

GARLIC

tebuconazole--4.0 to 6.0 fl oz 3.6F/A or OLF  
 Omega--1.0 pt 500F/A (also for Botrytis leaf blight and downy mildew)

Do not make more than one consecutive application of Pristine, azoxystrobin (both FRAC code 11) or, Endura (FRAC code 7) before switching to a fungicide with a different mode of action (i.e., FRAC code).

Thoroughly disc or plow under plant debris after harvest.

**Downy Mildew (*Peronospora destructor*)**

Tank mix chlorothalonil--1.0 to 3.0 pt 6F/A or OLF with one of the following fungicides:

Reason--5.5 fl oz 500SC/A

Zampro--14.0 fl oz 525SC/A

Forum--6.0 fl oz 4.18SC/A

Cabrio--12.0 oz 20EG/A

azoxystrobin--9.0 to 15.5 fl oz 2.08F/A or OLF

Quilt Xcel--17.5 to 26.0 fl oz 2.2SE /A

Omega--1.0 pt 500F/A (also for Botrytis leaf blight and purple blotch)

**Fusarium Basal Rot (*Fusarium spp.*)**

The fungus infects and causes decay of the stem plate. During the growing season, leaves can turn yellow and then brown. This disease is favored by very warm soil temperatures so symptoms are most frequently observed in mid- to late summer. A four-year crop rotation with non-hosts is the most effective management strategy.

**Bloat Nematode (*Ditylenchus dipsaci*)**

Infected garlic appears bloated and twisted, with swollen leaves and distorted and cracked bulbs. Secondary infection by *Fusarium* sp.is common. Plant only clean seed. Avoid planting bulbs that are split, have damaged basal plates or are desiccated. Currently there are no certification programs for garlic so check with your supplier about what production process they have in place to ensure clean seed cloves. Plant garlic in a location that has not been cropped to garlic or another *Allium* crop for at least four years. Following harvest plant biofumigant cover crops may help reduce nematode levels. Keep soils moist since the bloat nematode cannot survive long periods in high moisture. Implement good sanitation practices and avoid dumping culls and other infested debris in the field.

**GREENS (MUSTARD, TURNIP)**

**Recommended Greens Varieties – Mustards and Turnips  
 For Kale and Collard Greens, see the cole crop section**

Variety	Type	Use <sup>1</sup>	Hybrid	Season <sup>2</sup>	Description
Florida Broadleaf	Mustard	CG	No	Fall	Green, flat leaf
Garnet Giant	Mustard	S	No	Fall	Red, flat leaf
Green Wave	Mustard	CG, S	No	Fall	Green, curled leaf
Tendergreen	Mustard	CG	No	Fall	Green, flat leaf
Red Giant	Mustard	CG, S	No	Fall	Red, crinkled leaf
Red Splendor	Mustard	CG, S	No	Spring/Fall	Red, serrated leaf
Savannah	Mustard	CG	Yes	Spring/Fall	Green, flat leaf
Scarlet Frills	Mustard	S	No	Spring/Fall	Red, ruffled leaf
Southern Giant Curled	Mustard	CG	No	Fall	Green, curled leaf
Dark Purple Mizuna	Asian Mustard	CG, S	No	Fall	Green, serrated leaf
Red Streaked Mizuna	Asian Mustard	CG, S	No	Fall	Red, serrated leaf
Green Mizuna	Asian Mustard	CG, S	No	Fall	Green, serrated leaf
Tatsoi	Asian Mustard	CG, S	No	Fall	Green, semi savoy leaf
Tatsoi Savoy	Asian Mustard	CG, S	No	Fall	Green, heavy savoy leaf
Summerfest Komatsuna	Asian Mustard	CG, S	Yes	Spring/Fall	Green, flat leaf
Red Komatsuna	Asian Mustard	CG, S	Yes	Spring/Fall	Red, flat leaf
Alamo	Turnip	CG, S	Yes	Spring/Fall	Green, flat leaf
All Top	Turnip	CG	Yes	Fall	Green, flat leaf
Seven Top	Turnip	CG	No	Fall	Green, serrated leaf
Topper	Turnip	CG	Yes	Spring/Fall	Green, serrated leaf
Top Star	Turnip	CG	Yes	Spring/Fall	Green, serrated leaf

<sup>1</sup>Use CG=Cooked Green, S = Salad green for salad mixes.

<sup>2</sup>Recommended growing season for full size harvest to avoid bolting.

Greens may be planted throughout the year for harvest in the baby stage.

## Recommended Nutrients Based on Soil Tests

Before using the table below, refer to important notes in the Soil and Nutrient Management chapter in Section B and your soil test report. These notes and soil test reports provide additional suggestions to adjust rate, timing, and placement of nutrients. Your state's soil test report recommendations and/or your farm's nutrient management plan supercede recommendations found below.

Greens	Pounds N per Acre	Soil Phosphorus Level				Soil Potassium Level				Nutrient Timing and Method
		Low	Med	High	Very	Low	Med	High	Very	
				(Opt.)	High			(Opt.)	High	
		Pounds P <sub>2</sub> O <sub>5</sub> per Acre				Pounds K <sub>2</sub> O per Acre				
	50-110	150	100	50	0	150	100	50	0	Total nutrient recommended.
	50	150	100	50	0	150	100	50	0	Broadcast and disk-in.
	25-60	0	0	0	0	0	0	0	0	Topdress after each cutting.

### Seeding

Seed in early- to mid-August for fall harvest. Mustards and turnip greens planted in the spring are susceptible to bolting if exposed to cold temperatures for prolonged periods, and only bolt-resistant varieties such as Savanna mustard and Alamo turnip should be grown. Later spring plantings (April) have lower risk of bolting. For all plantings, sow 3 to 4 pounds of seed per acre in rows 12 to 24 inches apart.

A wide variety of mustards are available for incorporating into salad mixes for microgreens or baby salad mixes. These are sown in beds or trays as a broadcast or in narrow rows. They can be seeded from late winter through late fall in high tunnels for successive harvests.

### Harvest

Greens may be harvested by cutting off entire plants near ground level and then bunching (once over harvest) or by cutting 2-6 inches above the ground to allow for regrowth. For processing, greens are machine cut 4-6 inches from the ground when full tonnage has been achieved but before petioles and midribs have become too large. Multiple harvests may be possible. Greens for baby salad mix are cut at the ground level for once over harvest or 1-2 inches above ground level for multiple cuts. Greens for processing should be transported as quickly as possible to the processing plant.

Greens for fresh market, because of their perishability, should be held as close to 32°F as possible. At this temperature, they can be held for 10 to 14 days. Relative humidity of at least 95% is desirable to prevent wilting. Air circulation should be adequate to remove heat of respiration, but rapid air circulation will speed transpiration and wilting. Satisfactory precooling is accomplished by vacuum cooling or hydrocooling.

Greens are commonly shipped with package and top ice to maintain freshness. Research has shown that greens packed in polyethylene-lined crates and protected by crushed ice keeps in excellent condition if kept near 32°F but deteriorates rapidly at higher temperatures.

### Weed Control

Identify the weeds in each field and select recommended herbicides that control those weeds. See Tables E-3 and E-4.

Match preplant incorporated and preemergence herbicide rates to soil types and percent organic matter in each field. Apply postemergence herbicides when crop and weeds are within recommended size and/or leaf stage.

Determine the preharvest interval (PHI) for the crop. See

Table E-4 and consult the herbicide label.

Find the herbicides you plan to use in the Herbicide Resistance Action Committee's (HRAC) **Herbicide Site of Action Table E-8** and follow the recommended good management practices to minimize the risk of herbicide resistance development by weeds in your fields.

### Preplant Incorporated

Trifluralin--0.5 to 0.75 lb/A (processing turnip greens only and all mustard greens). Apply and incorporate Treflan 4EC before planting at a broadcast rate of 1.0 pint per acre on coarse and medium soils and 1.5 pints per acre on fine soils. Incorporate within 8 hours into top 2 to 3 inches of soil.

### Preplant Incorporated or Preemergence

Bensulide--5.0 to 6.0 lb/A. Apply 5.0 to 6.0 quarts per acre Prefar 4E before planting and incorporate 1 to 2 inches deep with power-driven rotary cultivators, or apply preemergence and activate with one-half inch of sprinkler irrigation within 36 hours to control most annual grasses. Use the maximum recommended rate preemergence followed by irrigation to suppress certain annual broadleaf weeds including common lambsquarters, smooth pigweed, and common purslane.

DCPA--6.0 to 10.5 lb/A. Apply 8.0 to 14.0 pints per acre of Dacthal 6F as a preemergence treatment at seeding.

### Postemergence

Clethodim--0.094 to 0.125 lb/A. Apply 12.0 to 16.0 fluid ounces of Select Max 0.97EC with nonionic surfactant to be 0.25% of the spray solution (1 quart per 100 gallons of spray solution) postemergence to control many annual and certain perennial grasses, including annual bluegrass. Select will not consistently control goosegrass. Control may be reduced if grasses are large or if hot, dry weather or drought conditions occur. For best results, treat annual grasses when they are actively growing and before tillers are present. Repeated applications may be needed to control certain perennial grasses. Yellow nutsedge, wild onion, or broadleaf weeds will not be controlled. Do not tank-mix with or apply within 2 to 3 days of any other pesticide unless labeled, as the risk of crop injury may be increased, or reduced control of grasses may result. Observe a minimum preharvest interval of 14 days.

Clopyralid--0.047 to 0.188 lb/A. Apply 2.0 to 8.0 fluid ounces of Stinger 3A or OLF per acre in one (turnip greens) or two (mustard greens) applications to control certain annual and perennial broadleaf weeds. Do not exceed 8.0 fluid

ounces in one year. Stinger or OLF controls weeds in the Composite and Legume plant families. Common annuals controlled include galinsoga, ragweed species, common cocklebur, groundsel, pineappleweed, clover, and vetch. Perennials controlled include Canada thistle, goldenrod species, aster species, and mugwort (wild chrysanthemum). Stinger or OLF is very effective on small seedling annual and emerging perennial weeds less than 2 to 4 inches tall, but is less effective and takes longer to work when weeds are larger. Use 2.0 to 4.0 fluid ounces to control annual weeds less than 2 inches tall. Increase the rate to 4.0 to 8.0 fluid ounces to control larger annual weeds. Apply the maximum rate of 8.0 fluid ounces to suppress or control perennial weeds. Spray additives are not needed or required by the label, and are not recommended. Observe a minimum preharvest interval (PHI) of 30 days. Stinger or OLF is a postemergence herbicide with residual soil activity. Observe follow crop restrictions or injury may occur from herbicide carryover.

Sethoxydim--0.2 to 0.3 lb/A. Apply 1.0 to 1.5 pints per acre Poast 1.5EC with oil concentrate to be 1 percent of the spray solution (1.0 gallon per 100 gallons of spray solution) postemergence to control annual grasses and certain perennial grasses. **The use of oil concentrate may increase the risk of crop injury when hot or humid conditions prevail.** To reduce the risk of crop injury, omit additives or switch to nonionic surfactant when grasses are small and soil moisture is adequate. Control may be reduced if grasses are large or if hot, dry weather or drought conditions occur. For best results, treat annual grasses when they are actively growing and before tillers are present. Repeated applications may be needed to control certain perennial grasses. Yellow nutsedge, wild onion, or broadleaf weeds will not be controlled. Do not tank-mix with or apply within 2 to 3 days of any other pesticide unless labeled, as the risk of crop injury may be increased, or reduced control of grasses may result. Observe a minimum preharvest interval of 30 days and apply no more than 3.0 pints per acre in one season. **Labeled for use in mustard greens only! Do not use for weed control in turnip greens.**

### Postharvest

Paraquat--0.6 lb/A. A **Special Local-Needs 24(c) label has been approved for the use of Gramoxone SL 2.0 or OLF for postharvest desiccation of the crop in Delaware, New Jersey and Virginia.** Apply 2.4 pints per acre Gramoxone SL 2.0 or OLF as a broadcast spray after the last harvest. Add nonionic surfactant according to the labeled instructions. See the label for additional information and warnings.

### Insect Control

**THE LABEL IS THE LAW. PLEASE REFER TO THE LABEL FOR UP TO DATE RATES AND RESTRICTIONS.**

**NOTE:** Copies of specific insecticide product labels can be downloaded by visiting the websites [www.CDMS.net](http://www.CDMS.net) or [www.greenbook.net](http://www.greenbook.net). Also, specific labels can be obtained via web search engines.

### Aphids

Apply one of the following formulations:  
acetamiprid--2.0 to 5.3 oz/A Assail 30SG (or OLF)

clothianidin--**soil** 9.0 to 12.0 fl oz/A Belay 2.13SC, **foliar** 3.0 to 4.0 fl oz/A Belay 2.13SC  
dimethoate--0.5 pt/A Dimethoate 400 (or OLF)  
flonicamid--2.0 to 2.8 oz/A Beleaf 50SG  
imidacloprid--**soil** 4.4 to 10.5 fl oz/A Admire Pro (or OLF),  
**foliar (mustard greens only)** 1.3 fl oz/A Admire PRO (or OLF)  
imidacloprid + beta-cyfluthrin--3.0 fl oz/A Leverage 360  
pymetrozine--2.75 oz/A Fulfill 50WDG  
thiamethoxam--(**mustard greens only**) **soil** 1.66 to 3.67  
Platinum 75SG; **foliar** 1.5 to 3.0 oz/A Actara 25WDG

### Caterpillar “worm” Pests including: Beet Armyworm (BAW), Cabbage Looper (CL), Diamondback moth (DBM), and Imported Cabbageworm (ICW)

Not all materials are labeled for all crops, insects or application methods; be sure to read the label for use directions. Due to resistance development, pyrethroid insecticides are not recommended for control of DBM or BAW. Other insecticides may no longer be effective in certain areas due to DBM resistance; consult your local county Extension office for most effective insecticides in your area. Rotation of insecticides with different modes of action is recommended to reduce the development of resistance.

Apply one of the following formulations:

*Bacillus thuringiensis*--0.5 to 1.5 lb/A Dipel (or OLF) **OMRI listed**  
beta-cyfluthrin--1.6 to 2.4 fl oz/A Baythroid XL (**Not recommended for DBM or BAW**)  
chlorantraniliprole **soil, drip, foliar**--3.5 to 5.0 oz/A Coragen (or other labeled mixtures containing chlorantraniliprole like Durivo and Voliam flexi)  
cyantraniliprole--(soil) 5 to 10 fl oz/A Verimark, (foliar) 7 to 13.5 fl oz/A Exirel  
cyfluthrin--1.6 to 2.4 fl oz/A Tombstone (or OLF) (**Not recommended for DBM or BAW**)  
emamectin benzoate--2.4 to 4.8 oz/A Proclaim 5SG  
flubendiamide--2.0 to 2.4 fl oz/A Belt SC (or other labeled mixtures containing flubendiamide like Vetica)  
indoxacarb--3.5 oz/A Avaunt 25WDG  
methomyl--1.5 to 3.0 fl oz/A Lannate LV  
methoxyfenozide--4.0 to 8.0 fl oz/A (**early season**) 8.0 to 10.0 fl oz/A (**late season**) Intrepid 2F  
spinetoram--5.0 to 10.0 fl oz/A Radiant SC  
spinosad--(**mustard greens**) 4.0 to 10.0 fl oz/A; (**turnip greens**) 4.0 to 8.0 fl oz/A Entrust SC **OMRI listed**

### Flea Beetles

Apply one of the following formulations:

beta-cyfluthrin--2.4 to 3.2 fl oz/A Baythroid XL  
carbaryl--0.5 to 1.0 qts/A Sevin XLR Plus (or OLF)  
clothianidin--**soil** 9.0 to 12.0 fl oz/A Belay 2.13SC, **foliar** 3.0 to 4.0 fl oz/A Belay 2.13SC  
cyfluthrin--2.4 to 3.2 fl oz/A Tombstone (or OLF)  
imidacloprid--**soil**--4.4 to 10.5 fl oz/A Admire Pro (or OLF),  
**foliar (mustard greens only)**--1.3 fl oz/A Admire PRO (or OLF)  
imidacloprid + beta-cyfluthrin--3.0 fl oz/A Leverage 360  
thiamethoxam--(**mustard greens only**) **soil** 1.66 to 3.67  
oz/A Platinum 75SG; **foliar** 1.5 to 3.0 oz/A Actara 25WDG

**Hawaiian Beet Webworm**

chlorantraniliprole--**soil, drip, foliar** 3.5 to 5.0 oz/A Coragen  
(or other labeled mixtures containing chlorantraniliprole  
like Durivo and Voliam flexi)  
spinetoram--7.0 to 10.0 fl oz/A Radiant 3C

**Leafhoppers**

Apply one of the following formulations:

beta-cyfluthrin--0.8 to 1.6 fl oz/A Baythroid XL  
carbaryl--1.0 to 2.0 qt/A Sevin XLR Plus (or OLF)  
clothianidin--**soil** 9.0 to 12.0 fl oz/A Belay 2.13SC, **foliar** 3.0  
to 4.0 fl oz/A Belay 2.13SC  
cyfluthrin--0.8 to 1.6 fl oz/A Tombstone (or OLF)  
dimethoate--0.5 pt/A Dimethoate 400 4EC (or OLF)  
imidacloprid--**soil** 4.4 to 10.5 fl oz/A Admire Pro (or OLF),  
**foliar (mustard greens only)**--1.3 fl oz/A Admire PRO  
(or OLF)  
imidacloprid + beta-cyfluthrin--3.0 fl oz/A Leverage 360

**Leafminers**

Apply one of the following formulations:

cyromazine--2.66 oz/A Trigard or OLF (**mustard and  
turnip greens -- tops only**)  
dimethoate--0.5 pt/A Dimethoate 400 (or OLF)  
spinetoram--6.0 to 10.0 fl oz/A Radiant SC  
spinosad--(**mustard greens**) 4.0 to 10.0 fl oz/A Entrust SC;  
(**turnip greens**) 6.0 to 10.0 fl oz/A Entrust SC

**Thrips**

Apply one of the following formulations:

imidacloprid + beta-cyfluthrin--3.0 fl oz/A Leverage 360  
spinetoram--6.0 to 10.0 fl oz/A Radiant SC  
spinosad--(**mustard greens**) 4.0 to 10.0 fl oz/A Entrust SC;  
(**turnip greens**) 6.0 to 10.0 fl oz/A Entrust SC  
thiamethoxam (**mustard greens only**)--**soil** 1.66 to 3.67  
oz/A Platinum 75SG; **foliar** 3.0 to 5.5 oz/A Actara  
25WDG

Pesticide	Use Category <sup>1</sup>	Hours to Reentry <sup>2</sup>	Days to Harvest
<b>INSECTICIDE</b>			
acetamiprid	G	12	3
<i>Bacillus thuringiensis</i>	G	4	0
beta-cyfluthrin	R	12	0
carbaryl	G	12	14
chlorantraniliprole (mustard/turnip)	G	4	3/1
clothianidin (soil/foliar)	G	12	21/7
cyantraniliprole (soil/foliar)	G	4/12	AP/1
cyfluthrin	R	12	0
cyromazine	G	12	7
dimethoate	R	48	14
emamectin benzoate (tops only)	R	12	7
flonicamid	G	12	0
flubendiamide	G	12	8
flubendiamide + buprofezin	G	12	1
imidacloprid (soil/foliar)	G	12	21/7
imidacloprid + beta-cyfluthrin	R	12	7
indoxacarb (tops only)	G	12	3
methomyl	R	48	10
methoxyfenozide	G	4	1
pymetrozine	G	12	7
spinetoram	G	4	3
spinosad	G	4	3
thiamethoxam (soil/foliar)	G	12	30/7

Pesticide	Use Category <sup>1</sup>	Hours to Reentry <sup>2</sup>	Days to Harvest
<b>FUNGICIDE (FRAC code)</b>			
Aliette (Group 33)	G	12,24	3
azoxystrobin (Group 11)	G	4	0
Cabrio (Group 11)	G	12	0
copper, fixed (Group M1)	G	see label	0
Endura (Group 7)	G	12	0
Folicur (Group 3)	G	12	7
Fontelis (Group 7)	G	12	0
Forum (Group 40)	G	12	0
Inspire Super (Groups 3 + 9)	G	12	7
Quadris Top (Groups 3 + 11)	G	12	1
Presidio (Group 43)	G	12	2
Priaxor (Groups 7 + 11)	G	12	3
Ranman (Group 21)	G	12	0
Revus (Groups 40)	G	4	1
Ridomil Gold (Group 4)	G	12	0
Switch (Groups 9 + 12)	G	12	7
Uniform (Groups 4 + 11)	G	0	AP
Zapro (Groups 40 + 45)	G	12	0

See Table D-6.

<sup>1</sup> G = general, R = restricted, AP = At planting

<sup>2</sup> Chemicals with multiple designations are based on product and/or formulation differences. CONSULT LABEL.

**Disease Control**

**Damping-Off** (caused by *Pythium*, *Rhizoctonia* or *Phytophthora* spp.).

Apply one of the following preplant incorporated or as a soil-surface spray after planting:

Ridomil Gold--1.0 to 2.0 pt 4SL/A (turnip greens only)  
azoxystrobin--0.40 to 0.80 fl oz 2.08F/1000 row ft or OLF  
Uniform--0.34 fl oz 3.66SE/1000 row ft

**Downy Mildew**

Scout on a regular basis. Apply the following during periods of high moisture and moderate temperatures and continue every 14 days.

Presidio--4.0 fl oz 4SC/A  
Ranman--2.75 fl oz 3.33SC/A  
Revus--8 fl oz 2.08SC/A  
Zapro--14 fl oz 4.38SC/A  
Forum--6.0 fl oz 4.18SC/A plus fixed copper  
Aliette--3.0 lb 80WDG/A (for mustard greens only)  
azoxystrobin--6.0 to 15.5 oz 2.08F/A or OLF  
Cabrio--8.0 to 16.0 oz 20EG/A

**Leaf Spot (caused by *Alternaria*, *Cercospora*)**

Practice good crop rotation with crops other than crucifers. When conditions favor disease development, utilize one of the below and alternate mode of actions (FRAC groups) every 7 to 10 days:

azoxystrobin--6.0 to 15.5 oz 2.08F/A or OLF  
Cabrio--8.0 to 16.0 oz 20EG/A  
Endura--14.0 oz 70WG/A  
Folicur--3.0 to 4.0 fl oz 3.6F/A or OLF  
Fontelis--14.0 to 30.0 fl oz 1.67SC/A  
Inspire Super--16.0 to 20.0 fl oz 2.82SC/A  
Quadris Top--12.0 to 14.0 fl oz 2.72SC/A  
Priaxor--6.0 to 8.2 fl oz 4.17SC/A  
Switch--11.0 to 14.0 oz 62.5WG/A  
copper, fixed--0.75 to 1.5 lb 53.8DF/A or OLF