Growing high quality Brussels sprouts

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Iowa State University and Grinnell Heritage Farm
PFI Annual Conference 1-20-2018
Brassica Centers of Origin

Northern Europe
- Rutabaga
- Turnip
- Brussels sprouts
- Cabbage
- Kohlrabi

Asia
- Chinese Cabbage

Mediterranean
- Broccoli
- Cauliflower
- Kale
- Collards

B. rapa
B. oleracea
B. napus

Source: Reiners and Bellinder
Many uses of Brussels sprout

Could be used as an excellent Growth Chart Ruler/indicator
Plan it before you plant it!

- Know your market
- Cultivar selection
- Primary market considerations
  - Quality
    - Uniform sizing
    - Postharvest quality
    - Flavor
  - Local
  - Reduced chemicals
  - Quality!!!!!
Site Selection
(warm is the key)

- Sandy to clay loam
- Must be well-drained
- pH = on the lower end (6.0 – 6.5)
- Ideal = sandy loam: dries out early and warms up faster in the spring.
- Slope = to the south. A 20 degree slope absorbs 6% more heat than level.
### Map Unit Legend

**Story County, Iowa (IA169)**

<table>
<thead>
<tr>
<th>Map Unit Symbol</th>
<th>Map Unit Name</th>
<th>Acres in AOI</th>
<th>Percent of AOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>55</td>
<td>Nicollet clay loam, 1 to 3 percent slopes</td>
<td>1.0</td>
<td>5.6%</td>
</tr>
<tr>
<td>107</td>
<td>Webster clay loam, 0 to 2 percent slopes</td>
<td>2.9</td>
<td>16.8%</td>
</tr>
<tr>
<td>138B</td>
<td>Clarion loam, 2 to 6 percent slopes</td>
<td>6.3</td>
<td>36.5%</td>
</tr>
<tr>
<td>138C2</td>
<td>Clarion loam, 6 to 10 percent slopes, moderately eroded</td>
<td>7.1</td>
<td>41.1%</td>
</tr>
</tbody>
</table>

**Totals for Area of Interest**  
17.3  100.0%
## Cultivar selection

<table>
<thead>
<tr>
<th>Cultivars</th>
<th>Days to maturity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Churchill</td>
<td>90</td>
</tr>
<tr>
<td>Diablo</td>
<td>110</td>
</tr>
<tr>
<td>Dagan</td>
<td>100</td>
</tr>
<tr>
<td>Franklin</td>
<td>80</td>
</tr>
<tr>
<td>Early Marvel</td>
<td>85</td>
</tr>
<tr>
<td>Jade Cross</td>
<td>85</td>
</tr>
<tr>
<td>Nautic</td>
<td>105</td>
</tr>
</tbody>
</table>
Transplant production: 5-6 weeks; Strive for improved quality and uniformity.
## Planting: bare soil or plastic mulch

<table>
<thead>
<tr>
<th>Crop</th>
<th>Between rows</th>
<th>In-rows</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kohlrabi</td>
<td>12-18”</td>
<td>4-8”</td>
</tr>
<tr>
<td>Broccoli</td>
<td>30-36”</td>
<td>8-12”</td>
</tr>
<tr>
<td>Cabbage, Cauliflower</td>
<td>30-36”</td>
<td>12-18”</td>
</tr>
<tr>
<td>Brussel Sprouts (single row)</td>
<td>30-36”</td>
<td>18-24”</td>
</tr>
</tbody>
</table>
Weed Management - cultivation

Healthy transplants can be “blind cultivated” with a flex-tine harrow to get early weeds

10 days after transplanting
Cultivation with sweeps between rows often done 2-5 times in brassica crops.

10-40 days after transplanting
Weed Management - cultivation
Brassica: Soil fertility

Relatively heavy feeders

N often 100-150lbs/a, but too much can cause splitting (cabbage) or hollow stem (broccoli)

Brassica crops are sensitive to several micro-nutrient deficiencies

pH 6.5 – 7.0 best
## Nutrient recommendation

<table>
<thead>
<tr>
<th>Nutrient concentration(s) from soil test</th>
<th>Status</th>
<th>Fertilizer needed (lb/A)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phosphorus (ppm)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than or equal to 15</td>
<td>Low</td>
<td>150</td>
</tr>
<tr>
<td>16 - 30</td>
<td>Medium</td>
<td>100</td>
</tr>
<tr>
<td>31 - 50</td>
<td>High</td>
<td>75</td>
</tr>
<tr>
<td>51 and higher</td>
<td>Very High</td>
<td>0</td>
</tr>
<tr>
<td><strong>Potassium (ppm)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than or equal to 80</td>
<td>Low</td>
<td>300</td>
</tr>
<tr>
<td>81 – 140</td>
<td>Medium</td>
<td>150</td>
</tr>
<tr>
<td>141 - 200</td>
<td>High</td>
<td>75</td>
</tr>
<tr>
<td>201 and higher</td>
<td>Very High</td>
<td>50</td>
</tr>
<tr>
<td><strong>Organic matter (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than or equal to 3%</td>
<td>Low</td>
<td>150</td>
</tr>
<tr>
<td>3.1 – 19.0</td>
<td>Medium</td>
<td>120</td>
</tr>
<tr>
<td>19.1 and higher</td>
<td>High</td>
<td>40</td>
</tr>
</tbody>
</table>
Nutrient Deficiency Review

**Old (lower) leaves**
- Uniform chlorosis
- Stunting Purple
- Edge/tip necrosis
- Inerveinal chlorosis
- Leaf edge Necrosis
- Uniform chlorosis
- Inerveinal chlorosis
- Purple deformed

**Young (upper) leaves**
- Uniform chlorosis
- Stunting Purple
- Edge/tip necrosis
- Inerveinal chlorosis
- Leaf edge Necrosis
- Uniform chlorosis
- Inerveinal chlorosis
- Purple deformed

**Nitrogen**
- Stunting Purple

**Phosphorous**
- Edge/tip necrosis

**Potassium**
- Inerveinal chlorosis

**Magnesium**
- Leaf edge Necrosis

**Calcium**
- Uniform chlorosis
- Inerveinal chlorosis
- Purple deformed

**Sulfur**
- Uniform chlorosis
- Inerveinal chlorosis

**Iron**
- Uniform chlorosis
- Inerveinal chlorosis

**Zinc Copper Manganese**
- Uniform chlorosis
- Inerveinal chlorosis

**Boron**
- Uniform chlorosis
- Inerveinal chlorosis

**Low pH problems**
- Magnesium
- Calcium

**High pH problems**
- Sulfur
- Iron

**Biggest Concern for cole crops**
- Calcium
Micronutrients

Manganese Deficiency. High pH.
Young leaves: Interverinal chlorosis

Boron Deficiency. High pH
Mature leaves; chlorotic margins; water-soaked brown spots on curds

Molybdenum Deficiency. Low pH
Young leaves; puckered and twisted; Chlorosis of leaf margins and leaf cupping

Suggested soil micronutrient levels and sampling procedures for vegetable crops (download from ISU Extension and Outreach store online)
Insect pests

Imported cabbage worm
Cabbage loopers
Japanese beetles too (secondary pest)
Brassica pests – Lepidoptera moths and butterflies

- Imported cabbage worm
- Cabbage looper
- Diamondback moth

Bt- *Bacillus thurengiensis*
Effects of non-crop species on brassica insect pests

- Purslane: diamondback moth; imported cabbageworm
- Redroot pigweed: imported cabbageworm
- Red clover: aphids; flea beetles; imported cabbageworm
- Mustard: flea beetles; aphids
- Red Fescue: flea beetles
- White clover: flea beetles

Sources: Costello, Kloen and Altieri, Andow et al., Dempster and Coaker
Which disease is it?

Altenaria leaf spot
Cool and wet especially at night; heavy dew in the morning

- Use pathogen free seed
- Practice 3-4 year crop rotation
- Incorporate crop residue at the end of the season
- Manage cruciferous weeds
- Fungicides: Chlorothalonil, Azoxystrobin, Mefenoxam
To Top or not-top - Implications

Grade A Gardens, Des Moines, IA
Removing the apical meristem causes the axillary buds to expand.

Removing at the right time has been shown to increase the size of the sprouts at the top of the stalk, improving marketable yields.

Top 6-8 weeks before harvest; typically early to mid September or when the largest sprouts are 0.5-1.0” diameter
Whole stock harvest better for smaller markets
Cut at the base with a knife or lopper (clean cut)
Many Thanks

Brandon Carpenter
Nick Howell

Andy Dunham
Jordan Clasen
Mike Von Weihe

Iowa Fruit & Vegetable Growers Assn.

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