Advanced Grazing School:
Alternative Winter Annual Forages

Dr. Dennis Hancock
Extension Forage Agronomist
UGA Extension
Benefits of Adding Legumes
A valuable source of N (time-released).

<table>
<thead>
<tr>
<th>Species</th>
<th>Annual lbs (N/acre)</th>
<th>N value at $0.75/lb. of N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfalfa</td>
<td>200-300</td>
<td>$150-225</td>
</tr>
<tr>
<td>Red clover</td>
<td>100-200</td>
<td>$75-150</td>
</tr>
<tr>
<td>White clover</td>
<td>100-150</td>
<td>$75-113</td>
</tr>
<tr>
<td>Annual clover</td>
<td>50-150</td>
<td>$38-113</td>
</tr>
</tbody>
</table>

The effect of annual clover addition on ‘Coastal’ bermudagrass yields.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>1965</th>
<th>1966</th>
<th>1967</th>
<th>1968</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crimson: 200 lbs/acre</td>
<td>2250</td>
<td>2230</td>
<td>1750</td>
<td>2450</td>
</tr>
<tr>
<td>Arrowleaf: 200 lbs N/Acre</td>
<td>2400</td>
<td>2160</td>
<td>1650</td>
<td>2710</td>
</tr>
<tr>
<td>No Clover: 200 lbs N/Acre</td>
<td>1710</td>
<td>1980</td>
<td>1540</td>
<td>2160</td>
</tr>
<tr>
<td>No Clover: 0 N</td>
<td>7700</td>
<td>6600</td>
<td>3500</td>
<td>6200</td>
</tr>
</tbody>
</table>


Annual Clover Yields in the Piedmont

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Average Yield</th>
<th>Variability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrowleaf</td>
<td>663</td>
<td>VVV VV</td>
</tr>
<tr>
<td>Berseem</td>
<td>447</td>
<td>VWWW VVV</td>
</tr>
<tr>
<td>Crimson</td>
<td>1168</td>
<td>VV VV</td>
</tr>
<tr>
<td>Red*</td>
<td>257</td>
<td>VWW VV</td>
</tr>
<tr>
<td>Subterranean</td>
<td>143</td>
<td>VWWW VWWW</td>
</tr>
</tbody>
</table>

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).

Value of Annual Legume Establishment

<table>
<thead>
<tr>
<th>Species</th>
<th>Cost of Adding</th>
<th>N Needed to BE*</th>
<th>Expected N Fixation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrowleaf</td>
<td>$2.00</td>
<td>$12</td>
<td>16</td>
</tr>
<tr>
<td>Crimson</td>
<td>$1.80</td>
<td>$27</td>
<td>36</td>
</tr>
<tr>
<td>Red Clover</td>
<td>$3.00</td>
<td>$24</td>
<td>32</td>
</tr>
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</table>

* Amount of N that the seed cost/acre would have purchased.
(ie, $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)

**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.
- 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

**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!

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**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
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

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.

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”)

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

**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.

**Tillage Radish** may or may not breakthrough the compacted zone
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

Questions?

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