

Module 15: Vegetables - Crucifers



LSU AgCenter Home Gardening Certificate Course

Dr. Joe Willis, Dr. Paula Barton-Willis, Anna Timmerman & Chris Dunaway

Crucifers – Cole Crops - Brassicas

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



Broccoli*



Kale*



Cauliflower*



Cabbage*



Arugula



Kohlrabi*



Napa Cabbage**



Brussels Sprouts*



Mustard Greens



Bok Choy**



Radish



Turnip**



Collards*

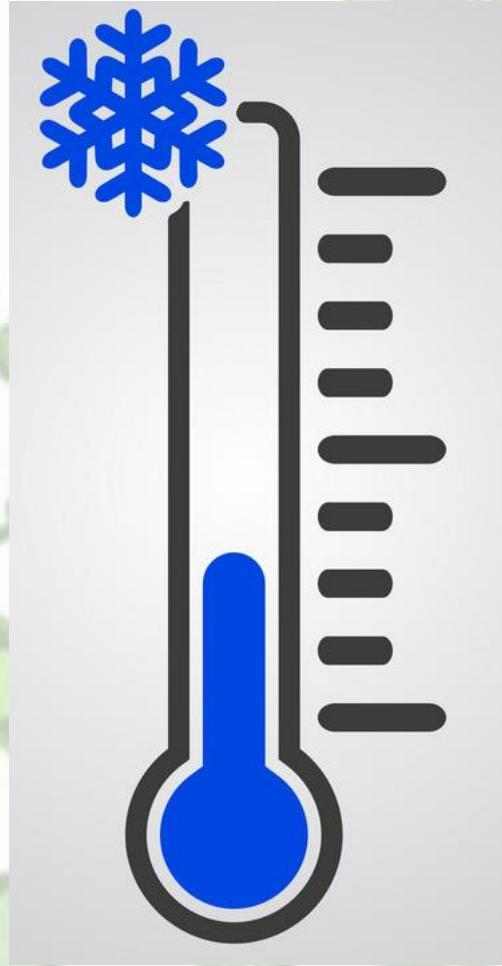
* - All are *Brassica oleracea*

** - 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:

Crop	Spacing	Crop	Spacing
Arugula	3-4"	Kale	6-12"
Bok Choy	8-12"	Kohlrabi	6"
Broccoli	12-18"	Mustard Greens	4-12"
Brussels Sprouts	18-24"	Napa Cabbage	12-18"
Cabbage	12-18"	Radish	1-2"
Cauliflower	18-24"	Turnip	3-6"
Collards	12-18"		

Days to Maturity

Varieties Vary:

Crop	Days to Harvest	Crop	Days to Harvest
Arugula	45-55	Kale	50-70
Bok Choy	40-50	Kohlrabi	55-75
Broccoli	50-90*	Mustard Greens	35-50
Brussels Sprouts	90*	Napa Cabbage	40-70*
Cabbage	50-75*	Radish	22-28
Cauliflower	55-65*	Turnip	40-50
Collards	75*		

* - Days after transplanting

Best Harvested

Crop	Harvest	Crop	Harvest
Arugula	Young tender leaves	Kale	Young tender leaves
Bok Choy	Whole plants when mature	Kohlrabi	2-3" dia. roots
Broccoli	Before flower buds open	Mustard Greens	Young tender leaves
Brussels Sprouts	When sprouts are firm	Napa Cabbage	When head is firm
Cabbage	When head is firm	Radish	1-2" dia. roots
Cauliflower	Before curds become loose	Turnip	2-4" dia. roots
Collards	Mature dark green leaves		

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



Lepidopteran Caterpillars

Cabbage Webworm (*Hellula rogatalis*)

- 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.
 $\frac{3}{4}$ " wingspan.



Lepidopteran Caterpillars

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 (*Phyllotreta cruciferae*)

Turnip Flea Beetle (*Phyllotreta 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



Crucifer Flea Beetle



Turnip Flea Beetle



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.



Common Cole Crop Diseases

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



This Can Come
From YOUR
Garden!





Please post all your questions and results to the message board that was emailed to you.

<https://www.facebook.com/groups/538153443545779/>