

Weed Control in Cole or Brassica Leafy Vegetables (Broccoli, Cabbage, Cauliflower, Collard, Mustard, Turnip, and Kale)¹

Peter J. Dittmar, Nathan S. Boyd, and Ramdas Kanissery²

The Brassica leafy vegetables (cole crops) range from major crops such as cabbage to very minor ones, including mustard and rape greens. Optimal production of these crops depends on successful weed control. Weeds reduce yields by direct competition for nutrients, water, and light. Weed control is especially important early in the season when weed competition can substantially reduce vigor, uniformity, and overall yield. In Florida, there are a large number of weeds that are also in the Brassicaceae (mustard) family. These weeds in and around the field can harbor insects and disease pathogens that can invade or spread to the crop soon after planting.

Management Practices

Effective weed control should include a combination of management practices designed to suppress weeds during the entire year. These practices include crop rotation, cover cropping, high planting density, mulching, cultivation, flooding, and herbicide use. The amount and timing of cultivation has been shown to be very important. Cultivating more than one or two times early in the season reduces head quality and yield in cabbage.

The most effective weed management strategies must be made long before the crop is planted.

Planting Dates

Planting dates can have an effect on weed management in a given region. When hard-to-control winter or summer annuals may be present in a field, it is best to plant the crop when the specific weed or weeds are not growing. Cabbage is much more competitive against weeds when grown under optimal conditions. For example, during the warmer part of the spring and fall seasons, wild radish densities up to 16 plants/meter will not reduce cabbage yields, but during the cooler part of the season, one wild radish plant/meter will reduce yields significantly.

Perennial weeds such as nutsedge should be controlled during noncrop periods. Detailed weed maps kept over time will help improve management decisions such as when to plant and which herbicides to use.

The crop variety and size should also be considered when selecting a herbicide. For example, when using Dual or Goal® in cabbage, growers must plan on having at least

1. This document is HS189, one of a series of the Horticultural Sciences Department, UF/IFAS Extension. Original publication date January 1996. Revised August 2003, October 2006, March 2010, August 2012, December 2015, and January 2019. Visit the EDIS website at <http://edis.ifas.ufl.edu>.
2. Peter J. Dittmar, assistant professor, Horticultural Sciences Department; Nathan S. Boyd, Gulf Coast Research and Education Center; and Ramdas Kanissery, assistant professor, Southwest Florida REC; UF/IFAS Extension, Gainesville, FL 32611.

The use of trade names in this publication is solely for the purpose of providing specific information. UF/IFAS does not guarantee or warranty the products named, and references to them in this publication do not signify our approval to the exclusion of other products of suitable composition. All chemicals should be used in accordance with directions on the manufacturer's label. Use pesticides safely. Read and follow directions on the manufacturer's label.

The Institute of Food and Agricultural Sciences (IFAS) is an Equal Opportunity Institution authorized to provide research, educational information and other services only to individuals and institutions that function with non-discrimination with respect to race, creed, color, religion, age, disability, sex, sexual orientation, marital status, national origin, political opinions or affiliations. For more information on obtaining other UF/IFAS Extension publications, contact your county's UF/IFAS Extension office.

U.S. Department of Agriculture, UF/IFAS Extension Service, University of Florida, IFAS, Florida A & M University Cooperative Extension Program, and Boards of County Commissioners Cooperating. Nick T. Place, dean for UF/IFAS Extension.

5-week-old transplants in 1-inch cells. Use of younger transplants in smaller cells may result in phytotoxicity to the young plants.

Labels and Crop Groups

The labels for Dual on cabbage are third-party registrations by TPR, Inc., Orlando. The label is issued by TPR, Inc. and is valid only when a grower indemnification agreement is signed.

The term “Brassica (cole) leafy vegetables” refers to a crop group set up by the EPA to allow tolerances to be established for the whole crop group. The group is separated into two subgroups: head and stem Brassica and leafy Brassica greens. The head and stem Brassica subgroup includes broccoli, Chinese broccoli, Brussels sprouts, cabbage, Chinese cabbage (napa), Chinese mustard cabbage, cauliflower, cavalo broccoli, and kohlrabi. The leafy Brassica greens subgroup includes broccoli raab, Chinese cabbage (bok choy and chilhilli), collards, kale, mizuna greens, mustard spinach, rape greens, and turnip greens. If the total crop group is not stated, then the product may only be used for those commodities listed on the label.

If a label states directions for cabbage, then it may only be used on cabbage; if it states cabbage and tight-headed Chinese cabbage, it may also be applied to the napa types of Chinese cabbage. The chilhilli types are classified as loose headed, as is bok choy.

Table 1 lists the herbicides that are suggested for use on the various crops before crop seed emergence or transplanting in Florida. Table 2 includes chemical weed control that can be used after crop seed emergence or after transplanting. Before using an herbicide, read the label carefully and follow all directions and restrictions.

Table 1. Preemergence or pretransplant herbicides for weed control in broccoli, cabbage, cauliflower, collards, mustard, turnips, and kale.

Common name lb. a.i./A	Trade name amount of product/A	MOA code	Crops	Weeds controlled / remarks
Bensulide 5–6	(Prefar [®]) 4E 5–6 qt.	8	Head and stem and leafy Brassica	Annual broadleaf and grass weeds. Mechanically incorporate 1–2 in. or irrigate 2–4 in. deep within 36 hours.
Carfentrazone Up to 0.031	(Aim [®]) 2 EC (Aim [®]) 1.9 EW Up to 2 fl. oz.	14	Head and stem and leafy Brassica	Apply as a preplant burndown for emerged broadleaf weeds. Use crop oil concentrate, methylated seed oil, or nonionic surfactant at recommended rates. Maximum rate of 0.096 lb. a.i./A per season. No pretransplant interval.
Clomazone 0.25 0.25–10.5	(Command [®]) 3ME 0.67 pt. direct seeded 0.67–1.0 pt. transplanted	13	Broccoli, Brussels sprouts, cauliflower, cabbage, and Brassica leafy vegetables	Broadleaf and grass weeds. Can be preplant incorporated. If weeds have emerged they must be cultivated or weeded before application.
DCPA 4.5–10.5	(Dacthal [®]) 75 WP 6–14 lb.	3	Broccoli, Brussels sprouts, cauliflower, cabbage, and leafy Brassica vegetables	Annual grass and broadleaf weeds. Can be preplant incorporated. If weeds have emerged, they must be cultivated or weeded before application.
Glyphosate 0.3–1.0	(Various formulations)	9	Head and stem and leafy Brassica vegetables	Actively growing broadleaf and grass weeds. Use as a preplant burndown.
Oxyfluorfen 0.25–0.5	(Goal [®] 2XL) 2 EC 1–2 pt. (Galigan [®]) 2 E 1–2 pt. (GoalTender [®] , Galigan [®] H ₂ O) 4 E 0.5–1 pt.	14	Broccoli, cabbage, cauliflower	Certain annual broadleaf weeds. Transplants less than 5 weeks old or in containers less than 1 inch square may result in more crop injury. Injury occurs as leaf cupping or crinkling. DO NOT apply in fields where acetanilide herbicides (Dual Magnum [®] , Lasso [®] , or Ramrod [®]) have been applied in the same growing season.
Paraquat 0.5–1.0	(Gramoxone [®] SL) 2.0 SL 2.0–4.0 pt. (Firestorm [®]) 3.0 SL 1.3–2.7 pt.	22	Broccoli, cabbage, cauliflower, cavalo broccoli, Chinese cabbage, turnip	Emerged broadleaf and grass weeds. Use as a preplant burndown. Crop plants that have emerged will be injured.
Pelargonic acid	(Scythe [®]) 4.2 EC 3%–10% v/v	27	Broccoli, cabbage, cauliflower, collards, kale, mustard/turnip greens	Emerged broadleaf and grass weeds. Use as a preplant burndown.
Pyraflufen ethyl 0.0008-0.003	(ET Herbicide/Defoliant) 0.5-2.0 fl.oz.	14	Cole crops	Broadleaf and grass weeds. Burndown preplant application 1 day before planting. Include a NIS or COC in the spray solution. Allow 30 days between applications. Do not exceed 3 applications or 5.5 fl. oz./A per season.
Sulfentrazone 0.07-0.09	(Willowwood sulfentrazone) 4SC 2.25- 3.0 fl. oz.	13	Brassica head & stem, Brassica leafy greens	Broadleaf and grass weed control Nutsedge suppression. Do not apply on sands with less than 1% organic matter. Do not apply more than 6.4 fl. oz./A within a 12 mo. period. Should be trialed on a small area to find suitable rate for the soil type in your area.
Trifluralin 0.5–0.75	(Treflan [®] HFP, Trifluralin, Trifluralin HF) 4 EC 1.0–1.5 pt. (Treflan [®]) 4 L 1.0–1.5 pt.	3	Broccoli, Brussels sprouts, cabbage, cauliflower	Annual broadleaf and grass weeds. Incorporate or irrigate 4 inches within 8 hours. Results in Florida are erratic on soils with low organic matter and clay content.

Table 2. Herbicides for weed control postemergence or post-transplant weed control in cole crops

Common name lb. a.i./A	(Trade name) amount of product/A	MOA code	Crops	Weeds controlled / remarks
Carfentrazone Up to 0.031	(Aim [®]) 2.0 EC (Aim [®]) 1.9 EW Up to 2 fl. oz.	14	Head and stem and leafy Brassica	Emerged broadleaf weeds. Apply with a hooded sprayer to row middles. Do not exceed 4.1 fl. oz./A in season as a row middle application. PHI 0 days.
Clethodim 0.09–0.13	(Select [®]) 2 EC 6–8 fl. oz. (Select Max [®]) 1 EC 9–16 fl. oz.	1	Head and stem and leafy Brassica	Emerged grass weeds. Include crop oil concentrate at 1% v/v in finished spray volume. Head & stem Brassica PHI 30 days. Leafy Brassica PHI 14 days.
Clopyralid 0.09–0.19	(Stinger [®]) 3 EC 0.25–0.5 pt.	4	Cabbage, Chinese cabbage (bok choy, napa), Chinese mustard cabbage	Broadleaf weeds. Do not apply more than 0.5 pt./A per year. Check plant-back dates. PHI 30 days.
DCPA 4.5–10.5	(Dacthal [®]) 75 WP 6–14 lb.	3	Broccoli, Brussels sprouts, cauliflower, cabbage, and Brassica leafy vegetables	Broadleaf and grass weeds. Spray over transplants without injury. If weeds have emerged, they must be cultivated or weeded before application. Can be preplant incorporated.
Glyphosate 0.3–1.0	(Various formulations)	9	Head and stem and leafy Brassica	Broadleaf and grass weeds. Use a hooded sprayer and direct to row middles only.
Pelargonic acid	(Scythe [®]) 4.2 EC 3%–10% v/v	27	Broccoli, cabbage, cauliflower, collards, kale, mustard/turnip greens	Emerged broadleaf and grass weeds. Apply as hooded spray to row middles only. Include a residual herbicide to broaden spectrum of weed control.
Pendimethalin 0.48–0.71	(Prowl H ₂ O) 3.8 1.0-1.5 pt.	3	Broccoli, Brussels sprouts, cabbage, cauliflower	Broadleaf and grass weeds. Apply after crop emergence (2- to 4-leaf stage) or after transplanting (1 to 3 days) and prior to weed emergence. Direct the spray to the base of the plant to limit contact to the foliage. PHI 60 days for broccoli. PHI 70 days for cabbage and other head & stem brassica.
Pendimethalin 1	(Satellite Hydrocap) 1.0-1.5 pt.	3	Broccoli, brussels sprouts, cabbage, cauliflower, Chinese broccoli, napa cabbage, Chinese mustard cabbage, Cavalo Broccoli, kohlrabi	Broadleaf and grass weeds. Preplant or postemergence-directed application. NOT direct-seeded. Post-transplant application to the base of the plant. PHI 60 days for broccoli. PHI 70 days for cabbage and other head and stem brassica.
Pendimethalin 1	(Satellite Hydrocap) 2.1 pt.	3	Mustard greens, broccoli raab, bok choy, collards, kale, mizuna, mustard spinach, rape greens, turnip greens (leaves only)	Broadleaf and grass weeds. Apply to direct seeded or transplanted crops at the 4- to 5-leaf stage. Do not apply in turnip greens if the roots will be used for food. PHI 21 days.
S-metolachlor Mineral 0.64–1.91 Muck 1.91	(Dual Magnum [®]) 7.62 EC Mineral 0.67–2.0 pt. Muck 2.0 pt.	15	Head and stem Brassica	Annual broadleaf and grass control. Apply immediately after planting. Label is a third-party registration by TPR, Inc., and grower must sign an indemnification agreement. Use higher rate on fine-textured soils or soils high in organic matter. Do not apply more than 1.91 lb. a.i./A of Dual Magnum [®] per crop on sandy soils. Chinese varieties are more sensitive to Dual Magnum [®] injury. PHI 60 days.
S-metolachlor Mineral 0.76–1.26 Muck 1.91–3.82	(Dual Magnum [®]) 7.62 EC Mineral 0.80–4.0 pt. Muck 1.82-3.64 pt.	15	Direct-seeded cabbage	Annual broadleaf and grass weeds. Label is a third-party registration by TPR, Inc., and grower must sign an indemnification agreement. May be applied preemergence or postemergence to direct-seeded tight-headed cabbage. Preemergence application should be made at least 20 days after seeding. Apply once per crop season. At higher rates, anticipate delayed maturity.
Sethoxydim 0.28	(Poast [®]) 1.5 EC 1.5 pt.	1	Broccoli (including Chinese and raab), Brussels sprouts, cabbage (bok choy, Chinese mustard, napa), cauliflower, collards, kale, kohlrabi, mustard/rape greens	Annual and perennial grass weeds. Include a crop oil concentrate or methylated seed oil in spray solution. Maximum rate or 3.0 pt./A per season. PHI 30 days.

Table 3.

Common name	Trade name	Timing and application location relative to crop					Timing relative to weeds			Weeds controlled / suppressed			Crops					
		Before seeding	After seeding, before emergence	Before transplanting	Postemergence	Postemergence – row middles only	Incorporated	Preemergence	Postemergence	Annual grasses	Broadleaves	Perennial sedges	Broccoli	Brussels sprouts	Cabbage	Cauliflower	Chinese cabbage (napa)	Kohlrabi
Bensulide	Prefar®	X		X			X	X		X	X		X	X	X	X	X	X
Carfentrazone	Aim®	X				X					X		X	X	X	X	X	X
Clethodim	Select Max®				X			X	X			X	X	X	X	X	X	X
Clomazone	Command®			X			X	X		X	X		X	X	X	X		
Clopyralid	Stinger®				X						X				X		X	
DCPA	Dacthal®			X	X		X	X		X	X		X	X	X	X		
Glyphosate	Roundup®	X		X				X	X	X	X	X	X	X	X	X	X	X
Napropamide	Devrinol®				X		X	X		X	X		X	X	X	X		
Oxyfluorfen	Goal®, Galigan®			X			X	X	X	X	X		X		X	X		
Paraquat	Gramoxone®	X		X					X	X	X		X		X	X	X	
Pelargonic acid	Scythe®	X		X		X			X	X	X		X		X	X		
Pendimethalin	Prowl H2O®, Satellite Hydrocap®			X ¹	X		X	X		X	X		X	X	X	X	X	X
S-Metolachlor	Dual Magnum®				X		X	X		X	X	X	X	X	X	X	X	X
Sethoxydim	Poast®				X			X	X			X	X	X	X	X	X	X
Trifluralin	Treflan®	X		X			X	X		X	X		X	X	X	X		

¹Not all brands are labeled for this use pattern. Consult labels before purchasing or application.

Table 4. Herbicide timing in leafy brassica vegetable crops.

Common Name	Trade Name	Timing and Application Location Relative to Crop					Timing Relative to Weeds			Weed Groups Controlled			Crops					
		Before seeding	After seeding, before emergence	Before transplanting	Postemergence	Postemergence –row middle	Incorporated	Preemergence	Postemergence	Annual grasses	Broadleaves	Perennial sedges	Broccoli raab	Chinese cabbage (bok choy)	Collards	Kale	Mustard greens	Turnip greens
Bensulide	Prefar [®]	X		X			X	X		X	X		X	X	X	X	X	X
Carfentrazone	Aim [®]	X				X					X		X	X	X	X	X	X
Clethodim	Select Max [®]				X				X	X			X	X	X	X	X	X
Clomazone	Command [®]			X			X	X		X	X		X	X	X	X	X	X
Clopyralid	Stinger [®]				X						X		X					
DCPA	Dacthal [®]			X	X		X	X		X	X		X	X	X	X	X	X
Glyphosate	Roundup [®] , others	X		X					X	X	X	X	X	X	X	X	X	X
Oxyfluorfen	Goal [®] , Galigan [®]			X			X	X	X	X	X							
Paraquat	Gramoxone [®]	X		X					X	X	X		X					X
Pelargonic acid	Scythe [®]	X		X		X			X	X	X				X	X	X	X
Pendimethalin	Prowl H2O [®] Satellite Hydrocap [®]			X ¹	X		X	X		X	X		X	X	X	X	X	X
Sethoxydim	Poast [®]				X				X	X			X	X	X	X	X	X

¹ Not all brands are labeled for this use pattern. Consult labels before purchasing or application.