Module 15: Vegetables - Cruciferae

LSU AgCenter Home Gardening Certificate Course

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Brassicaceae (formerly Cruciferae) Characteristics:

- Alternating leaf arrangement or rosettes
- Flower has:
  - Four sepals
  - Four petals
  - Two short and Four long stamens
- Flower petals in opposite arrangement form a cross
- Fruit is a silique (type of capsule) – longer than wide
- Fruit splits in two to release, usually, small round seeds
Common Cruciferous Vegetables

* - All are *Brassica oleracea*

** - All are *Brassica rapa*

Differentiated by Cultivar Group
Growing

• Cool Season Crops (Fall/Winter/Early Spring)
• Can survive mild frosts, some lower
• Seeds will germinate as low as 40°F; optimum usually 65-75°F
• Direct seed: Radish, Turnip, Mustard
• Direct seed or Transplant: Collards, Kohlrabi, Kale, Arugula, Bok Choy
• Transplant: Broccoli, Brussels Sprouts, Cauliflower, Cabbage, Napa Cabbage
Growing

- Well-drained soil, rich in organic matter
- Ideal pH 6.0 – 6.5
- Sunlight – 6-8 hours minimum direct
- Soil test for fertilization recommendations
- Generally, complete fertilizer at 3-4 weeks and again 2-3 weeks later.
Plant Spacing

Somewhat Variety Dependent, but in general:

<table>
<thead>
<tr>
<th>Crop</th>
<th>Spacing</th>
<th>Crop</th>
<th>Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arugula</td>
<td>3-4”</td>
<td>Kale</td>
<td>6-12”</td>
</tr>
<tr>
<td>Bok Choy</td>
<td>8-12”</td>
<td>Kohlrabi</td>
<td>6”</td>
</tr>
<tr>
<td>Broccoli</td>
<td>12-18”</td>
<td>Mustard Greens</td>
<td>4-12”</td>
</tr>
<tr>
<td>Brussels Sprouts</td>
<td>18-24”</td>
<td>Napa Cabbage</td>
<td>12-18”</td>
</tr>
<tr>
<td>Cabbage</td>
<td>12-18”</td>
<td>Radish</td>
<td>1-2”</td>
</tr>
<tr>
<td>Cauliflower</td>
<td>18-24”</td>
<td>Turnip</td>
<td>3-6”</td>
</tr>
<tr>
<td>Collards</td>
<td>12-18”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crop</td>
<td>Days to Harvest</td>
<td>Crop</td>
<td>Days to Harvest</td>
</tr>
<tr>
<td>---------------</td>
<td>----------------</td>
<td>---------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Arugula</td>
<td>45-55</td>
<td>Kale</td>
<td>50-70</td>
</tr>
<tr>
<td>Bok Choy</td>
<td>40-50</td>
<td>Kohlrabi</td>
<td>55-75</td>
</tr>
<tr>
<td>Broccoli</td>
<td>50-90*</td>
<td>Mustard Greens</td>
<td>35-50</td>
</tr>
<tr>
<td>Brussels Sprouts</td>
<td>90*</td>
<td>Napa Cabbage</td>
<td>40-70*</td>
</tr>
<tr>
<td>Cabbage</td>
<td>50-75*</td>
<td>Radish</td>
<td>22-28</td>
</tr>
<tr>
<td>Cauliflower</td>
<td>55-65*</td>
<td>Turnip</td>
<td>40-50</td>
</tr>
<tr>
<td>Collards</td>
<td>75*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* - Days after transplanting

Days to Maturity
Varieties Vary:
<table>
<thead>
<tr>
<th>Crop</th>
<th>Harvest</th>
<th>Crop</th>
<th>Harvest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arugula</td>
<td>Young tender leaves</td>
<td>Kale</td>
<td>Young tender leaves</td>
</tr>
<tr>
<td>Bok Choy</td>
<td>Whole plants when mature</td>
<td>Kohlrabi</td>
<td>2-3” dia. roots</td>
</tr>
<tr>
<td>Broccoli</td>
<td>Before flower buds open</td>
<td>Mustard Greens</td>
<td>Young tender leaves</td>
</tr>
<tr>
<td>Brussels Sprouts</td>
<td>When sprouts are firm</td>
<td>Napa Cabbage</td>
<td>When head is firm</td>
</tr>
<tr>
<td>Cabbage</td>
<td>When head is firm</td>
<td>Radish</td>
<td>1-2” dia. roots</td>
</tr>
<tr>
<td>Cauliflower</td>
<td>Before curds become loose</td>
<td>Turnip</td>
<td>2-4” dia. roots</td>
</tr>
<tr>
<td>Collards</td>
<td>Mature dark green leaves</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Common Insect Pests - Aphids

Aphids:

- **Cabbage aphids** (*Brevicoryne brassicae*) - green gray with a white, waxy coating
- **Green peach aphids** (*Myzus persicae*) - yellowish-green, without a waxy coating
- **Turnip aphids** (*Lipaphis erysimi*) - whitish-green or with a white, waxy coating

**Damage:**
- Curled/Misshapen Leaves
- Chlorotic blotches
- Transmit virus

**Control:**
- Insecticidal Soaps, Horticultural Oil, Neem Oil, Malathion
- Parasitic wasps, ladybird beetles, syrphid fly, lacewing
Common Insect Pests – Lepidopteran Caterpillars

Damage:
• Ragged holes in leaves
• Dark frass balls

Control:
• Bt
• Spinosad
• Kaolin clay
• Parasitoid wasps and flies
• Pyrethrins
• Carbaryl
• Diazinon
• Cyfluthrin
Cabbage Webworm (*Hellula rogata*)

- Larvae - Early instar - yellowish-gray without stripes; mature larvae - grayish-yellow, with five purple or black longitudinal stripes
- Weaves webs for protection
- Adult - light brown and gray, respectively to yellowish-brown. Forewing has a dark kidney shaped spot and irregular whitish bands. ¾” wingspan.
Cabbage Looper (*Trichoplusia ni*)

- Larvae - light green with 2 white stripes on each side.
- Legs – 3 pair near head, 3 pair near end. Moves “inch worm” style.
- Adult - mottled grayish-brown moth, 1½ inch wing span.
- It has a small silvery white figure 8 in the middle of each of the front wings.
Lepidopteran Caterpillars

Cross-striped Cabbageworm
(*Evergestis rimosalis*)
- Larvae - bluish-gray with numerous transverse black bands. There is a yellow line along each side of the caterpillar.
- Adult moth – 1” Wingspan
  Forewings are mottled yellowish-brown to brown with zigzag lines of dark brown.
Lepidopteran Caterpillars

Great Southern White (*Ascia monuste*)

- Larvae - yellow and gray longitudinal stripes and multiple small black spots along the body.
- Adult butterfly – 2.5-3.5” wingspan. Male wings are white with a black margin in a zigzag pattern on the forewings. Female color varies from white to gray, and have a black margin and a small black spot on the forewings.
Lepidopteran Caterpillars

Diamondback Moths (*Plutella xylostella*)
- Larvae - light green and pointed at each end. Their bodies are covered by tiny, erect black hairs.
- Adult moth - small (<1” wingspan) and slender with very long antennae. Grayish-brown with a broad, cream or light brown band along its back. Males have three light yellow diamond-shaped markings on their wings. When viewed from the side, the wing tips appear to turn up slightly.
Lepidopteran Caterpillars

Beet Armyworm (*Spodoptera exigua*)

- Larvae - wavy, light-colored stripes lengthwise down the back and broader stripes on each side. Although often dull green, the color of caterpillars can vary.
- Adult moth - (1” Wingspan) dark front wings with mottled lighter markings and hind wings thinly covered with whitish scales.
Lepidopteran Caterpillars

Imported Cabbage Worm (*Pieris rapae*)
- Larvae - velvety green with faint yellow stripes running longitudinally on its back and sides.
- Adult - white butterfly (1 ½” wingspan) that has black-tipped forewings. Females have two black spots on top of each of their forewings; males have only one black spot.
Common Insect Pests – Harlequin Bug

**Harlequin Bug** (*Murgantia histrionica*)
- Adult: a flat, shield-shaped stink bug (3/8” long) with red and black spotted markings on its back.
- Nymph: has the same markings but is smaller and more round.

**Damage:**
- Both the adult and nymph suck sap from the plant, causing it to wilt, turn brown and die.

**Control:**
- Remove by hand, permethrin, cyfluthrin
Common Insect Pests – Flea Beetles

Crucifer Flea Beetle (**Phyllostreta cruciferae**)

**Turnip Flea Beetle (**Phyllostreta nemorum**)

- **Adults** – shiny brown to black in color, sometimes with longitudinal stripes, 0.06 to 0.12 inch long.
- **Larvae** - live in the soil, are slender, whitish, ¼” long.

**Damage:**

Adults chew small holes in leaves, giving them a sievelike appearance.

Larvae feed on underground plant parts.

**Control:**

neem oil, Kaolin clay, carbaryl, permethrin, bifenthrin, imidacloprid
Common Cole Crop Diseases

Downy Mildew (fungus Peronospora parasitica)
Symptoms: Gray mold on lower leaf surface. Upper leaf surface turns yellow and then brown or necrotic. Leaves wither and die.
Control: Resistant varieties, Crop rotation, Remove plant debris, Chlorothalonil, Copper, Avoid wetting leaves.
Common Cole Crop Diseases

**Alternaria Leaf Spot** (fungus *Alternaria* sp.)

**Symptoms:** Seedlings - small dark stem spots, damping-off. Mature plants - bottom leaves are infected first, brown circular with characteristic concentric rings. Leaves turn yellow and drop. Dark spots on cauliflower curds.

**Control:** Crop rotation, Remove plant debris, Chlorothalonil, Avoid wetting leaves
Common Cole Crop Diseases

**Black rot** (bacterium, *Xanthomonas campestris pv. campestris*)

**Symptoms**: In general, yellow, V-shaped lesions along leaf margins. Infection may spread into the stems. Cutting into the stems often reveals a black-brown discoloration with a yellowish slime. On cauliflower, may appear as numerous black or brown specks, black veins and discolored curds.

**Control**: Good sanitation, Disease-free seed, Tolerant varieties, Avoid OH irrigation.
**Common Cole Crop Diseases**

**Black Leg** *(fungus *Phoma lingam)*

**Symptoms:** Ash gray spots speckled with tiny black dots on the leaves and stem. Stems become girdled, and the plants wilt and die.

**Control:** Good sanitation, Disease-free seed, Tolerant varieties, Avoid OH irrigation.
Viruses:
- Turnip mosaic virus (TuMV)
- Cauliflower mosaic virus (CaMV)

Symptoms: Infected plants may be stunted and have distorted leaves. Black spots develop on the heads of plants. Mosaic pattern on leaves.

Control: Remove crucifer weeds
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