

## CORN, SORGHUM, SUDANGRASS, AND BMR HYBRID FORAGES

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### INTRODUCTION

Annual forage crop production has increased in Idaho. Annual forages include traditional production of corn for silage and small grains, as well as less traditional forages and fodders, such as Sudan grass and turnip. There is increasing interest and growth in the direct harvest of these less traditional forages by livestock through grazing. Use of annual forages also may fit comfortably in crop rotations, especially in years when irrigation water is in short supply, or the profitability of traditional cash crops such as wheat and barley grains are low. Annual forages can also be used as “double crops” either for harvesting or direct consumption by livestock to extend the grazing season. While these crops have been grown successfully in other locations, there is little data from Idaho on growing, harvesting, preserving or grazing annual forages. More non-proprietary information is needed to help growers do an effective job of variety selection, crop production, harvesting (including grazing), preservation (including ensilage), and nutrient management with crops.

The objectives are to 1) determine forage yield in a double-crop situation, 2) simulate timing of taking a first crop of alfalfa then rotating to annual forages, and 3) measure forage quality at September 15 harvest date, and at end of possible grazing period, February 1. The study was funded by University of Idaho Cooperative Extension and Specialty Crops Grants through the Idaho State Department of Agriculture.

**Keywords:** brassicas, corn, sorghum, turnips, forage

### ANNUAL FORAGE CROPS

Annual forages are often used as emergency crops during droughts. However, they should be a planned part of the forage system and not simply grown in response to dry conditions. Most annual forage crops are more satisfactory for pasture or silage than for hay. Annual forages have the following benefits:

- Quick source of forage—within one season.
- Rapid payback on production costs.
- Breaks disease and pest cycles in crop rotations.
- Allows quick response to changing economic and production conditions.
- Good nutrient uptake potential.
- Potential to double crop.

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Annual forage crops include cool-season forages, such as cereals; forage brassicas such as canola (rape), kale, turnips, and Swedes; and warm-season annual forages such as corn and sorghum x Sudan grass hybrids.

## METHODS

Entries were planted in 4 replications in a randomized complete block design during 10-11 July 2003, and 6-8 July 2004. Cereals, sorghum-hybrids, brassicas, and legumes were planted with a press-wheel drill in 6-inch rows. Corn was planted in 30-inch rows with a unit planter. Planting depth was 1 inch except for alfalfa and clover which was planted at ½ inch depth. Forage crop, cultivar, seeding rate, and supplier are listed in Table 1. The 10 x 20 feet plots were furrow irrigated at 30-inch centers in 2003 and by solid set sprinkler in 2004.

The center 2 rows of corn at 30 inch rows, or center 5 ft of other forages were harvested to a 3-inch stubble height for forage dry matter yield, dry matter content, forage quality (ADF, NDF, CP) during 16-19 September 2003, and 21-23 September 2004. Forage quality on Feb 1 will be determined by grab sampling from plot remnants.

## RESULTS AND DISCUSSION

Planting of plots occurred about 10 days later than planned. However, growing season was still 67 days in 2003 and 77 days in 2004. Forage yields are expressed on a dry matter basis in figures 1-3. The corn and sorghum hybrids yielded 7 to 12.5 tons dry matter /acre in 2003, but only 1.7 to 4.6 tons dry matter /acre in 2004. The summer of 2003 had record high temperatures while the summer of 2004 was near record cool temperatures. Sweet Leaf II, a sorghum x Sudan hybrid yielded significantly more than all other forages in 2003. The field corn HLS053 yielded highest along with Pasja, Appin, and purple top turnips in 2004. The brassica's tops yielded 2.2 to 3 tons dry matter/acre in 2003 and from 3 to 4.5 tons dry matter/acre in 2004. Purple top turnip beets yielded 1.4 tons dry matter/acre in 2003.

Forage dry matter coefficients are given in figures 4-6. The dry matter coefficient is the proportion of the dry matter to fresh weight. Fresh forage yield multiplied by the dry matter coefficient equals the forage dry matter yield. Dry matter coefficients varied from 0.1 to 0.23 for cereals, 0.15 to 0.2 for corn and sorghums, less than 0.1 for brassicas in 2003 in contrast to about 0.2 in 2004.

Example: The dry matter coefficient for Sweetleaf II in 2003 was 0.21. This means the forage was 21% dry matter concentration or 79 % moisture. This demonstrates the necessity for producers to test the forage dry matter prior to ensiling, especially. Sweetleaf II and most of the other forages were too wet to ensile. The desired moisture level would be 60 to 65% moisture for most forages, so most of these would have to be wilted somewhat before chopping.

A killing frost about September 15, 2003 ceased all growth of the corn and sorghum hybrids. The cereal forages and brassicas continued growth well into October.

**Table 1.** Forage crop, cultivar, seed characteristics, supplier, and marketer of annual forage study in Kimberly R&E Center from 2003-4.

Entry No.	Crop/Variety	Entry	Seeding rate (lbs/ac)	Seeds/pound	Supplier	Marketer
<b><u>Winter Cereals</u></b>						
1	Barley	Schuyler	80	14,300	Kimberly R&E	
2	Italian ryegrass	Greenspirit	20	227,000		John Wiersema
3	Triticale	L815	75	15,000	Davenport	
4		356	75	15,000	Davenport	
5		102	75	15,000	Davenport	
6		2700	75	15,000	Davenport	
7		xxx Triticale	75	15,000		Gooding/Oregon Trail Seed
8	Wheat	Stephens	80	15,000	Kimberly R&E	
9		Brundage	80	15,000	Kimberly R&E	
<b><u>Spring Cereals</u></b>						
10	Barley	Washford	80	14,300	Wash. Crop. Imp.	
11		Belford	80	14,300	Wash. Crop. Imp.	
12	Oats	Provina	80	16,200	Kimberly R&E	
13		Monida	80	16,200	Kimberly R&E	
14		Stampede	80	16,200		Gooding/Oregon Trail Seed
15	Wheat	Dirkwin	80	15,000	Kimberly R&E	
<b><u>Warm-season grasses</u></b>						
19	Field corn	ST7624RR	20	1,334		Northwest Seeds
20		ST7141	20	1,400		Northwest Seeds
21		HLS 009	20	1,400	Hyland Seeds	KeyAg
22		HLS 058	20	1,400	Hyland Seeds	KeyAg
23	Grazing corn	Amaizing Graze 75	20	1,400	Baldrige Hybrids	
24		Amaizing Graze 100	20	1,400	Baldrige Hybrids	
25		Amaizing Graze 105gt	20	1,400	Baldrige Hybrids	
26		Amaizing Graze 112	20	1,400	Baldrige Hybrids	
27	Sorghum x sudan	Sweetleaf II	25	20,000		Gooding/Oregon Trail Seed
28	Forage sorghum	NC+ BMR	25	15,000		Gooding/Oregon Trail Seed
29		Greentreat+	25	15,000	Forage Genetics	Rick Speicher
30		Sweeter-N-Honey BMR	25	15,000	Richardson Seeds	
31		Bundle King BMR	25	15,000	Richardson Seeds	
32		BMR 100	25	12,000		Northwest Seeds
33	?	Dairymaster BMR	25	15,000		Northwest Seeds
34	Grain sorghum	371	25	15,000		Northwest Seeds
<b><u>Legumes</u></b>						
37	Alfalfa	Rampage	12	199,000		Gooding Seed
38	Red clover	Red clover	10	252,000		Gooding Seed
39	Spring peas	Yellow pea	100		Kimberly R&E	
<b><u>Brassicacae</u></b>						
40	Turnips	Purple top	4	190,000		Gooding Seed
41		Appin	4			AMPAC Seed Company
42	Kale	Maris Kestral Kale	4			AMPAC Seed Company
43	Rape	Bonar	4	145,000		AMPAC Seed Company
44	Hybrid forage brassica	Pasja	4			AMPAC Seed Company
<b><u>Mixes</u></b>						
16	Oats&peas	Monida/yellow pea	1/2 rates			
17	Barley&turnips	Washford & purple top 102 Triticale & Red	1/2 rates			
18	Triticale&red clover	clover	1/2 rates			
35	Corn&turnips	HLS058 & purple top	1/2 rates			
36	SxS&rape	Sweetleaf II & Bonar	1/2 rates			



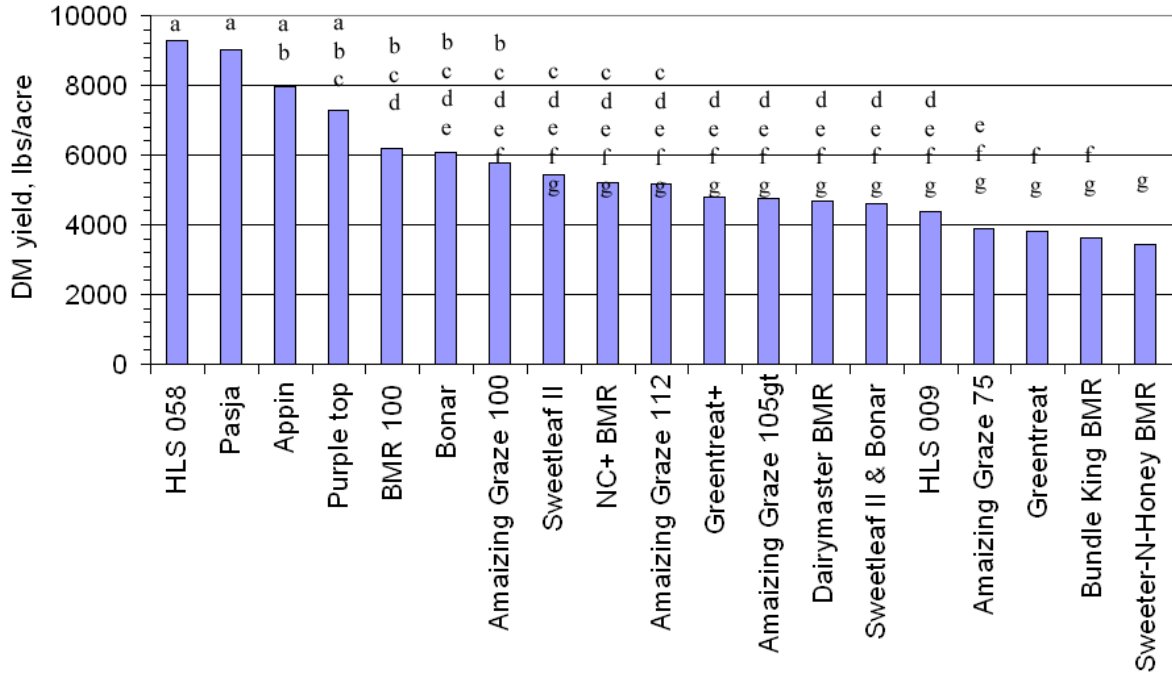


Figure 3. Forage dry matter yields of corn, sorghum, Sudan hybrids, and Brassicas from July 7 to September 22, 2004. Forages with a common letter above the bar are not different (P=0.05).

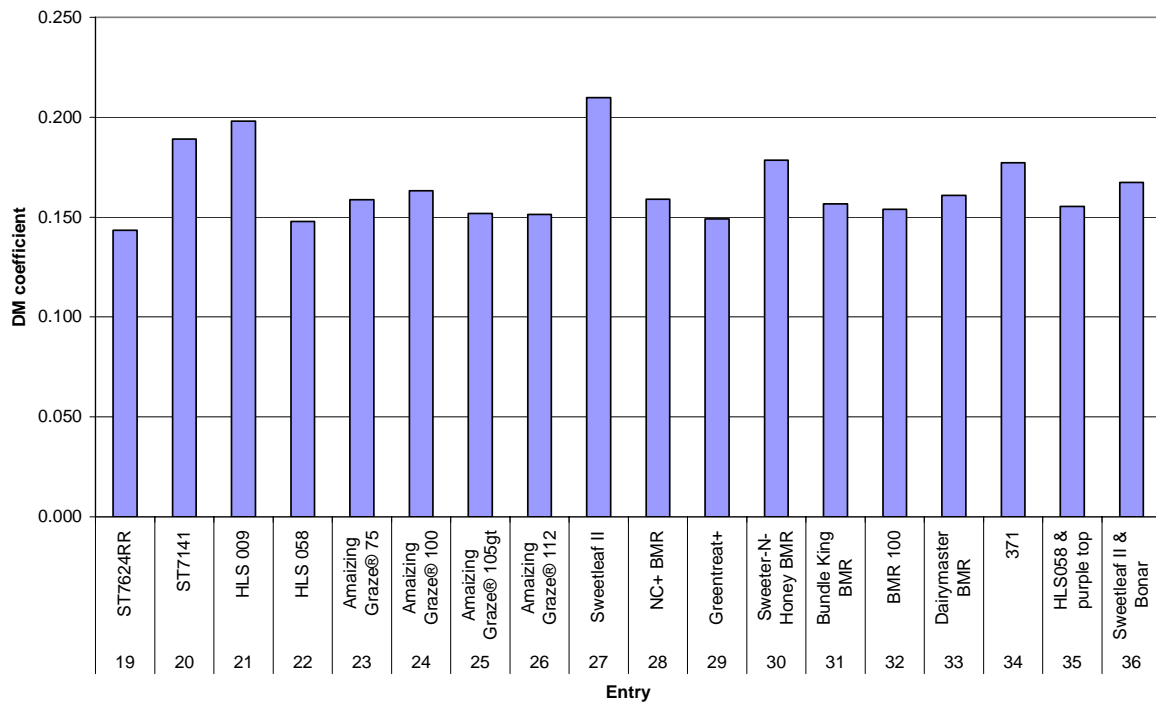
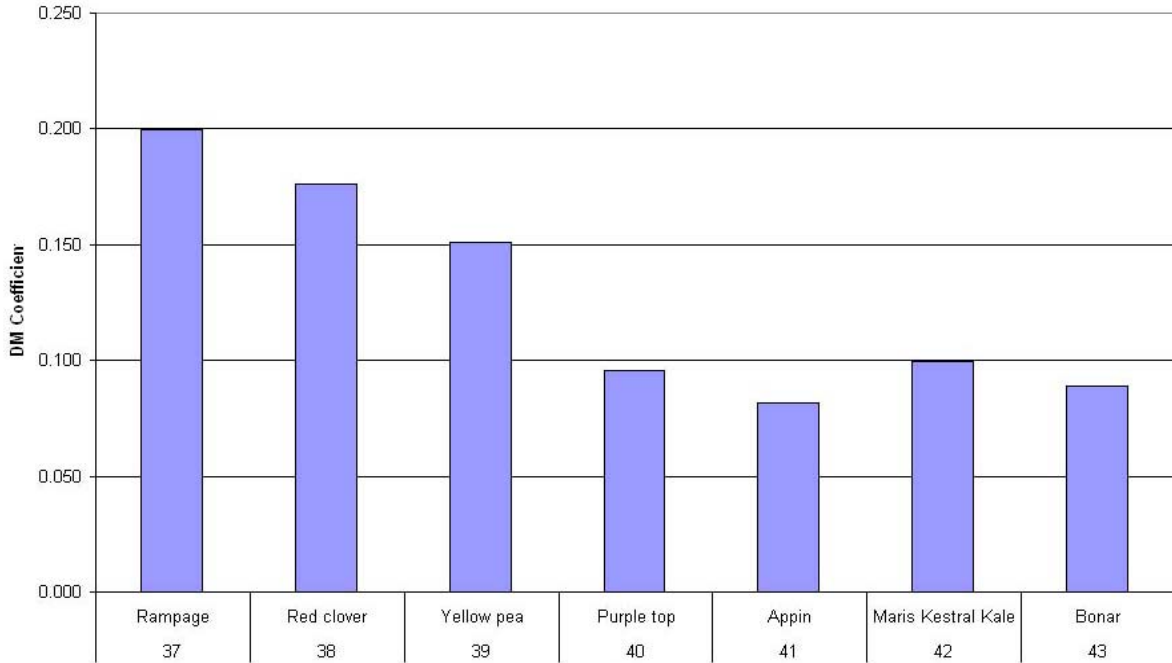
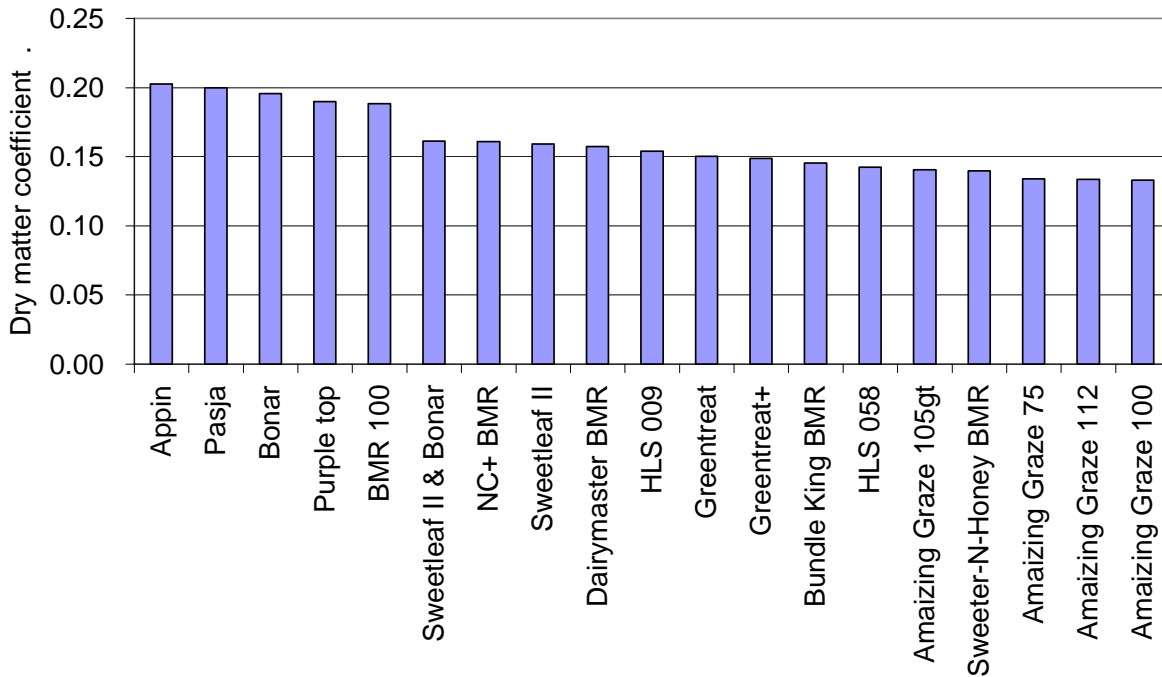


Figure 4. Dry matter coefficients for corn, sorghum, & Sudan hybrids and mixes on September 16-19, 2003.



**Figure 5.** Dry matter coefficients for legumes and Brassicas on September 16-19, 2003.



**Figure 6.** Forage dry matter coefficients of corn, sorghum, Sudan hybrids, and Brassicas from July 7 to September 22, 2004.

## **GUIDELINES AND RECOMMENDATIONS**

### **Brassica Forage Crops**

- Forage Brassicas such as canola (rape), kale, turnips, and swedes are high-yielding, high quality, and fast growing crops
- Drought hardy and cold hardy
- Stems and leaves normally have 20-25% crude protein and 65-80% digestibility
- Roots of turnips and kale usually have 10-14% crude protein and 80-85% digestibility
- These crops maintain quality, if not headed, well into November

### **Turnips**

- Grow fast and can be grazed as early as 70 days after planting
- Maximum production is reached in 80-90 days
- Some hybrids have fibrous roots that are not readily grazed by livestock
- Seed at least 70 days prior to killing frost
- Promising varieties are Purple Top, Green Globe, York Globe, and Sirius

### **Rape or Canola**

- Works well for fattening lambs and flushing ewes
- Hybrids should grow for 60 days before first harvest and 30 days before 2<sup>nd</sup> harvest  
Varieties: Bonar, Rang, Fora, Wairoa, Tyfon

### **Brassica Agronomic Mgt.**

- Brassica species can furnish good quality forage in late fall and winter.
- 60-80 days of warm temperatures are required
- Seeding rates are 2-4 lbs/acre
- Seeding dates June 10- August 20
- Seeding depth ¼ inch
- Days for seeding to grazing: 60-90
- Fertilization: apply 75 lbs N/acre at establishment

### **Establishment of Brassica Crops**

- Require >50 degree soils temperature, good soil drainage and soil pH in the range of 5.3-6.8
- Can be no-tilled into a sod provided it has been killed with glyphosate
- 1.5 to 2 lbs seed/acre for turnips and swedes
- 3.5 to 4 lbs/acre for rape and kale
- Drill on 6-8" row spacing and place seed at no more than ½" deep (double seeding rate if broadcast)
- Fertilize with 75 lbs N/ac and apply P and K similar to small grains

### **Brassica Conclusions**

- Treat this forage crop like it was a concentrate feed –because of its high quality
- Do not allow livestock to gorge themselves
- Provide a lower quality hay to provide some fiber in the diet
- Do not grow brassicas in the same field for more than 2 years to prevent disease problems

## CONCLUSIONS

- Warm season forages will yield more than cool season forages when planted in mid summer
- Corns, sorghums, and Sudan hybrids will cease growth with the first frost
- Cool season forages continue to grow after the first frost in the fall and will grow again in early spring
- Strip grazing of alternative forages will usually provide for a more uniform plain of nutrition
- If the forage is low in dry matter (washy), you probably need to add another source of dry matter
- If you let the animals onto the whole field, they will have a declining plane of nutrition  
Too much energy at first, then too little protein and energy (too much fiber) at the end
- Use feed tests so you know what you have in the forage and what you need to balance the ration
- Test for nitrates in forage that is stressed by drought, hail, high fertilizer or manure rates, or frost.
- Avoid hays or straws with a lot of silt or clay.
- There is no such thing as cheap feed!