



Evaluation of Yield and Quality of Photoperiod Sensitive Sorghums in Central Wisconsin

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OBJECTIVES

Evaluate the yield and nutrient composition of photoperiod sensitive and non photoperiod sensitive forage sorghum and sorghum-sudangrass compared to corn planted on 2 dates and harvested using single or multiple-cut strategies at 2 research stations (Marshfield and Hancock) during 2015 and 2016 in central Wisconsin.

BACKGROUND

Sorghum hybrids are becoming increasingly popular as a source of moderate quality forage in areas that experience drought stress regularly. Photoperiod-Sensitive varieties remain vegetative until mid-September maximizing forage yield until a frost and allowing for a flexible harvest schedule.

MATERIALS & METHODS

- Treatments were arranged in randomized complete block design with 4 replicates.
- Results were analyzed as a split-split plot design.
 - planting date (early or mid-June) designated as main plot
 - harvest strategy (single or multi-cut) designated as sub-plot
 - 8 forage cultivars designated as sub-sub-plot
- Plots were clean tilled, corn was planted using a 4 row planter and sorghums were planted using a no till drill.
- Corn seeding rate was 12,950 seeds/ha
- Sorghum seed rates: forage sorghum- 40,470 seeds/ha, sorghum-sudan – 22.4 kg/ha, Sudangrass 16.8 kg/ha
- Plots harvested using multi-cut strategy were harvested in late August and early October. Corn plots harvested using the multi-cut strategy were harvested once in July and did not regrow for the second harvest.

SUMMARY

DM Yield

- There was a location x year x variety x harvest method interaction for DM yield ($P= 0.015$).
- Yields of plots harvested using a single-cut strategy were greater than the combined forage yields of plots harvested with a multi-cut strategy.

Nutrients

- There was a year x harvest method x variety interaction for NDF concentration; NDF concentration of forages was decreased for the single harvest method. Variation between single and multi harvest systems was higher in 2015 than 2016 and was hybrid dependent.
- In vitro total digestibility decreased for single harvest samples ($P=0.003$).
- There was a harvest method x planting date ($P = 0.021$) and a location x year x variety interaction on TDN values ($P = 0.035$).
- Overall the decrease in TDN using a single cut system was most pronounced in forages with the highest DM yields.

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Table 1. Sorghum variety information

Treatment	Hybrid/Variety	Company
Forage sorghum	AF8301	Alta Seeds
Sorghum-sudangrass	AS5201	Alta Seeds
PS forage sorghum ¹	4-Ever Green	Walter Moss Seeds
PS sorghum-sudangrass	Mega Green	Walter Moss Seeds
BMR forage sorghum ²	BMR 3411	Croplan®
BMR sorghum-sudangrass	Greentreat® 1731	Croplan®
PS BMR sorghum-sudangrass	Greentreat® Rocket	Croplan®

¹ PS = photoperiod sensitive; ² BMR = brown mid-rib

Table 2. NDF (%DM) values of sorghums and corn silage harvested using a single or multiple cut harvest strategy at Hancock and Marshfield Agricultural Research Stations between 2015 and 2016

Year	Harvest Method	2015		2016	
		Multi	Single	Multi	Single
Forage					
Corn Silage		65.5	50.4	62.3	43.4
PS forage sorghum ¹		64.3	60.8	60.9	62.2
PS sorghum-sudan		65.6	60.4	63.0	62.9
Forage sorghum		64.3	54.7	62.7	58.6
Sorghum-sudan		65.0	54.0	63.5	59.0
BMR forage sorghum ²		62.9	51.2	58.5	52.9
BMR sorghum-sudan		63.5	59.1	62.0	55.5
PS BMR sudangrass		62.4	55.9	59.4	59.0

SEM= 1.2
Year x Harvest Method x Variety ($P < 0.01$)

¹PS = Photoperiod sensitive variety; ²BMR = Brown mid-rib variety

Table 4. Total digestible nutrients (% DM) of sorghums and corn silage harvested using a single or multiple harvest strategy at Hancock and Marshfield Agricultural Research Stations between 2015 and 2016

Forage	Hancock		Marshfield	
	2015	2016	2015	2016
Corn Silage	66.3	65.2	65.4	67.8
PS forage sorghum ¹	59.5	61.1	64.1	61.0
PS sorghum-sudan	56.9	57.7	61.5	59.2
Forage sorghum	62.1	61.4	64.3	61.1
Sorghum-sudan	59.5	58.8	61.2	58.3
BMR forage sorghum ²	63.4	65.2	66.5	67.1
BMR sorghum-sudan	63.3	64.4	65.6	64.9
PS BMR sudangrass	64.2	64.0	64.9	63.5

SEM = 0.8
Location x Year x Variety ($P = 0.04$)

¹PS = Photoperiod sensitive variety; ²BMR = Brown mid-rib variety

Table 3. Concentrations of 48-hour in vitro true digestibility (%DM) of sorghums and corn silage harvested using a single or multiple cut harvest strategy at Hancock and Marshfield Agricultural Research Stations between 2015 and 2016

Forage	Multi	Single
Corn Silage	80.2	77.4
PS forage sorghum ¹	78.8	71.3
PS sorghum-sudan	76.7	67.0
Forage sorghum	78.4	71.6
Sorghum-sudan	76.5	67.8
BMR forage sorghum ²	82.3	75.4
BMR sorghum-sudan	80.9	74.7
PS BMR sudangrass	82.3	76.1

SEM = 1.7
Variety x Harvest ($P < 0.01$)

¹PS = Photoperiod sensitive variety; ²BMR = Brown mid-rib variety

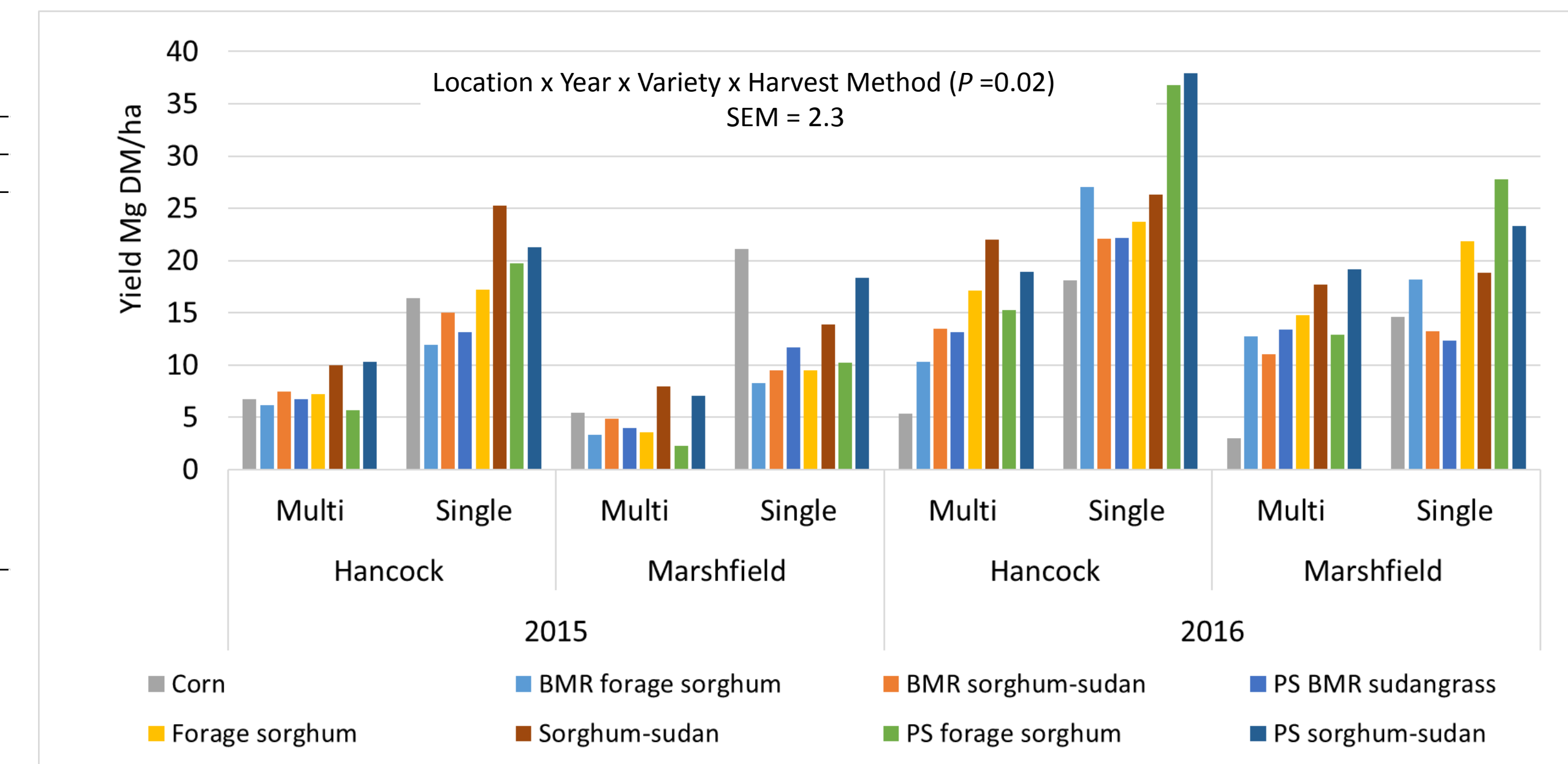


Figure 1. Forage yields (Mg DM/ha) of sorghums and corn silage harvested using a single or multiple harvest strategy at Hancock and Marshfield Agricultural Research Stations between 2015 and 2016

CONCLUSIONS

- When harvested using a single cut system, PS forage sorghum and PS sorghum-sudangrass yielded more DM than corn.
- A multi harvest strategy led to DM yields less than 1/2 of yields from sorghum cut once at the end of the season.
- Total digestible nutrients varied by location and year, but overall fluctuations in TDN values of hybrids were small.
- Forage sorghums with or without PS traits would fit well into bred dairy heifer diets to control energy intakes as they supply a high yield of forage with moderate energy density.
- Using a single-cut system, PS sorghums need to be frost-killed to allow dry down for a direct cut system; PS sorghums can also be cut and wilted prior to chopping if there are adequate weather conditions.
- Further research is necessary to establish harvest recommendations.