Evaluating Teff Grass as a Summer Forage

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Introduction

- Finding a more water-efficient crop to produce forage for livestock is becoming increasingly important as producers adapt to drought conditions.
- Native to Ethiopia, teff (*Eragrostis tef*) is a fine-stemmed, warm-season annual grass that uses the C_4 photosynthetic pathway.
- Little research has been done establishing teff grass as a competitive forage.

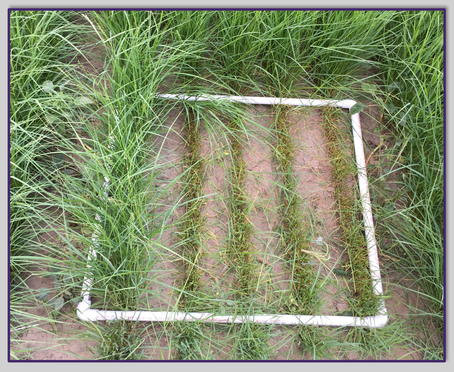
Objective

- Determine the forage yield, nutritive value, and water use efficiency (WUE) of teff grass under field conditions when compared to sorghum sudangrass (*Sorghum x drummondii*) and forage pearl millet (*Pennisetum glaucum*).

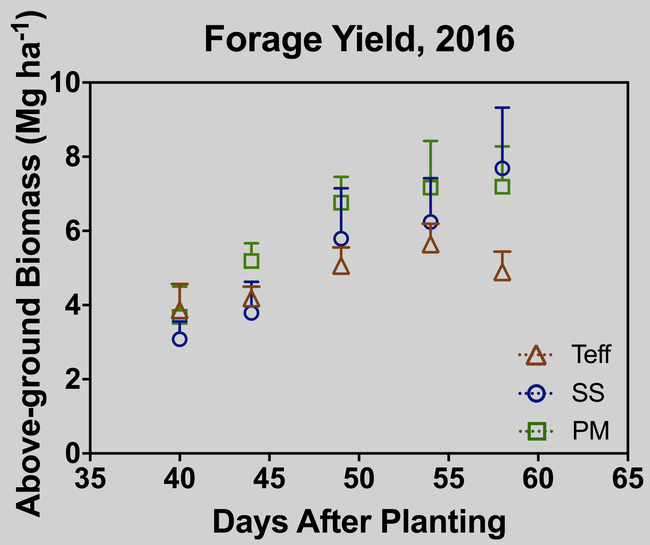
Methods

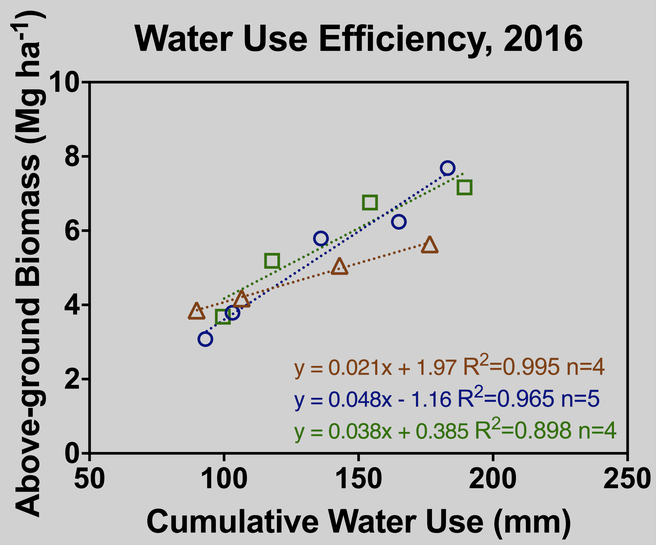
Source: http://bit.ly/2kGPQl5

- Location: KSU Northwest Research Extension Center in Colby, KS
- Design: Split plot in a randomized complete block
  - Whole plot effect: Cultivar
  - Subplot effect: Time interval as days after planting (DAP)
  - Block effect: Four replicates
- Treatments: Four teff varieties, sorghum sudangrass (SS), and pearl millet (PM). Planted 8 June 2016 in 9.1-m by 6.1-m plots.
- Forage yield: Harvested from 0.76 m^2 quadrats. Clippings dried to a constant weight at 50°C.
- Forage Quality: Samples were ground through a 2-mm sieve using a Model 4 Wiley Mill. Neutral detergent fiber (NDF) and acid detergent fiber (ADF) were analyzed via wet chemical analysis. Protein content was determined from total nitrogen in samples.
- WUE: Determined by regressing aboveground biomass on cumulative water use (CWU) between sampling periods.
- CWU = Sum of soil water depletion (SWD) + precipitation. No corrections were made for drainage, runoff, or evaporation.
- Soil water: Measured using neutron thermalization.
- SWD was calculated for 5 different sampling periods in 2016.
- Leaf area index (LAI) was measured using an LAI-2000 instrument.

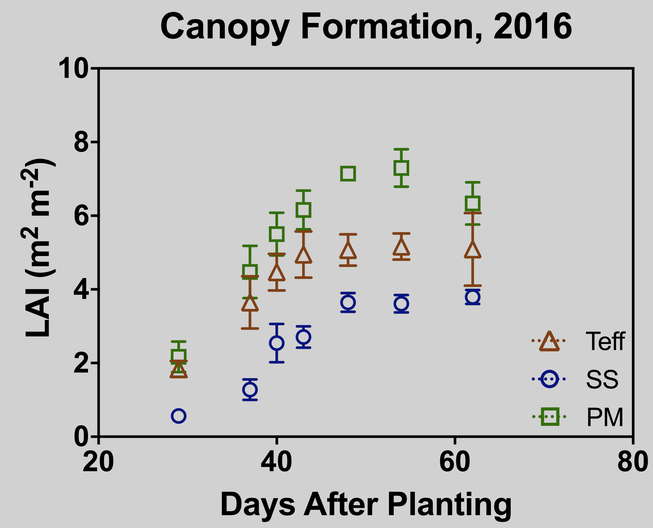


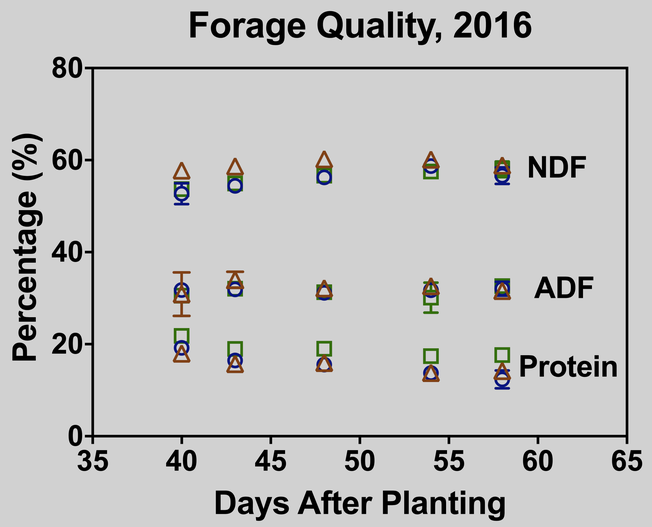
Results





- Tiffany teff grass had similar yields to both SS & PM at 40 DAP. SS & PM had greater productivity from 48 DAP onward.
- SS & PM demonstrated larger WUE compared to tiffany teff.





- Tiffany had higher leaf area index than sorghum sudangrass until the last measurement.
- NDF and % protein differed among treatments.

Forage Performance Indicators at 54 Days After Planting

Cultivars	Biomass (Mg ha^{-1})	CWU (mm)	WUE (g biomass mm^{-1} water)	LAI (m^2 m^{-2})	NDF (%)	ADF (%)	Protein (%)	Days to Boot Stage
Teff (Bonus)	4.3 d*	170 ab	2.5 c	4.99 b	58.8 bc	30.3 a	16.8 a	43
Teff (Haymore)	4.5 cd	170 ab	2.6 c	4.87 b	60.3 a	32.2 a	14.7 b	41
Teff (Moxie)	5.1 bcd	184 ab	2.8 bc	5.36 b	59.2 abc	31.0 a	16.3 a	48
Teff (Tiffany)	5.6 bc	176 ab	3.2 ab	5.17 b	60.1 ab	32.6 a	13.8 b	43
Sorghum Sudangrass	6.2 ab	165 b	3.8 a	3.61 c	58.7 bc	31.7 a	13.8 b	72
Forage Pearl Millet	7.2 a	189 a	3.8 a	7.30 a	57.5 c	30.1 a	17.4 a	58

*Means with different letters within a column are significantly different according to a least significant difference test ($\alpha = 0.05$).

- Tiffany teff grass performed similarly to SS in all indicators except LAI, in which teff was higher. Bonus and moxie had higher protein values than SS at 54 DAP.
- Forage pearl millet had the greatest productivity and the lowest NDF values at 54 DAP.

Conclusion

- Teff grass can be a competitive forage crop; tiffany teff had similar yields and water use efficiency to sorghum sudangrass.