean fall forage yield on dry weight basis of WC at first freeze (Fig 1) was 59% higher than WW. The difference in forage productivity gradually decreased during early spring months and by mid April all had similar forage yields (Table 1).



Figure 1. Visual comparison of biomass production of three winter canola cultivars (Safran, Griffin and DKW 44-10) with winter wheat (cv. TAM 111) at Clovis, NM in 2012-13.

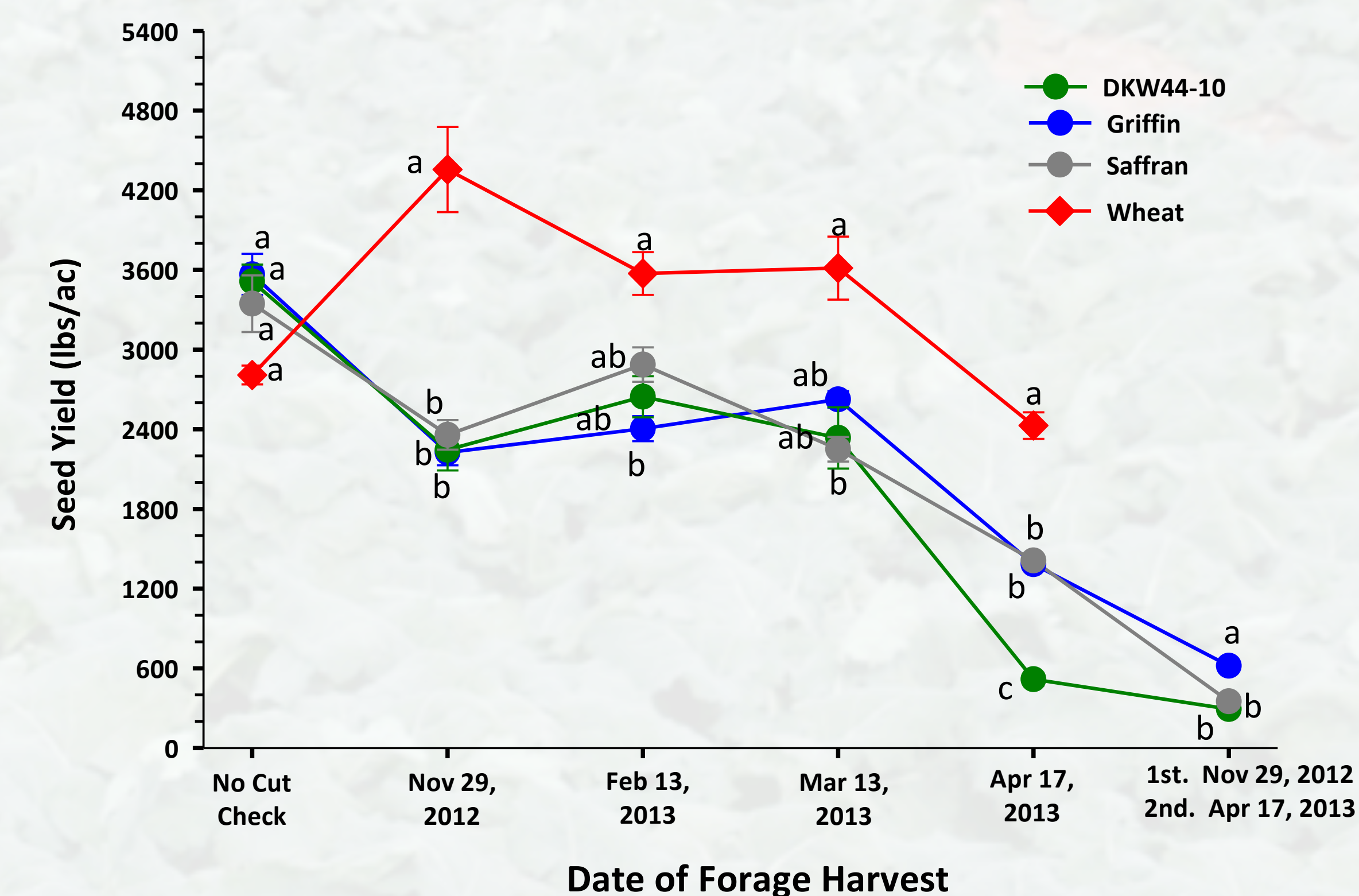


Figure 2. Effect of forage harvest during different times in the growing season on seed yield of three winter canola cultivars (Safran, Griffin and DKW 44-10) in comparison with a winter wheat (cv. TAM 111) at Clovis, NM in 2012-13.

- Harvesting forage in the fall did not affect winter survival of three WC cultivars in 2012.
- Mean Relative Feed Value (RFV) or Relative Feed Quality of WC was 65 to 96% higher than WW suggesting better intake potential and digestibility of WC than WW forage.
- Nitrate content of WC forage was much higher compared to WW, indicating some concern of feeding only WC forage.
- Simulated grazing improved grain productivity of WW during the season characterized by many unusual killer freezes (Fig 1), however, seed yield of WC decreased by grazing.
- Repeated killer freezes early in the spring killed flowering canola 3-4 times, but each time it recovered and produced good seed yield.
- Seed samples are being processed to assess effect of forage harvesting on oil yield.

Conclusions

Preliminary results indicated that winter canola can produce similar or higher forage biomass compared to winter wheat and has similar winter survival characters of wheat. However, forage quality was much superior to wheat. Relatively limited information is available on actual grazing, recovery from grazing or multiple cut forage harvesting. In a related study, winter canola used less water compared to winter wheat. That suggests winter canola is a well adopted, higher yielding alternative forage crop that can produce better quality forage with less water and fits very well in winter wheat based rotation system. However, more research is needed especially in actual animal grazing. The trial is being repeated in 2013-14 season.

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