

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, Italian 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 an 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.
	Previcur Flex [®] for leaf lettuce before or after transplanting in greenhouse.	See label for rate information and application instructions. Note warning about possible phytotoxicity. 2-day PHI.
	Ridomil Gold SI [®] 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. 7-day PHI.
Downy Mildew, White Rust	Plant downy mildew resistant varieties.	
	Actigard [®] at 0.75 oz. per acre. Spinach only.	Do not make more than 3 consecutive applications per crop. Do not apply to crops stressed by heat, drought, etc. 7-day PHI.
	Agri-Fos 400 [®] at 2 qt. per acre.	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.	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.
	Amistar [®] at the following rates: Downy mildew: 4-5 oz. per acre. White rust: 2-5 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.
	Phostrol [®] at 2.5-5 pt. per acre.	0-day PHI.
	Presidio 4SC [®] at 3-4 fl. oz. per acre.	2-day PHI.
	Previcur Flex [®] at 2 pts. per acre. Downy mildew on lettuce only.	2-day PHI.
	Quadris [®] at the following rates: Downy mildew: 12.0-15.5 fl. oz. per acre. White rust: 6.0-15.5 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.
	Reason [®] at 5.5-8.2 oz. per acre.	Do not make more than 1 application of Reason [®] before alternating to a fungicide with a different mode of action. 2-day PHI.
	Revus 2.09SC [®] at 8 fl. oz. per acre.	Do not make more than 2 consecutive applications before switching to another effective non-group 40 fungicide.
	Ridomil Gold EC [®] and Ridomil Gold Copper [®] 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. Downy mildew on lettuce only.	Do not make more than 1 application of Tanos [®] before alternating to a fungicide with a different mode of action. 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.	
	Amistar [®] at the following rates: Downy mildew: 4-5 oz. per acre. White rust: 2-5 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.
	Endura 70WG [®] at 8-11 oz. per acre. Suppression of bottom rot in lettuce only.	Do not make more than 2 sequential applications before rotating to a product with a different mode of action. 14-day PHI.

Leafy Vegetables (continued)

Disease Control (continued)

Diseases Controlled ¹	Treatment	Comments
Bottom Rot and Drop (lettuce)	Quadris® at the following rates: Downy mildew: 12.0-15.5 fl. oz. per acre. White rust: 6.0-15.5 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.
	Rovral® at 1.5-2 pts. per acre for flowable (F) formulations. Lettuce only.	Do not cultivate after application. See label for details. 14-day PHI.
Powdery Mildew	Amistar® at 4-5 oz per acre.	See comment under downy mildew. 0-day PHI.
	Folicur 3.6F® at 3-4 fl. oz. per acre. Not for Brussels sprouts, cabbage, or cauliflower.	7-day PHI.
	Quadris® at 12.0-15.5 oz. per acre.	See comment under downy mildew. 0-day PHI.
	Quintec® at 4-6 fl. oz. per acre.	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, or Gramoxone Max 3L® at 1.3-2.7 pts. per acre. Lettuce only. Not for spinach, parsley, chicory, endive, 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	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, chicory, endive, Florence fennel, lettuce, parsley, 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. Chicory and endive only. Not for Florence fennel, 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, and Florence fennel only. Not for chicory 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.

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)	Fusilade DX [®] at 10-12 fl. oz. per acre. Endive only.	Use with 1-2 pts. COC or 0.5-1 pt. of nonionic surfactant per 25 gallons of spray solution. Spray on actively growing grass. Do not exceed 3 pts. per acre. 28-day PHI.
	Poast 1.5E [®] at the following rates: Endive, dill, Florence fennel, lettuce, parsley, and spinach: 1-1.5 pts. per acre. Dill: up to 2.5 pts. per acre. Not for chicory or 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 and head lettuce.
	Select Max [®] at 12-16 fl. oz. per acre, or Select 2EC [®] at 6-8 fl. oz. per acre. Leaf lettuce, Florence fennel, and spinach only. Not for chicory, endive, head lettuce, parsley, or herbs.	Use with 1 qt. of COC per 25 gallons of spray solution. 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 fennel.

¹For specific weeds controlled by each herbicide, check Table 19 on page 37.

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 ^{®5}	trifluralin	Kerb [®]	Balan [®]	Prefar [®]	Poast [®]	Fusilade [®]	Spin-Aid [®]	glyphosate	paraquat	Lorox [®]	Select [®]	Stinger [®]
Chicory	X	X							X				
Endive	X	X	X		X	X	X		X				
Lettuce	X		X	X	X	X			X	X		X	
Spinach	X					X		X	X			X	X
Parsley	X				X	X			X		X		
Florence Fennel	X				X	X			X			X	

Insect Control

Insects Controlled	Treatment	Comments
Aphids, Leafminers, Mites	Actara [®] at 1.5-3 oz. per acre. Aphids only.	Do not exceed 11 oz. per acre per season. 7-day PHI.
Aphid Thresholds Seedlings: 2 per plant Established plants: 7 per plant	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.
Leafminer Thresholds Seedlings: 50% of plants infested Near Harvest: 5% of leaves infested	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.

Leafy Vegetables (continued)

Insect Control (continued)

Insects Controlled	Treatment	Comments
Aphids, Leafminers, Mites (continued)	Align® according to label directions. Aphids and leafminers only.	0-day PHI.
	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.
Aphid Thresholds Seedlings: 2 per plant Established plants: 7 per plant Leafminer Thresholds Seedlings: 50% of plants infested Near Harvest: 5% of leaves infested	Assail 30SG® at 2-4 oz. per acre, or Assail 70WP® 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.
	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.
	Endosulfan® at 1-1.33 qts. per acre. Lettuce and spinach only.	Do not exceed 2 applications per season. 14-day PHI.
	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.
	Epi-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.
	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.
	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.
	Caterpillars, Loopers Caterpillar/Looper Threshold 5% of plants infested	SpinTor 2SC® at 6-10 fl. oz. per acre. Leafminers only.
Avaunt 30WDG® at 2.5-6.0 oz. per acre. Not for spinach.		Do not exceed 6 applications per acre per season. 7-day PHI.

Insects Controlled	Treatment	Comments
Caterpillars, Loopers (continued)	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.
Caterpillar/Looper Threshold 5% of plants infested	Baythroid [®] at the following rates: Cabbageworm and loopers: 1.6-2.4 fl. oz. per acre. Armyworms, corn earworms, and European corn borers: 2.4-3.2 fl. oz. per acre.	Do not exceed 12.8 fl. oz. per acre per season. Allow 7 days between applications. 0-day PHI. RUP.
	Brigade 2EC [®] at 2.1-6.4 fl. oz. per acre, or Brigade WSB [®] at 5.3-16 oz. per acre. Head lettuce and spinach only.	Head lettuce: Do not exceed 0.5 lb. a.i. per acre per season. 7-day PHI. Spinach: Do not exceed 0.4 lb. a.i. per acre per season. 40-day PHI. RUP.
	Entrust [®] at 1-2.0 oz. per acre.	Do not exceed 9 oz. per acre per season. Observe resistance management restrictions. 1-day PHI.
	Intrepid 2F [®] at the following rates: Early season applications: 4-8 fl. oz. per acre. Mid- to late-season applications: 8-10 fl. oz. per acre.	Do not exceed 64 fl. oz. per acre per season. 1-day PHI.
	Lannate SP [®] at 0.5-1 lb. per acre.	Maximum application amounts and PHIs vary among vegetables. Read and follow label directions. RUP.
	Larvin 3.2 [®] at 16-30 fl. oz. per acre.	Do not exceed 60 fl. oz. per acre per season. 14-day PHI. RUP.
	Mustang MAX [®] at 2.24-4.0 fl. oz. per acre.	Do not exceed 0.15 lb. a.i. per acre per season. 1-day PHI. RUP.
	Orthene 97 [®] at 1 lb. per acre. Head lettuce only.	Do not exceed 2 1/8 lbs. a.i. per acre per season. 21-day PHI.
	Pounce 25WP [®] at 3.2-12.8 oz. per acre.	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.
	Proclaim [®] at 2.4-4.8 oz. per acre.	Do not exceed 28.8 oz. per acre per season. Allow 7 days between applications. 7-day PHI. RUP.
	SpinTor 2SC [®] at 3-6 fl. oz. per acre.	Do not exceed 29 fl. oz. per acre per season. Observe resistance management restrictions. 1-day PHI.
	Warrior [®] at 1.92-3.20 fl. oz. per acre. Lettuce only.	Do not exceed 2.4 pts. per acre per season. 1-day PHI. RUP.
Flea Beetles, Leafhoppers	Admire PRO [®] at 4.4-10.5 fl. oz. per acre. Leafhoppers only.	Do not exceed 0.38 lb. a.i. per acre per season. 21-day PHI.
Flea Beetle Threshold Seedling plants: >50% plants infested and defoliation > 30%	Align [®] according to label directions.	0-day PHI.
	Ambush 25W [®] at 6.4-12.8 oz. per acre. Leafhoppers 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.
	Ammo 2.5EC [®] at 2.5-5.0 fl. oz. per acre. Head lettuce only.	Do not exceed 0.6 lb. a.i. per acre per season. 5-day PHI. RUP.
	Baythroid [®] at the following rates: Flea beetles: 2.4-3.2 fl. oz. per acre. Potato leafhopper: 0.8-1.6 fl. oz. per acre.	Do not exceed 12.8 fl. oz. per acre per season. Allow 7 days between applications. 0-day PHI. RUP.
	Brigade 2EC [®] at 2.1-6.4 fl. oz. per acre, or Brigade WSB [®] at 5.3-16 oz. per acre. Head lettuce and spinach only.	7-day PHI for head lettuce. 40-day PHI for spinach. RUP.

Leafy Vegetables (continued)

Insect Control (continued)

Insects Controlled	Treatment	Comments
Flea Beetles, Leafhoppers (continued)	Dimethoate 4E® or Dimethoate 400® at 0.5 pt. per acre, or Dimethoate 2.67EC® at 0.75 pt. per acre. Leafhoppers only. Not for parsley, spinach, celery or head lettuce.	14-day PHI for endive, swiss chard, and leaf lettuce.
	Mustang MAX® at 2.24-4.0 fl. oz. per acre.	Do not exceed 0.15 lb. a.i. per acre per season. 5-day PHI. RUP.
	Neemix® according to label directions.	0-day PHI.
	Platinum® at 5-11 fl. oz. per acre.	30-day PHI.
	Pounce 25WP® at 6.4-12.8 oz. per acre. Leafhoppers 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. Leafhoppers only.	Do not exceed 0.23 lb. a.i. per acre per season. Allow 5 days between applications. 7-day PHI.
	Sevin XLR PLUS® at 0.5-1 qt. per acre.	Do not exceed 6 qts. per acre per season. 14-day PHI.
	Warrior® at 2.56-3.84 fl. oz. per acre. Lettuce only.	Do not exceed 2.4 pts. per acre per season. 1-day PHI. RUP.



Starting lettuce from transplants can help the crop get a head start on weeds.