

Advanced Grazing School:

Alternative Winter Annual Forages

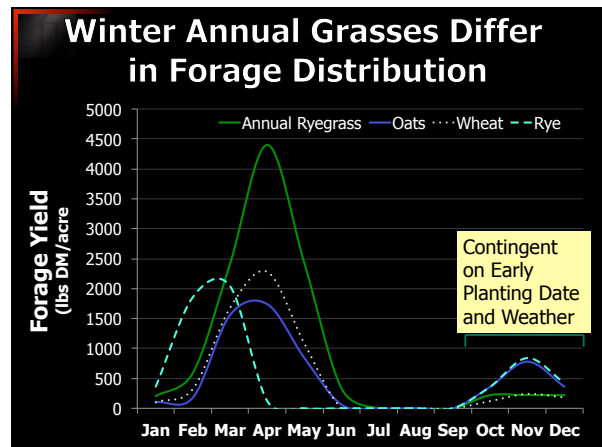


Winter Annual Forage Quality

Species	Crude Protein	Total Digestible Nutrients		Annual Yield* lbs DM/acre
		----- % -----	-----	
Ryegrass	10-20	56-74		10,630
Oats	8-14	55-70		7,100
Wheat	8-14	52-70		7,110
Rye	8-14	50-70		4,850
Arrowleaf	14-17	56-75		3,470
Crimson	14-16	57-75		3,570

Quality ranges are approximate and are highly dependant upon forage maturity at grazing/harvest. Yields are 3-yr averages from GA and AL.

GRASS



Improvement in soil OM in 3 paddocks located in a pasture-based dairy in Wrens, GA. (2007-2009)

Paddock	Initial	1 year	2 years	3 years
----- Soil Organic Matter, % -----				
P4	1.08	1.15	1.25	2.20
P8	1.01	1.17	1.59	2.18
P14	1.14	1.63	1.86	2.00
Avg.	1.07	1.32	1.57	2.13

3 years after grazing system started, averaging an inc. in soil OM of 0.35 percentage points per year!!!

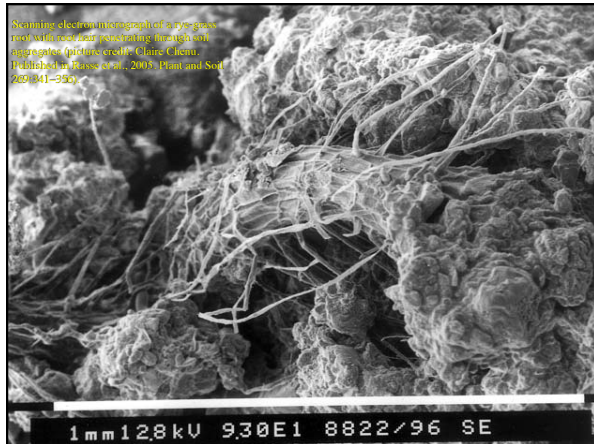
GRASS

Dr. Dennis Hancock
Extension Forage Agronomist
UGA Extension



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Focus: Winter Annual Legumes

Benefits of Adding Legumes

A valuable source of N (time-released).

Species	Annual lbs (N/acre)	N value at \$0.75/lb. of N
Alfalfa	200-300	\$150-225
Red clover	100-200	\$75-150
White clover	100-150	\$75-113
Annual clover	50-150	\$38-113



The effect of annual clover addition on 'Coastal' bermudagrass yields.

Treatment	1965	1966	1967	1968
----- dry lbs/acre -----				
Crimson; 200 lbs N/Acre	22500	22300	17500	24500
Arrowleaf; 200 lbs N/Acre	24000	21600	16500	27100
No Clover; 200 lbs N/Acre	17100	19800	15400	21600
No Clover; 0 N	7700	6600	3500	6200

Location: Starkville, MS Source: Knight, W.E. 1970. Agron. J. 62:773-775.



Annual Clover Yields in the Piedmont

Treatment	Average Yield		Variability	
	By Mar 31	Total	By Mar 31	Total
Arrowleaf	663	3645	VVV	VV
Berseem	447	2745	VVVV	VVV
Crimson	1168	2974	VV	V
Red*	257	3813	VVV	VV
Subterranean	143	1987	VVVV	VVV

(dry lbs/acre)

The number of "V"s indicates the amount of variability in yield that there was over the 3 years and 2 locations (i.e., more "V"s = more variable).
Source: Hoveland et al., 1986. GA Ag. Exp. Sta. Res. Rep 510.

Value of Annual Legume Establishment

Species	Cost of Adding Legume to Ryegrass		N Needed to BE*	Expected N Fixation
	cost/lb	cost/acre		
Arrowleaf	\$2.00	\$12	16	50-110
Crimson	\$1.80	\$27	36	70-140
Red Clover	\$3.00	\$24	32	50-130

* Amount of N that the seed cost/acre would have purchased (e.g., \$12 per acre / \$0.75 per lb of N = 16 lbs of N fixed per acre)

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Brassicas (Turnips, Hybrids, Forage Rape, Kale, Swede, Radish)

BENEFITS:

- Fast establishing, winter hardy forage crop.
- Early planted (late summer-early fall)
- Ready to graze after 60-120 d.
- Very high quality
 - TDN: 65-80% (tops); 75-85% (bulbs)
 - CP: 15-25% (tops); 9-16% (bulbs)
 - Rapid passage rate. Pair with high fiber source.
- High weight gains (1.8 – 2.6 lbs/hd/d)



Brassicas

Type ¹	November 21	January 24	March 26	Total
lb/ac				
Rape				
Barnapoli	812	2898	4257	7968
Bonar	924	2630	4222	7776
Dwarf Essex	1232	3121	4855	9209
T-Raptor	1799	4112	6211	12123
Turnips				
Appin	1571	2657	3928	8256
Barabas	1402	1746	1957	5105
Barkant	1241	1902	2434	5577
FL Broadleaf	1512	2505	3473	7491
Pasja	1420	3661	5761	10842
Purpletop	2375	2201	3389	7965
LSD _{0.05} ²	560	445	532	866

¹Planted at 5 lb/ac and fertilized with 400 lb of 15-5-10 at planting and after each harvest.
²LSD = Least Significant Difference. LSD for comparison of varieties within each column.
 Source: Lang et al., 2007. Brassicas as Alternative Winter Forage for Mississippi. Mississippi State Univ.



Brassicas (Turnips, Hybrids, Forage Rape, Kale, Swede, Radish)

BENEFITS:

- Aggressive growth competitive with weeds
- Tap root of some brassicas can help break through compaction or pans
- Naturally contain glucosinolates
 - Wards off many insect pests
 - Inhibits take-all disease (*Gaeumannomyces graminis var. tritici*)
 - Natural nematicide ("biofumigant")
 - Nitrification inhibitor
- Great renovation tool!



Brassicas (Turnips, Hybrids, Forage Rape, Kale, Swede, Radish)

CHALLENGES:

- Requires pH of 5.5-6.8 and well-drained soil.
- Not for overseeding! Does not tolerate much residue and tolerates NO competition from sod.



Brassicas (Turnips, Hybrids, Forage Rape, Kale, Swede, Radish)

CHALLENGES:

- Animal health issues (usually because of sharp change in diet)
 - High in S, so polioencephalomalacia can develop
 - Pure brassica diet can lead to hemolytic anemia/goiter
 - Glucosinolates can cause metabolic problems and taint milk (possibly meat?).
 - Forage types are generally low



Turnips (*Brassica rapa*)

- Bushy tops and large roots (bulbs)
 - High in carbohydrates
- Seeding rate = 1-3 lbs/ac
- Vary in partitioning of tops to bulbs
 - 90:10 – 15:85
- Quick to grazing:
 - 60-90 DAP
- Usually grazed 1-2 times for tops and once for bulbs



Photo credit: <http://www.agassizeed.com/> (top)
<http://www.ampacseed.com/> (bottom)

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Leafy Turnips and Hybrids (*Brassica campestris* spp.)

- Usually crosses of turnips and oriental vegetables.
- Grazing begins earlier than forage rape
 - 45-75 DAP
- Seeding rate, 1-3 lbs/ac



Photo credit: <http://www.brightseeds.co.uk/>



Forage rape (*Brassica napus*)

- Ready to graze after 60-120 d.
 - At least 60 d before first grazing
 - 30 d before 2nd grazing.
- 3-4 lbs seed/ac
- Two types:
 - Leafy and upright
 - Dwarf that is short and branched.
- Develop reddish top when ready to graze.



Photo credit: <http://www.brightseeds.co.uk/>



Kale (*Brassica oleracea*)

- Excellent winter hardiness
 - Down to 10° F
 - Excellent grazing into winter
- 3-4 lbs seed/ac
- Two types:
 - Narrow stem (up to 60" tall, 2" stem)
 - Stemless (up to 25")
- Later maturing
 - First grazing may be 90-120 DAP
- Can be conserved as baleage ("kaleage")



Photo credit: <http://www.auswestseeds.com.au/> (top)
<http://www.limagrain.co.uk/> (bottom)

Swede (*Brassica napus*)

- More commonly grown where winters are cold and summers are wet.
- 1-3 lbs seed/ac
- Larger bulbs than turnips
- Slower to mature (20-24 wk)
- Usually only grazed after reaching maturity.
- Not recommended in Georgia

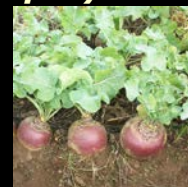


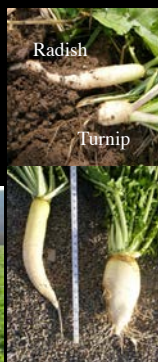
Photo credit: <http://gleadell.breezegrroup.net/> (top)
<http://www.scri.ac.uk/> (bottom)

Forage or "Tillage" Radish (*Raphanus sativus*)

- Partitions more energy to root than shoots
- Impressive root, but...
 - questionable as to impact on and practicality in forage systems.



Photos: Dave Robinson, 2010 Midwest Cover Crop Council Meeting <http://bit.ly/1qGIX0p>



Tillage Radish may or may not breakthrough the compacted zone



Photo: Dave Robinson, 2010 Midwest Cover Crop Council Meeting <http://bit.ly/1qGIX0p>

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Brassica Fertilization

N Fertility

- Turnips and hybrids and forage rape
 - 40-50 lbs at planting, 30-40 lbs after first grazing
- Kale and Swedes
 - Up to 60 lbs at planting, 30-60 lbs 10-12 weeks after planting (if good grazing potential)

P & K Fertility

- Based on soil test recommendations
- Kale and swede use up to 2x the P & K of others



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Questions?



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1-800-ASK-UGA1



Dr. Dennis Hancock
Extension Forage Agronomist
UGA Extension

