Seasonal Forage Productivity and Quality of Dual Purpose Winter Canola and Wheat in the Southern High Plains

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Introduction

- Declining Ogallala aquifer in the Southern High Plains need water efficient alternative forage crops to feed large dairy and beef industries in the region.
- Winter canola (WC) is very well adopted to the region and produces acceptable crop yields with relatively less water.
- It also offers a number of rotational benefits including weed control. Adds crop diversity to the predominant cereal based cropping systems of the region.
- Unlike winter wheat (WW), most of the fall foliage produced by WC is killed by freezing temperatures in the winter (Fig 1).
- Opportunity exists to use WC as a dual purpose crop like winter wheat and utilize most of the fall growth.

Figure 1. Comparison of winter canola (left) and wheat (right) growth at Clovis, NM in 2013. Most of the fall growth of WC (left), except the growing tip, is killed in the winter, while only leaf tip burns in WW.

Objectives

- To compare seasonal patterns of forage productivity and quality of diverse winter canola cultivars with wheat under limited irrigation.

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 3rd yr)

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

Treatments:

Canola Cultivars: Griffin (KSU)
Safran (DL Seeds)
DKW-44-10 (Monsanto)

Wheat Cultivar: TAM-111
TAM-113 (year 2 onward)

Simulated Grazing (Harvest) Treatments
1. November End (Fall freeze)
2. Mid February
3. Mid March
4. Mid April
5. November End & Mid April
6. No Harvest (Control)

Design: Split Plot (4 Reps)

Irrigation: Center pivot irrigation (Target 300 mm)

Forage quality: NIR Analysis (Ward lab)

Results

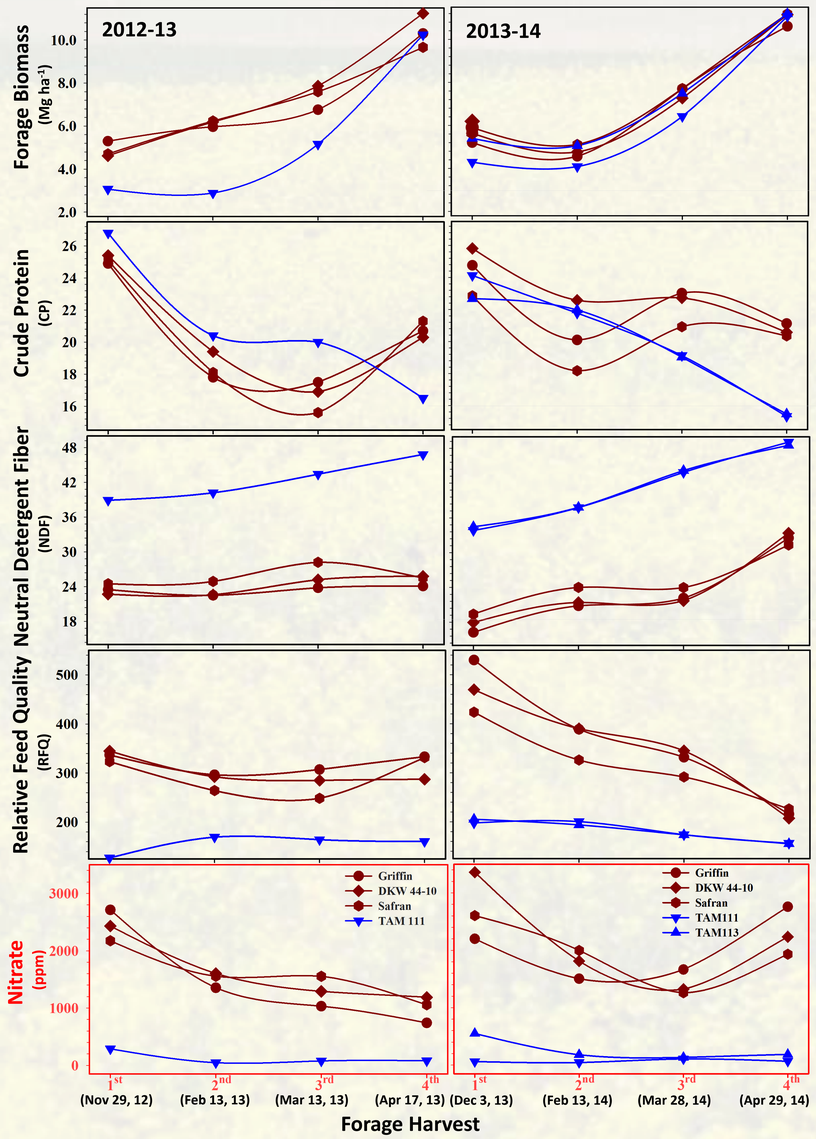

Figure 2. Seasonal forage productivity and quality of three diverse WC cultivars compared WW at Clovis, NM in 2012-13 and 2013-14.

- In spite of differences in plant architecture and growth duration, there were similarity among WC cultivars for forage production and quality compared to WW (Fig. 2).
- In 2012-13, WC produced 59% more forage (dry weight) at the first freeze, but the difference gradually disappeared by mid-April.
- In 2013-14, WC produced 30% more forage compared to TAM111 (first year check) at the first freeze. However, mean WC forage production over mean of both WW cultivars was only 15% higher.
- Crude protein (CP) differences between WW and WC were small.
- Acid detergent fiber (ADF) content also did not clearly differentiate WW and WC (data not presented), but neutral detergent fiber (NDF) was lower in WC.

- Mean Relative Feed Quality (RFQ) of WC was 40 to 134% 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 (negative point).
- In general, winter survival was not affected by forage harvest.
- However in 2013-14 season, regrowth from April or from multi-cut treatment did not survive severe hailstorm in early June. Other forage harvest treatments (bigger regrowth) survived. In contrast, WW was completely destroyed by hailstorm.
- Simulated grazing decreased WC grain productivity. Grazing time seems to have an effect (data not presented).

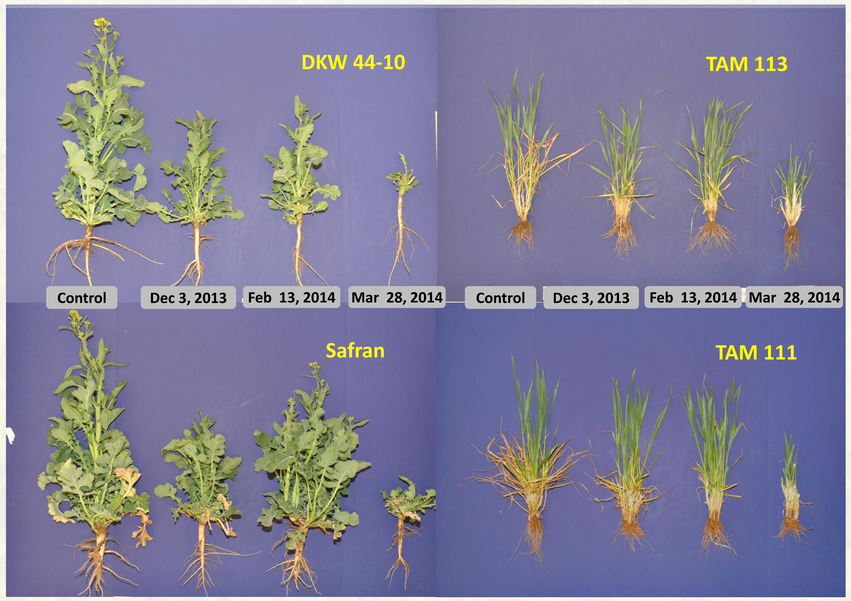

Figure 1. Visual comparison (on April 4, 2014) of WW and WC to simulated grazing at Clovis, NM. Forage harvest in the late fall slowed down winter crop recovery compared to harvest early in the spring.

Conclusions

- Two year results indicated that winter canola can produce similar or higher forage biomass compared to winter wheat.
- Forage quality of winter canola was much superior to wheat.
- Information on actual grazing or silaging and on crop recovery are needed.
- Winter killed fall growth has some role in spring canola regrowth. Therefore, timing of forage harvest is important.
- With rotational benefit and dual purpose potential, winter canola can be a good alternative crop for the region under deficit irrigation management.
- The trial is being repeated in 2014-15 season.

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