Cole Crop IPM Guide for Small Acreage & Backyard Production

PPFS-VG-23

Nicole Gauthier, Plant Pathology Extension Specialist; Kimberly Leonberger, Plant Pathology Extension Associate; April Lamb, Plant Pathology Postdoctoral Scholar; Ric Bessin, Entomology Extension Specialist; and Shawn Wright, Horticulture Extension Specialist

Introduction

Cole crops (cabbage, broccoli, cauliflower, kohlrabi, and brussels sprouts) are popular vegetables for both commercial production and backyard gardens. Yields may be impacted by diseases, insect pests, or weeds, so a proactive management approach is needed. Preventative practices are recommended to minimize damage and cost of management. This guide focuses on preventative cultural practices with options of low-input pesticide applications; organic options are also presented. Refer to the *Home Vegetable Gardening in Kentucky* (ID-128) publication for additional information on pesticide spray schedules for small acreages.

IPM Practices

Integrated Pest Management (IPM) utilizes a combination of biological, cultural, physical, and chemical methods to reduce and/or manage diseases and pests. Implementation of multiple IPM practices is often more impactful than any practice used alone.

Cultural Practices

Cultural practices should always be considered when planning, planting, and maintaining a field or garden. Some practices keep plants healthy and ensure the lowest risk for disease outbreaks or insect infestations. Other practices eliminate and eradicate sources of disease agents or insects, thereby reducing risk. Combine cultural practices with a preventative spray program or use them alone for a no-spray alternative.

- Choose a well-drained site located in full sun.
- Maintain plant vigor by watering during drought, mulching to regulate soil moisture and temperature, and amending soil nutrients according to soil tests.
- Minimize insect and wildlife damage.
- Increase plant spacing to improve air circulation and promote leaf drying.
- Utilize specific cultural practices listed in the table to eliminate disease-causing pathogens or insects and to reduce risks for infections/infestations.

Resistance

A healthy vegetable garden begins with planning. Disease-resistant cultivars can reduce the need for many fungicide and bactericide applications. Select cultivars that are resistant to the most devastating cole crop diseases in the area. Growers are advised to maintain a record of disease occurrence and select cultivars with resistance. Information about resistant cultivars can be found in *Vegetable Cultivars for Kentucky Gardens* (ID-133) or through supplier catalogs/websites.

Weed Management

Cultural practices such as manual weed removal and mulching are the primary methods for weed management in small acreages. Fields and gardens should be scouted frequently to remove weeds while they are young. Never allow weeds to go to seed. Often, a hoe is sufficient to remove above and below-ground portions of weeds. Vegetable plants should be planted as soon as possible after working the soil to minimize the germination of new weeds. Organic mulches such as compost, straw (not hay), shredded bark, newspaper, or cardboard can be used to limit weed emergence. Lawn clippings should not be used if herbicide treatments were applied prior to mowing. Avoid introducing mulch from sources that may be contaminated with weeds or weed seeds.

Small acreage farmers and gardeners rarely rely on herbicides for weed management. Non-selective contact herbicides, such as glyphosate, may be used according to the label. Herbicide applications should be made with low spray pressure to avoid drift, and precautions should be taken to avoid herbicide contact with vegetable plants. Pre-emergent herbicides may be applied after transplanting or when plants are at least 2 to 3 inches tall but before weeds have emerged. There are few organic herbicides labeled for home gardens. Check labels for information, precautions, and pre-harvest intervals.

Using the Table

The following table focuses on cultural practices as a means for eliminating or reducing risk for diseases and insects of cole crops. Cultural practices should be considered for each plant growth stage and should be utilized regardless of spray programs. Fungicides and insecticides are listed in the right-hand columns with target pathogens or insects. Always read and follow label instructions when using pesticides, including pre-harvest intervals. Organic products (OMRI-approved) are marked with an asterisk (*). Organic fungicides are generally less effective for managing diseases than synthetic products.

Spring-planted Cole Crops

Time of Year[1]	Growth Stage	Cultural Practices: Target Disease/Insect	Cultural Practices: Cultural Management	Disease: Target Disease	Disease: Fungicide/ Bactericide Management[2]	Insect: Target Insect	Insect: Insecticide/ Miticide Management[2,3]
March-April	Planting or transplant	-Damping-off (Pythium) -White mold	Utilize new or pasteurized potting mix; Use new or sanitized trays/pots; Plant certified or heat-treated seed; Rote plants into a different area of the garden; Solarize soil prior to planting; Plant in a well-drained location.		NONE		NONE
		-Cutworms -Flea beetles	Prepare soil two or more weeks in advance of planting.				
May-June	Vegetative growth and harvest	-Alternaria Leaf -Spot bacterial soft rot -Black leg -Black rot -Cercospora leaf spot -Pythium root & crown rot	Use wide spacing for air circulation; Avoid overhead watering; Improve drainage; Remove diseased plants and debris (do not compost); Sanitize tools.	-Alternaria leaf spot -Cercospora leaf spot	chlorothalonil	-Aphids	insecticidal soap* or neem*
				-Bacterial soft rot	copper*	-Diamondback moth -Imported cabbageworm	Bt* or pyrethroid or spinosad*
		-Aphids -Diamondback moth -Flea beetles -Imported cabbageworm	Protect plants from insect feeding with row covers; Scout for insects.	-Black rot	copper*	-Flea beetles	pyrethorid

[1] The growth stage indicated typically occurs during this time of year; however, this may vary from year to year depending on environmental conditions.

[2] Products noted with * indicate those that may be used in organic production. For a list of products approved by Organic Materials Review Institute (OMRI) please see University of Kentucky Publication Homeowner's Guide to Fungicides (PPFS-GEN-07).

[3] For a list of insecticides approved for use in residential areas see: General Use Insecticides for Home Gardeners (ENTFACT-445).

Spring-planted Cole Crops							
		Cultural Practices		Disease		Insect	
Time of Year[1]	Growth Stage	Target Disease/Insect	Cultural Management	Target Disease	Fungicide/ Bactericide Management[2]	Target Insect	Insecticide/ Miticide Management[2,3]
End of season	After harvest	-Alternaria leaf spot -Bacterial soft rot -Blackleg -Black rot -Cercospora leaf spot -Pythium root & crown rot -Aphids -Diamondback moth -Flea beetles -Imported cabbageworm	Gather all remaining plant tissues and destroy (do not compost diseased material); Deep-till to encourage decomposition.	NONE		NONE	

[1] The growth stage indicated typically occurs during this time of year; however, this may vary from year to year depending on environmental conditions.
[2] Products noted with * indicate those that may be used in organic production. For a list of products approved by Organic Materials Review Institute (OMRI) please see University of Kentucky Publication Homeowner's Guide to Fungicides (PPFS-GEN-07).
[3] For a list of insecticides approved for use in residential areas see: General Use Insecticides for Home Gardeners (ENTFACT-445).

Fall-planted Cole Crops

Time of Year[1]	Growth Stage	Cultural Practices: Target Disease/Insect	Cultural Practices: Cultural Management	Disease: Target Disease	Disease: Fungicide/ Bactericide Management[2]	Insect: Target Insect	Insect: Insecticide/ Miticide Management[2,3]
July-August	Planting or transplant	-Damping-off (Pythium & Rhizoctonia)	Utilize new or pasteurized potting mix; Use new or sanitized trays/pots; Plant certified or heat-treated seed; Rotate plants into a different area of the garden; Solarize soil prior to planting; Plant in a well-drained location.	NONE		-Beet armyworm -Cabbage looper -Cross-striped cabbageworm -Diamondback moth -Fall armyworm -Imported cabbageworm -Southern cabbageworm -Yellowstriped armyworm	Bt* or pyrethroid or spinosad*
		-Beet armyworm -Cabbage looper -Cross-striped cabbageworm -Diamondback moth -Fall armyworm -Harlequin bug -Imported cabbageworm -Southern cabbageworm -Yellowstriped armyworm	Protect plants from insect feeding with row covers; Scout for insects.			-Harequin bug	pyrethroid

[1] The growth stage indicated typically occurs during this time of year; however, this may vary from year to year depending on environmental conditions.

[2] Products noted with * indicate those that may be used in organic production. For a list of products approved by Organic Materials Review Institute (OMRI) please see University of Kentucky Publication Homeowner's Guide to Fungicides (PPFS-GEN-07).

[3] For a list of insecticides approved for use in residential areas see: General Use Insecticides for Home Gardeners (ENTFACT-445).

Fall-planted Cole Crops

Time of Year[1]	Growth Stage	Cultural Practices: Target Disease/Insect	Cultural Practices: Cultural Management	Disease: Target Disease	Disease: Fungicide/ Bactericide Management[2]	Insect: Target Insect	Insect: Insecticide/ Miticide Management[2,3]
August-November	Vegetative growth and harvest	-Alternaria leaf spot -Bacterial soft rot -Black rot -Cercospora leaf spot -Pythium root & crown rot -Rhizoctonia root & crown root	Use wide spacing for air circulation; Avoid overhead watering; Improve drainage; Remove diseased plants and debris (do not compost); Sanitize tools.	-Alternaria leaf spot -Cercospora leaf spot	chlorothalonil	-Aphids	insecticidal soap* or neem*
				-Bacterial soft rot -Black rot	copper*	-Beet armyworm -Cabbage looper -Cross-striped cabbageworm -Diamondback moth -Fall armyworm -Imported cabbageworm -Southern cabbageworm -Yellowstriped	Bt* or pyrethroid or spinosad*
		-Beet armyworm -Cabbage looper -Cross-striped cabbageworm -Diamondback moth -Fall armyworm -Harlequin bug -Imported cabbageworm -Southern cabbageworm -Yellowstriped armyworm	Protect plants from insect feeding with row covers; Scout for insects.			-Harlequin bug	pyrethroid

[1] The growth stage indicated typically occurs during this time of year; however, this may vary from year to year depending on environmental conditions.

[2] Products noted with * indicate those that may be used in organic production. For a list of products approved by Organic Materials Review Institute (OMRI) please see University of Kentucky Publication Homeowner's Guide to Fungicides (PPFS-GEN-07).

[3] For a list of insecticides approved for use in residential areas see: General Use Insecticides for Home Gardeners (ENTFACT-445).

Fall-planted Cole Crops

Time of Year[1]	Growth Stage	Cultural Practices: Target Disease/Insect	Cultural Practices: Cultural Management	Disease: Target Disease	Disease: Fungicide/ Bactericide Management[2]	Insect: Target Insect	Insect: Insecticide/ Miticide Management[2,3]
End of season	After harvest	-Alternaria leaf spot -Bacterial soft rot -Black rot -Cercospora leaf spot -Pythium root & crown rot -Rhizoctonia root & crown rot -Beet armyworm -Cabbage looper -Cross-striped cabbageworm -Diamondback moth -Fall armyworm -Harlequin bug -Imported cabbageworm -Southern cabbageworm -Yellowstriped armyworm	Gather all remaining plant tissues and destroy (do not compost diseased material); Deep-till to encourage decomposition.	-Alternaria leaf spot -Cercospora leaf spot	chlorothalonil	-Aphids	insecticidal soap* or neem*
						-Beet armyworm -Cabbage looper -Cross-striped cabbageworm -Diamondback moth -Fall armyworm -Imported cabbageworm -Southern cabbageworm -Yellowstriped armyworm	Bt* or pyrethroid or spinosad*
				-Bacterial soft rot -Black rot	copper*		
						-Harlequin bug	pyrethroid

[1] The growth stage indicated typically occurs during this time of year; however, this may vary from year to year depending on environmental conditions.

[2] Products noted with * indicate those that may be used in organic production. For a list of products approved by Organic Materials Review Institute (OMRI) please see University of Kentucky Publication Homeowner's Guide to Fungicides (PPFS-GEN-07).

[3] For a list of insecticides approved for use in residential areas see: General Use Insecticides for Home Gardeners (ENTFACT-445).

Additional Resources

- Entomology Extension Publications/Vegetable Pests
https://entomology.ca.uky.edu/entfacts/vegetables
- Horticulture Extension Publications/Home Vegetables
https://horticulture.ca.uky.edu/growers/home/vegetables
- Plant Pathology Extension Publications
https://plantpathology.ca.uky.edu/extension/publications
- Home Vegetable Gardening in Kentucky (ID-128)
https://www2.ca.uky.edu/agcomm/pubs/id/id128/id128.pdf
- General Use Insecticides for Home Gardens (ENTFACT-445)
https://entomology.ca.uky.edu/ef445
- IPM Scouting Guide for Common Problems of Cole Crops in Kentucky ID-216
https://www2.ca.uky.edu/agcomm/pubs/ID/ID216/ID216.pdf
- Veggie Scout Website
https://veggiescout.ca.uky.edu/
- Homeowner's Guide to Fungicides (PPFS-GEN-07)
https://plantpathology.ca.uky.edu/files/PPFS-GEN-07.pdf
- Cleaning & Disinfecting Hand Tools & Planting Supplies (PPFS-GEN-17)
https://plantpathology.ca.uky.edu/files/PPFS-GEN-17.pdf
- Vegetable Cultivars for Kentucky Gardens – 2013 (ID-133)
https://www2.ca.uky.edu/agcomm/pubs/id/id133/id133.pdf
- Cornell University Resource of Resistant Vegetable Varieties
https://www.vegetables.cornell.edu/pest-management/disease-factsheets/disease-resistant-vegetable-varieties/

For larger fields and commercial acreage refer to the

UK Plant Pathology Extension Publications website for additional resources.

July 2024

Acknowledgement: The authors would like to thank Daniel Becker, University of Kentucky Horticulture Extension Associate for his review of this publication.
Photo credit: Matt Barton, UK Ag Communications **Editor:** Cheryl Kaiser, Plant Pathology Extension Support
Revised from the fact sheet *Sustainable Disease Management of Cole Crops in the Home Garden* (PPFS-VG-23) by Emily Pfeufer.