

Leafy Vegetables

Endive, Herbs, Lettuce, Parsley, and Spinach

Varieties		
Salad Greens	Endive	Full Heart Batavian, Green Curled Ruffoc
	Leaf Lettuce	Tiara, Glossy Green, Green Wave, New Red Fire, Sierra, Vulcan, Tango (oakleaf), Lolla Rossa
	Butterhead	Buttercrunch, Esmeralda, Ermosa (for trial)
	Head Lettuce	Ithaca, Maverick (for trial), Montello (for trial)
	Spinach	Bloomsdale Long Standing (spring), Early Hybrid No. 7 (fall), Early Hybrid No. 10 (fall), Old Dominion (fall), Virginia Savoy (fall), Tyee, Melody, Decatur, Unipak 151 (semi-savoy)
Herbs	Cilantro	Long Standing. Cilantro is a type of coriander grown for its aromatic leaves. Plant tends to bolt and must be planted early in the spring.
	Fennel	Marketed for its foliage as anise and for its edible leaf base as Florence or finocchio fennel. Plant has a strong licorice flavor and aroma.
	Parsley	Curly leaf: Moss Curled, Dark Moss Curled, Perfection Flat leaf: Plain Hamburg: enlarged edible root marketed as a fresh product
	Sweet Basil	Green foliage: Sweet basil, Mammoth, Genovese Small Leaf: Piccolo Purple Foliage: Dark Opal, Opal, Rubin. May partially revert to green foliage due to by genetic instability. Lemon-Scented: Lemon Basil, Sweet Dani Lemon Basil

Spacing

These crops can have a common between-row spacing for convenience in cultivating. Raised beds are recommended for the culinary herbs.

Fennel: Rows 12 to 18 inches apart. Plants 6 to 8 inches apart in row. Transplant to the field early in the spring.

Spinach: Rows 12 to 18 inches apart. Plants 4 to 6 per foot of row. Seed 12 to 20 pounds per acre.

Lettuce and Endive: Rows 12 to 15 inches apart. Plants 10 to 16 inches apart in row. Seed 1 to 2 pounds per acre.

Sweet Basil: Rows 15 to 36 inches apart. Plants 6 to 8 inches apart within rows.

Parsley: Rows 15 inches apart. Plants 4 to 8 inches apart in row. Seed 30 pounds per acre. Germination is enhanced by presoaking seeds in water for 24 hours, then allowing them to partially dry.

Fertilizing

Lime: To maintain soil pH of 6.5 to 6.8. Spinach is particularly sensitive to soil acidity.

Preplant: N: 60 pounds per acre. P₂O₅: 0 to 150 pounds per acre. K₂O: 0 to 200 pounds per acre. Adjust according to soil type, previous management, and soil test results for your state.

Sidedress N: for soils with more than 3 percent organic matter and following soybeans, alfalfa, or a grass-legume hay crop, apply 30 pounds N per acre. For soils with less than 3 percent organic matter and the above rotation, apply 45 pounds N per acre. Following corn, rye, oats, wheat, or a vegetable crop, apply 60 pounds N per acre. Use a total of 90 to 120 pounds N per acre for culinary herbs. For herbs grown for seeds, such as coriander, fennel, and dill, use 60 to 90 pounds N acre.

Herb Weed Control

Plastic or organic mulch is recommended. Most herbs are weak competitors to weeds, and herbicides are not available.

Disease Control

Diseases Controlled ¹	Treatment	Comments
Damping-Off	Conditions that favor rapid germination limit damping off severity.	Avoid excessive irrigation and poorly drained soils. Good sanitation is critical to avoiding damping-off.
	Previcur Flex [®] for leaf lettuce before or after transplanting in greenhouse.	See label for rate information and application instructions. Note warning about possible phytotoxicity.
	Ridomil Gold SL [®] at 1-2 pts. per acre applied pre-plant, to control damping-off.	Apply preplant to the soil surface and incorporate to a depth of 2 inches.
Downy Mildew, White Rust	Plant downy mildew resistant varieties.	
	Actigard [®] at the following rates: Spinach: 0.5-0.75 oz. per acre. Lettuce: 0.75-1 oz. per acre. Not for herbs.	Do not make more than 3 consecutive applications per crop. Do not apply to crops stressed by heat, drought, etc. 7-day PHI.
	BP Agri-Fos 50WP [®] . See label for rate. Not for herbs.	0-day PHI.
	Aliette [®] at 3-5 lbs. per acre (alone), or at 2-3 lbs. per acre when tank mixed with another fungicide registered for use on greens. Not for herbs.	Apply when conditions are favorable for disease and continue on a 7-21 day interval. Do not tank mix with copper fungicides. 3-day PHI.
	BP Phostrol [®] . See label for rate. Label includes cilantro and fennel.	0-day PHI.
	Presidio 4SC [®] at 3-4 fl. oz. per acre. Label includes fennel.	2-day PHI.
	Previcur Flex [®] at 2 pts. per acre. Not for herbs.	Lower rate may be used with tank mix partner. 2-day PHI.
	RR Quadris [®] at the following rates: Downy mildew: 12.0-15.5 fl. oz. per acre. White rust: 6.2-15.4 fl. oz. per acre.	See label for caution regarding possible phytotoxicity. Do not make more than 1 application before alternating to a fungicide with a different mode of action. 0-day PHI.
	RR Revus 2.09SC [®] at 8 fl. oz. per acre. Downy mildew only. Not for basil.	Do not make more than 2 consecutive applications before switching to another effective non-group 40 fungicide.
Ridomil Gold SL [®] may be applied preplant, by surface application and shanked. Spinach only.	Read label carefully for rates and application instructions. Do not apply Ridomil Gold [®] where white rust is already established. 21-day PHI.	
Tanos 50WP [®] at 8 oz. per acre. Not for herbs.	Do not make more than 1 application of Tanos [®] before alternating to a fungicide with a different mode of action. Must be tank mixed. 3-day PHI.	
Bottom Rot and Drop (lettuce)	Bottom rot is caused by <i>Rhizoctonia</i> . Lettuce drop is caused by <i>Sclerotinia</i> .	
	Avoid poorly drained fields with a history of the disease.	
	Botran 75W [®] . Rate varies by application method. Lettuce drop only.	
RR Endura 70WG [®] at 8-11 oz. per acre. Bottom rot in lettuce is suppression only.	Do not make more than 2 sequential applications before rotating to a product with a different mode of action. 14-day PHI.	

¹The information in this table does not necessarily pertain to herbs since labeling for herbs varies widely.

RR This is a reduced-risk pesticide. See pages 23-24 for details.

BP This is a biopesticide, see pages 23-24 for details.

Diseases Controlled ¹	Treatment	Comments
Bottom Rot and Drop (lettuce)	RR Quadris® at 0.40-0.80 fl. oz. per 1,000 linear ft. of row. Bottom rot in lettuce is suppression only.	See label for other labeled diseases.
	Rovral® at 1.5-2 pts. per acre for flowable (F) formulations.	Do not cultivate after application. See label for details. 14-day PHI.
Powdery Mildew	RR Quadris® at 12.0-15.5 oz. per acre.	See comment under downy mildew. 0-day PHI.
	RR Quintec® at 4-6 fl. oz. per acre.	Apply in a tank mix or following the application of a systemic fungicide. See label for additional restrictions. 1-day PHI.

¹The information in this table does not necessarily pertain to herbs since labeling for herbs varies widely.

Weed Control

Weeds Controlled ¹	Treatment ²	Comments
Annuals (emerged) — treatment applied before crop emergence	Gramoxone Inteon 2L® at 2-4 pts. per acre. Endive and lettuce only. Not for spinach, parsley, radicchio, or herbs.	Include 1 qt. of COC or 4-8 fl. oz. of nonionic surfactant per 25 gallons of spray solution. Apply before or after seeding but before crop emerges. RUP.
Annuals and Perennials (emerged) — crop not present or protected from spray	RR Glyphosate products at 0.75-3.75 lbs. acid equivalent (ae) per acre. Use formulations containing 3 lbs. ae/gal. (4 lbs. isopropylamine salt/gal.) at 1-5 qts. per acre, or formulations containing 4.5 lbs. ae/gal. (5 lbs. potassium salt/gal.) at 0.66-3.3 qts. per acre. Basil, endive, Florence fennel, lettuce, parsley, radicchio, and spinach only.	Broadcast before seeding, or apply between crop rows with wipers or hooded or shielded sprayers. Use low rate for annuals and higher rates for perennials. See label for suggested applications volume and adjuvants. 14-day PHI.
Broadleaves and Grasses (not emerged)	Balan 60DF® at 2-2.5 lbs. per acre. Lettuce only.	Apply and incorporate before seeding or transplanting.
	Kerb 50WP® at the following rates: Endive only: 2-3 lbs. per acre. Lettuce only: up to 4 lbs. per acre.	Use lower rate on coarse soils. Apply before or after seeding but before crop emerges. May also be applied postemergence to endive and head lettuce. Mechanical incorporation or rainfall required for effectiveness. Do not exceed 1 application per crop per year. 55-day PHI. RUP.
	Lorox 50DF® at 1.5-3 lbs. per acre. Only for parsley grown east of the Mississippi River.	Do not use on sand, loamy sand, or soils with less than 1% organic matter. Apply after seeding before crop emerges. On muck soils, may be applied at 1 lb. per acre to control small emerged weeds after parsley has 3 true leaves. Do not exceed 3 lbs. per acre per season. 30-day PHI.
	Trifluralin products at 0.5-0.75 lb. a.i. per acre. Apply 4EC formulations at 1-1.5 pts. per acre. Endive and radicchio only. Not for Florence fennel, herbs, lettuce, spinach, or parsley.	Use lowest rate on coarse soils. Apply and incorporate before planting. Not effective on soils with high organic matter.
Grasses (not emerged)	Prefar 4E® at 5-6 qts. per acre. Lettuce, endive, Florence fennel, and radicchio only. Not for herbs or spinach.	Use low rate on soils with less than 1% organic matter. Apply and incorporate before planting, or apply after seeding before crop emerges and irrigate within 24 hours.
Broadleaves (emerged)	Aim EC® at 0.5-2 fl. oz. per acre.	Apply with hooded sprayers as a directed application between crop rows. Use COC or nonionic surfactant. Weeds must be actively growing and less than 4 inches tall. Do not allow spray to contact crop. Do not exceed 6.1 fl. oz. per acre per season.

RR This is a reduced-risk pesticide. See pages 23-24 for details.

Leafy Vegetables (continued)

Weed Control (continued)

Weeds Controlled ¹	Treatment ²	Comments
Broadleaves (emerged) (continued)	Spin-Aid 1.3E [®] at 3-6 pts. per acre in 11-22 gals. of water. For spinach grown for processing or seed only.	Apply to spinach with 4 true leaves to avoid injury. Do not apply if spinach is stressed. Does not control pigweed. 40-day PHI.
Broadleaves (emerged) — primarily composites and nightshade	Stinger 3L [®] at 4-8 fl. oz. per acre. Spinach only.	Maximum 8 oz. per acre per year. 21-day PHI.
Grasses (emerged)	Clethodim products at the following rates: Select Max [®] at 9-16 fl. oz. per acre. 2EC formulations of clethodim products at 6-8 fl. oz. per acre.	Herbs may vary in sensitivity. Test on a small area before applying to entire crop. Use Select Max [®] with 8 fl. oz. of NIS per 25 gallons of spray solution (0.25% v/v). Use 2EC formulations with 1 qt. COC per 25 gallons of spray solution (1% v/v). Apply to actively growing grass. Wait at least 14 days between applications. Maximum 64 fl. oz. Select Max [®] or 32 fl. oz. Select 2EC [®] per acre per season. 14-day PHI for lettuce and spinach. 30-day PHI for Florence fennel.
	Poast [®] 1.5E at the following rates: Endive, dill, Florence fennel, lettuce, parsley, radicchio, and spinach: 1-1.5 pts. per acre. Dill: up to 2.5 pts. per acre. Not for herbs other than dill.	Use with 1 qt. of COC per acre. Spray on actively growing grass. Do not exceed 3 pts. per acre per season. For dill, do not exceed 5 pts. per acre per season. 14-day PHI for dill. 15-day PHI for leaf lettuce, spinach, endive, and parsley. 30-day PHI for fennel, head lettuce, and radicchio.

¹For specific weeds controlled by each herbicide, check Table 21 on page 39.












²Rates given are for overall coverage. For band treatment, reduce amounts according to the portion of acre treated.

Herbicides For Use on Leafy Vegetables


	Aim [®]	Balan [®]	clethodim	glyphosate	Kerb [®]	Lorox [®]	paraquat	Poast [®]	Prefar [®]	Spin-Aid [®]	Stinger [®]	trifluralin
Endive	X		X	X	X			X	X			X
Florence fennel	X		X	X				X	X			
Lettuce	X	X	X	X	X		X	X	X			
Parsley	X		X	X		X		X	X			
Radicchio	X		X	X				X	X			X
Spinach	X		X	X				X		X	X	


Insect Control

Insects Controlled	Treatment	Comments
Aphids, Leafminers, Mites RR Aphid Thresholds Seedlings: 2 per plant Established plants: 7 per plant Leafminer Thresholds Seedlings: 50% of plants infested Near Harvest: 5% of leaves infested	Actara [®] at 1.5-3 oz. per acre. Aphids only.	Do not exceed 11 oz. per acre per season. 7-day PHI.
	Admire PRO [®] at 4.4-10.5 fl. oz. per acre. Aphids only.	Do not exceed 0.38 lb. a.i. per acre per season. 21-day PHI.
	Agri-Mek 0.15EC [®] at 8-16 fl. oz. per acre. Leafminers and mites only.	Do not exceed 2 applications or 48 fl. oz. per acre per season. Use non-ionic surfactant. 7-day PHI. RUP.
	Ambush 25W [®] at 6.4-12.8 oz. per acre. Leafminers only.	Spinach: Do not exceed 1 lb. a.i. per acre per season. Other labeled crops: Do not exceed 2 lbs. a.i. per acre per season. 1-day PHI. RUP.

Insects Controlled	Treatment	Comments
Aphids, Leafminers, Mites (continued)	 Assail 30SG® at 2-4 oz. per acre, or Assail 30SG® at 0.8-1.7 oz per acre. Aphids only.	Do not exceed 0.375 lbs a.i. per acre per season. 7-day PHI.
	Diazinon AG500® at 0.5-1 pt. per acre, or Diazinon 50W® at 0.5-1 pt. per acre.	Do not exceed 5 applications per acre per season. 14-day PHI. RUP.
Aphid Thresholds	Dimethoate 4E® or Dimethoate 400® at 0.5 pt. per acre, or Dimethoate 2.67EC® at 0.75 pt. per acre. Not for parsley, spinach, celery or head lettuce.	14-day PHI for endive, swiss chard, and leaf lettuce.
Seedlings: 2 per plant Established plants: 7 per plant	Endosulfan® at 1-1.33 qts. per acre. Lettuce and spinach only.	Do not exceed 2 applications per season. 14-day PHI.
Leafminer Thresholds	 Entrust® at 2-3 oz. per acre. Leafminers only.	Do not exceed 9 oz. per acre per season. Observe resistance management restrictions. 1-day PHI.
Seedlings: 50% of plants infested Near Harvest: 5% of leaves infested	 Fulfill® at 2.75 oz. per acre.	Do not exceed 5.5 oz. per acre per season. 7-day PHI.
	Malathion 5EC® or at 2 pts. per acre.	14-day PHI for leaf lettuce. 7-day PHI for head lettuce, endive, and spinach.
	 Movento® at 4-5 fl. oz. per acre.	3-day PHI.
	M-Pede® at 1-2% by volume. Aphids only.	Must contact aphids to be effective. 0-day PHI.
	 Neemix® according to label directions. Aphids and leafminers only.	0-day PHI.
	 Oberon 2SC® at 7-8.5 fl. oz. per acre. Mites only.	Do not exceed 25.5 fl. oz. per acre per season. 7-day PHI.
	Orthene 97® at 0.5-1 lb. per acre. Aphids on head lettuce only.	Do not exceed 2 1/8 lbs. a.i. per acre per season. 21-day PHI.
	 Platinum® at 5-11 fl. oz. per acre. Aphids only.	30-day PHI.
	Pounce 25WP® at 6.4-12.8 oz. per acre. Leafminers only.	Spinach: Do not exceed 1 lb. a.i. per acre per season. Other labeled crops: Do not exceed 2 lbs. a.i. per acre per season. 1-day PHI. RUP.
	Provado 1.6F® at 3.8 fl. oz. per acre. Aphids only.	Do not exceed 0.23 lb. a.i. per acre per season. Allow 5 days between applications. 7 day-PHI.
	 Radiant SC® at 6-10 fl. oz. per acre. Leafminers only.	Do not exceed 34 fl. oz. per acre per season. 1-day PHI.
	 SpinTor 2SC® at 6-10 fl. oz. per acre. Leafminers only.	Do not exceed 29 fl. oz. per acre per season. Observe resistance management restrictions. 1-day PHI.
	Trigard® at 2.66 oz. per acre. Leafminers only.	Do not exceed 6 applications per acre per season. 7-day PHI.
Caterpillars, Loopers	Ambush 25W® at 3.2-12.8 oz. per acre.	Spinach: Do not exceed 1 lb. a.i. per acre per season.
Caterpillar/Looper Threshold		Other labeled crops: Do not exceed 2 lbs. a.i. per acre per season.
5% of plants infested	 Avaunt 30WDG® at the following rates: Spinach: 3.5 oz. per acre. Other labeled crops: 2.5-6.0 oz. per acre.	1-day PHI. RUP. 3-day PHI. Spinach: Do not exceed 14 oz. per acre per season. Other labeled crops: Do not exceed 24 oz. per acre per season.
	 Various <i>Bacillus thuringiensis</i> products (Agree®, Biobit®, Dipel®, Javelin®, Lepinox®, Xentari®) are available in various formulations.	Follow label instructions for rates and use. 0-day PHI.

 This is a reduced-risk pesticide. See pages 23-24 for details.

 May be acceptable for use in certified organic production. Check with your certifier before use.

 This is a biopesticide, see pages 23-24 for details.