Extending the Grazing Season with Forage Brassicas
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What are Brassicas?
Brassicas (cole crops, cruciferous plants) – a large, multi-purpose plant family
• Forages: turnips, swede (rutabaga), kale, rape, mustard, fodder radish, hybrids
• Vegetable: turnips, rutabaga, kale, mustard, radish, broccoli, cabbage, cauliflower, brussels sprout, bok choi, arugula, cress, collards
• Oilseed: rape seed, canola, oilseed radish, camelina, mustard
• Cover crop: turnip, stubble radish, mustard
• Biofumigant: rape, mustard
• Condiment/spice: mustard seed
• Ornamental: flowering kale
• Genetics model plant: Arabidopsis thaliana
• Weeds: mustards, cress, rocket, shepherds purse

Brassica species
Turnips (B. rapa L. var. rapa)
• 60 days to grazing
• Bulbs (“roots”) high in starch and sugar
• Leaves high in protein and sugar
Rape and Canola
• 60-90 days to grazing
• Good regrowth if stems are left (regrows from leaf nodes)
Swedes (B. napus L.)
• Similar to turnip but much longer (90-120 d) to grazing
Kale (B. napus L.)
• Relatively slow growth (90-120 days to grazing)

Radish (Raphanus sativus L.)
• Synonyms: fodder radish, forage radish, daikon, stubble radish
• Edible top and root
• Stubble types have large root that breaks through compacted subsoils
• Specialized forage varieties have less root, more leaf, and better regrowth potential than stubble types
Forage radish + oats, regrowth, Oct. 19
Double cropped after sweet corn

Why Brassicas?
• Long tradition of use to extend fall grazing season in the USA
  – Extremely frost tolerant
  – High energy content supports animal performance (milk, lamb, beef)
  – Hold nutritious quality well, especially if insulated by snow
  – Highly preferred by animals
  – 60 days from planting to grazing fits short windows of opportunity
• Dual use as cover crop
  – Fall brassica pasture maintains soil cover and controls weeds after early-harvested crops like wheat
  – Forage brassicas will not dependably survive Michigan winter
  – Resulting spring seedbed is ideal for crop establishment (row crop or new perennial forage paddock)
Brassica forage quality – too good?

Nutritive value of brassica forage compared to grass pasture, alfalfa pasture, corn silage, and corn grain.

<table>
<thead>
<tr>
<th></th>
<th>DM, %</th>
<th>CP, %</th>
<th>NDF, %</th>
<th>NFC, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turnip leaf</td>
<td>4.22</td>
<td>7.33</td>
<td>11.44</td>
<td>10.58</td>
</tr>
<tr>
<td>Turnip root</td>
<td>8.20</td>
<td>4.23</td>
<td>17.35</td>
<td>20.81</td>
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<tr>
<td>Forage rape</td>
<td>4.23</td>
<td>5.31</td>
<td>13.43</td>
<td>9.46</td>
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<tr>
<td>Grass pasture</td>
<td>15.35</td>
<td>7.34</td>
<td>39.79</td>
<td>10.20</td>
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<tr>
<td>Alfalfa pasture</td>
<td>25.35</td>
<td>16.35</td>
<td>35.67</td>
<td>20.30</td>
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<tr>
<td>Corn silage</td>
<td>35.40</td>
<td>7.11</td>
<td>45.55</td>
<td>30.40</td>
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<td>Corn grain</td>
<td>88</td>
<td>10</td>
<td>9.5</td>
<td>75</td>
</tr>
</tbody>
</table>

Recent variety improvements

- Genetics are coming from Europe, New Zealand
- Improved single species or species hybrid varieties
- Promoted for improved yields, faster establishment, better cold tolerance, greater shoot/root ratio, soil improvement, and/or multiple grazings
  - Forage turnip – Appin
  - Forage rape – Barsica
  - Turnip x rape – Paksja, Pacer
  - Turnip x kale – Wenfred, Goliath
  - Radish – Tillage, Groundhog

- Forage yield up to 11,000 lb DM/acre reported with 3-4 grazings
Our question:
How much regrowth is really possible from summer-planted brassicas in Michigan?

Experimental design:
• 2 sites
  - East Lansing (planted July 27, 2013)
  - Lake City (planted July 17, 2013)

• 10 brassica varieties, planted at 3-4 (turnip, rape) or 7.5 (radish) lb/acre
  - Turnips: Purple Top (check), Barkant, Appin
  - Forage Rape: Dwarf Essex (check), Barnipoli, Barsica
  - Turnip x rape hybrids: Pasja, Pacer
  - Radish: Groundhog, Tillage

• All plots also planted with 25 lb/A ‘Ida’ oats

Plot Management
• Both sites previously in alfalfa, killed and plowed down in May

• Planting date target – mid/late July
  - East Lansing (planted July 27, 2013)
  - Lake City (planted July 17, 2013)

• Clean tillage for establishment, no herbicides
• East Lansing – no fertilizer, pH ~6.2
• Lake City – 28 lb P₂O₅, 84 lb K₂O, pH ~6.5

• 1st harvest target – ~45 days after planting
• Regrowth harvest target – every 30 days
• Hand harvest followed by machine clean-off, all at 6-in residual height
• Forage quality will be determined

Good rainfall
Barsica rape exhibited best early growth rate

Very dry conditions
Not as much growth
Essex rape check had best yield
4 wk regrowth, East Lansing

0
500
1000
1500
2000
2500
3000
3500

Biomass (lb DM/acre)

Oats
Brassica

East Lansing

33 d regrowth

• Poor for “pure” rapes, but oats filled in the gap
• Similar for turnips, turnip-rape hybrids, and radish

Questions?

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