

# Cucumbers: Processing and Fresh Market

## Culture

In 1994, farm gate value of approximately 3,200 acres of pickles in Ohio was valued at \$9.8 million, with an average yield of 11.4 tons, or 460 bushels per acre. Pickles grow on many soil textures, ranging from sandy loams and silt loams to clay loams. Select soils that are well-drained and high in organic matter. Wet fields are slow to warm and will result in poor yields. There should be a minimum of a 3-year rotation with other cucurbits. Do not plant pickles on land that has been treated the previous year with a triazine herbicide, such as Atrazine, Sencor/Lexone or Karmex.

Cultivar	Spine Color	Disease Resistance
<b>Pickles</b>		
Eureka (trial)		
<b>Pickles Machine Harvest</b>		
Vlaspik	white spine	1, 2, 3, 4, ~5, 6
Journey (trial)	white spine	1, 2, 3, 4, ~5
Expedition (trial)	white spine	1, ~2, 3, ~4, ~5
<b>Fresh Market Slicers</b>		
Raider		—
Encore		
Dasher II		
Indy		
Intimidator		
Thunder		
Turbo		
Meteor		
Marketmore 76 (Monoecious)		2, 3, 4
Marketmore 86		
Disease Resistance Codes 1. Angular leaf spot 2. Anthracnose 3. CMV 4. Downy mildew 5. Powdery mildew 6. Scab ~ = Intermediate resistance		

## Varieties

Processors determine cultivar recommendations, harvest sizes and processing characteristics. The following cultivars are hybrids and gynoecious—all female flowers, as compared with older varieties that were monoecious—male and female flowers on the same plant. The table can be used if a processor does not provide specific recommendations.

## Lime and Fertilizer

Maintain a soil pH of 6.5-6.8.

Apply per acre 100-120 lb N, 50-160 lb P<sub>2</sub>O<sub>5</sub> and 120-240 lb K<sub>2</sub>O. Some soils may require nitrogen rates as high as 150 lb/A. Phosphorus and potassium are best determined by soil test.

Apply 50%-60% of the recommended N prior to planting, and disk in another 15-25 lb N in a band 2 inches to the side and 2 inches below the seed at planting.

Apply the remaining N in a sidedress application when plants are in the 4- to 6- leaf stage. A typical banding fertilizer is 6-24-12, but do not apply more than 80-100 lb nitrogen plus potassium in the band.

# Seeding and Spacing

Do not plant adjacent to sweet corn or other crops where insecticides are used that are harmful to bees.

Plantings usually are made from May 15-20. Do not plant until soil temperatures are 60°F at seed depth. Plant seed at 0.5-1.5 inch depth, depending on soil moisture. Most growers adjust planting depth so that seed is placed in moist soil.

	<b>Processing (Hand Pick)</b>	<b>Machine Harvest</b>	<b>Fresh Market</b>
In-Row	6-12 inches	3-6 inches	9-12 inches
Rows	36-72 inches	15-30 inches	36-72 inches
Population	7,500-29,000	34,848-139,392	7,500-22,000

Treat seed with recommended fungicide to protect against seed decay.

Seedcorn maggot can be a serious problem during stand establishment especially during cool wet springs. At-planting treatment (see page 140) is a solution to this pest problem.

# Pollination

Local bee populations can be variable, resulting in poor cross-pollination, lower yield and poor fruit shape. Provide one bee colony for every 50,000 plants.

For example, if a field has 25,000 plants/A, provide one colony for every 2 acres. Or, a field with 100,000 plants/A needs two colonies for every acre.

Delay introduction of the colonies until 3-7 days after the appearance of the first bloom. This allows the first group of fruit that develops to be larger in number and more uniform in shape. Also, provide a sufficient amount of fresh water near the hives to boost efficiency in pollination.

Use pesticides wisely to avoid unnecessary bee kills. Apply pesticides in late afternoon or early in the morning when there is no bee activity. Bees start flying on cucumbers at 65-70°F.

# Harvest

Work closely with crew leaders. Train the vines—by “rowing”—so they are parallel to the direction of the row. This makes harvesting easier and reduces vine damage. Instruct pickers to turn the vines as they pick and then return them to the original position. Snap off the pickles with the stem left on.

Picking intervals depends on temperature. High temperatures of 80-90°F require picking every other day.

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# Disease Control

## Damping off

Buy commercial fungicide-treated seed. If Pythium has been a problem, apply **Ridomil Gold** (EC) at 1-2 pt/A pre-plant. (See label instructions.)

## Angular Leaf Spot

Use disease-tolerant varieties. Practice a 3-year rotation. At the first sign of disease, apply **Kocide 3000** or other fixed copper formulation and continue every 7 days until mid-harvest (0 days-PHI).

## Anthracnose

Control program should start at first signs of disease. Spray at weekly intervals with one of the following fungicides:

**Bravo Weather Stik** 1.0-1.5 pt/A (0 days-PHI).

**Bravo Ultrex** 1.4-1.8 lb/A (0 days-PHI).

**Equus DF** 1.4-1.8 lb/A (0 days-PHI).

\***Topsin M 70 WP** 0.25-0.5 lbs/A (0 days-PHI). Tank mix with a protectant fungicide.

\***Quadris** 11-15.4 fl oz/A (1 day-PHI).

\***Quadris Opti** 3.2 pt/A (1 day-PHI).

**Maneb** 75DF 1-2 lb/A (5 days-PHI) or other maneb formulation.

**Manzate Pro-Stick** 2-3 lb/A (5 days-PHI) or other mancozeb formulation.

\***Tanos 50DF** 8 oz/A (3 days-PHI). Must be tank-mixed with a protectant fungicide.

## Alternaria Leaf Spot, Scab and Gummy Stem Blight

Plant resistant varieties. For susceptible varieties, spray at 5- to 7-day intervals with one of the following:

**Bravo Weather Stik** 2.0-3.0 pt/A (0 days-PHI).

**Bravo Ultrex** 1.8-2.7 lb/A (0 days-PHI).

**Equus** DF 1.8-2.7 lb/A (0 days-PHI).

**Echo 720** (6F) 1.5-3 pt/A (0 days-PHI). 15.75 lb a.i./A/year total.

**Echo 90DF** 1.25-2.5 lb/A (0 days-PHI). 15.75 lb a.i./A/year total.

\***Quadris** (2.08F) 11-15.4 fl oz/A (1 day-PHI).

\***Quadris Opti** 2.4-3.7 pt/A (1 day-PHI).

\***Tanos 50DF** 8 oz/A (3 days-PHI). Alternaria leaf spot only. Tank mix with a protectant fungicide.

**Maneb** 75DF 1-2 lb/A (5 days-PHI) or other maneb formulation.

**Mancozeb** 75DF 2-3 lb/A (5 days-PHI) or other mancozeb formulation.

## Downy Mildew

Scout fields regularly. If cool rainy conditions occur and/or downy mildew has been confirmed in the region, apply a protectant fungicide (Bravo, Equus, maneb, mancozeb). Once downy mildew has been found nearby, apply Presidio + protectant, alternated with Ranman, Previcur Flex, Curzate, Tanos or Gavel + protectant. See list below for rates and PHIs.

\***Presidio** 3-4 fl oz/A (2 days-PHI).

\***Ranman** 2.1-2.75 fl oz/A (0 days-PHI).

\***Gavel** 1.5-2.0 lb/A (5 days-PHI) (See label for use directions.)

\***Tanos 50DF** 8 oz/A (3 days-PHI).

**Bravo Weather Stik** 1.5-2 pt/A (0 days-PHI).

**Equus 720** 1.4-1.8 lb/A (0 days-PHI).

**Maneb** 75DF 1-2 lb/A (5 days-PHI) or other maneb formulation.

**Manzate Pro-Stick** 2-3 lb/A (5 days-PHI) or other mancozeb formulation.

\***Previcur Flex** 1.2 pt/A (2 days-PHI).

\***Curzate 60DF** 3.2-5 oz/A (3 days-PHI). Apply with a protectant fungicide such as Manex. Maximum 30 oz per 12 months.

Phytophthora blight (below) and downy mildew are related diseases; however, not all of the products listed for Phytophthora blight are effective against downy mildew. See the following table for relative efficacy of fungicides against downy mildew.

**Relative effectiveness of fungicides for downy mildew management in cucumbers.  
Preharvest interval.**

Fungicide	PHI <sup>a</sup>	Efficacy <sup>b</sup>
Presidio	2	+++++++
Ranman	0	+++++++
Previcur Flex	2	+++++
Curzate	3	+++++
Tanos	3	+++++
Gavel <sup>c</sup>	5	++++
Mancozeb <sup>c</sup>	5	++++
Bravo	0	++++

<sup>a</sup>Preharvest interval (days).

<sup>b</sup>Based on research trials in many states, effectiveness was ranked on a scale from highly effective (9+) to somewhat effective (4+).

<sup>c</sup>Not registered for all cucurbits—see label.

## Phytophthora Blight

In areas where Phytophthora blight has occurred in vine crops (cucurbits), peppers, eggplant or green beans, apply fungicides in concert with cultural practices (raised beds, good drainage). None of the following fungicides will control the disease completely under highly favorable conditions (high temperatures, heavy rain). Use seed treated with Apron XL or Allegiance FL to protect plants up to five weeks after sowing. Control may be improved if fungicides are tank-mixed with the recommended rate of a fixed copper fungicide (e.g. Kocide 3000 or Cuprofix Disperss).

\***Acrobat** 50WP 6.4 oz/A (0 days-PHI).

\***Gavel** 75DF 1.5-2 lb/A (5 days-PHI).

\***Ranman** 2.1-2.75 fl oz/A (0 days-PHI).

\***Revus** 8.0 fl oz/A (0 days PHI).

\***Presidio** 3-4 fl oz/A (2 days PHI).

\***Tanos** 8-10 oz/A tank mixed with a copper-containing fungicide (e.g. Kocide 3000) and Maneb or other protectant fungicide.

## Powdery Mildew

Use a powdery mildew resistant or “tolerant” variety. When disease appears, apply one of the following:

\***Rally 40W** 2.5-5.0 oz/A (1 day-PHI).

\***Procore** 50WS 4-8 oz/A (0 days-PHI).

**Microthiol Disperss** 2-4 lb/A (0 days-PHI) or other sulfur formulation.

**Pristine** 12.5-18.5 oz/A (0 days-PHI).

\***Bravo Weather Stik** 1.5-2 pt/A (0 days-PHI) or other chlorothalonil formulation.

**Potassium bicarbonate** (**Armicarb 100**, **Kaligreen** or other formulation) 2.5-5 lb/A (0 days-PHI).

## Belly Rot (Rhizoctonia)

Apply one of the following as a single application when vines form:

**Bravo Ultrex** 7.6 lb/A.

\***Quadris** 11-15.4 fl oz/A (1 day-PHI).

## Cottony Leak (Pythium)

If disease has been a problem in previous crops, apply preplant:

**Ridomil Gold EC** 1-2 pt/treated A (see label for application information).

**Aliette/Maneb** 2+2 4 lb/A (7 days-PHI).

## Cucumber Mosaic Virus (CMV)

Perennial weeds harbor CMV over winter; it is spread by aphids. Grow resistant varieties, if available. For control of CMV on susceptible varieties, it may help to (1) kill perennial weed hosts of the virus within 150 feet of plantings and (2) control aphids.

## Bacterial Wilt

The bacteria that cause this disease are carried by the yellow and black striped and spotted cucumber beetles. It is essential to control these insects with a recommended insecticide as soon as they appear in the spring. Once plants are infected with bacterial wilt due to feeding on young plants by these insects, no control is possible.

\*Follow guidelines for fungicide resistance management on the product label (see pages 59-60).

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# Insect Control

See the table on the next page for overview of insecticides used to control cucumber pests.

## • At-planting treatment

**Bifenthrin** (3 days-PHI)

For maggot, wireworm, grubs.

**Brigade 10WSB**: 8-16 oz/A. Apply in-furrow with seed.

## Insecticides for Use on Cucumbers in Ohio

(E = excellent; G = good; F = fair; P = poor; ✓ = pest listed on label but efficacy uncertain; - = pest not on label; rating in parentheses = pest not on label but product known to provide some control)

Pest >>	Pre-harvest interval (days)	Seed-corn maggot	Cucumber beetles	Spider mites	Leafhoppers	Thrips	Aphids	Caterpillars	Impact on beneficial insects
<i>How often an insecticide has been needed on Ohio farms for this pest in the past &gt;&gt;</i>		occasional especially in cool wet springs	every year especially early season	occasional especially in dry years	occasional	rare	rare	rare	
<b>ORGANOPHOSPHATES</b>									
malathion (Cythion)	1	-	G	F	✓	✓	F	F	low/moderate
MSR (oxydemetonmethyl)	3	-	-	F	-	-	G	-	moderate
<b>CARBAMATES</b>									
Furadan (carbofuran)	-	-	E	-	-	-	-	-	moderate
Lannate (methomyl)	1, 3	-	G	-	-	-	G	G	disruptive
Sevin (carbaryl)	3	-	G	-	G	-	-	F	disruptive
Vydate (oxamyl)	1	-	-	(G)	-	✓	G	-	disruptive
<b>PYRETHROIDS</b>									
Asana (esfenvalerate)	3	-	G	-	G	-	-	G	disruptive
Baythroid (cyfluthrin)	0	-	✓	-	-	-	-	✓	disruptive
Capture, Brigade (bifenthrin)	3	-	G	F	G	-	F	G	disruptive
Danitol (fenpropathrin)	7	-	G	F	(G)	-	-	G	disruptive
Decis (deltamethrin)	3	-	✓	-	✓	-	-	✓	disruptive
Mustang (zeta-cyber.)	30	-	✓	-	-	-	-	-	disruptive
Pounce (permethrin)	0	-	G	-	G	-	F	G	disruptive
Warrior (lambda-cy.)	1	-	✓	-	✓	-	✓	✓	disruptive
<b>NEONICOTINOIDS (CHLORONICOTINYLS)</b>									
Actara (thiamethoxam)	0	-	F	-	-	-	G	-	low/moderate
Admire (imidacloprid)	21	-	✓	-	-	✓	G	-	low/moderate
Assail (acetamiprid)	0	-	✓	-	✓	-	✓	✓	moderate
Platinum (thiamethoxam)	30	-	F	-	✓	-	G	-	low/moderate
Venom (dinotefuran)	1, 21	-	✓	-	✓	✓	✓	-	low/moderate
<b>OTHER INSECT NERVE POISONS</b>									
Agri-Mek (abamectin)	7	-	-	G	-	-	-	-	low/moderate
Avaunt (indoxacarb)	3	-	-	-	-	-	-	-	low/moderate
Beleaf (flonicamid)	0	-	-	-	-	-	✓	-	-
Fulfill (pymetrozine)	0	-	-	-	-	-	G	-	low
Pyronyl, PyGanic (pyrethrins)	0	-	✓	-	✓	✓	✓	✓	moderate
Radiant (spinetoram)	3	-	-	-	-	✓	-	✓	-
SpinTor (spinosad)	1	-	-	-	-	✓	-	G	low
Thionex (endosulfan)	2	-	G	-	-	-	G	F	moderate
<b>INSECT GROWTH REGULATORS</b>									
Courier (buprofezin)	7	-	-	-	-	-	-	-	low/moderate
Neemix, Aza-Direct (azadirachtin)	0	-	-	-	-	✓	✓	✓	low/moderate
Trigard (cyromazine)	0	-	-	-	-	-	-	-	low/moderate
<b>MISCELLANEOUS</b>									
Acramite (bifenazate)	3	-	-	✓	-	-	-	-	low
<i>Bacillus thuringiensis</i> (B.t.)	0	-	-	-	-	-	-	G	very low
Coragen (chlorantraniliprole)	1	-	-	-	-	-	-	✓	low
cryolite (Kryocide)	14	-	✓	-	-	-	-	✓	low
Kelthane (dicofol)	2	-	-	G	-	-	-	-	low/moderate
Oberon (spiromesifen)	7	-	-	✓	-	-	-	-	-
soap (M-Pede)	0	-	-	F	✓	✓	F	-	low
Synapse (flubendiamide)	1	-	-	-	-	-	-	✓	low

### **Carbofuran**

For striped cucumber beetle, spotted cucumber beetle, nematodes.

Furadan 4F: 2.4 fl oz/1,000 feet; apply in seed furrow or as 7-inch band over row. (Ohio 24c label)

### **Dinotefuran** (21 days-PHI)

For aphids (suppression), thrips, whiteflies, leafhoppers, cucumber beetles.

Venom 70SG: 5-6 oz/A as in-furrow spray or post-seeding drench. Limit 12 oz/A per season.

### **Imidacloprid** (21 days-PHI)

For aphids, cucumber beetles, thrips, whiteflies.

Admire 2F, Alias 2F: 16-24 fl oz/A. Limit 24 oz/A per year.

Admire Pro (4.6F): 7-10.5 fl oz/A.

### **Thiamethoxam** (30 days-PHI)

For aphids, flea beetles, leafhoppers, thrips, suppression of cucumber beetle.

Platinum 2SC: 5-11 oz/A.

## • **Bait treatment**

### **Carbaryl** (1-3 days-PHI)

Sevin 5B: 20 lb/A or 7.3 oz/1,000 sq ft. For cutworms. 1 day-PHI.

Prozap Sevin 10% Bait Granules: 10 lb/A. For cutworms.

## • **Via drip (trickle) irrigation**

### **Thiamethoxam + chlorantraniliprole** (30 days-PHI)

For aphids, whiteflies, pickleworm, suppression of cucumber beetles.

Durivo 1.67SC: 10-13 fl oz/A.

## • **Foliar treatment**

For cucumber beetle, make the first application of insecticide as soon as the young plants start to break through the soil surface and repeat at 5-day intervals until infestation subsides.

### **Abamectin** (7 days-PHI)

For spider mites, leafminers.

Agri-Mek 0.15EC, Abba 0.15EC: 8-16 fl oz/A.

### **Acetamiprid** (0 days-PHI)

For cucumber beetles, aphids, leafhoppers, whiteflies, pickleworm.

Assail 30SG: 2.5-5.3 oz/A. Limit 26.5 oz/A per season.

### **Bacillus thuringiensis (B.t.)** (0 days-PHI)

For variegated cutworm, pickleworm, loopers.

Agree WG (3.8% a.i.): 0.5-2 lb/A.

CryMax WDG (15% a.i.): 0.5-1.5 lb/A.

DiPel DF (10.3 a.i.): 0.25-1 lb/A.

Javelin WG (6.4%): 0.5-1 lb/A.

XenTari (10.3% a.i.): 0.5-2 lb/A.

### **Bifenazate** (3 days-PHI)

For spider mites.

Acramite 50WS: 0.75-1.0 lb/A. Limit one spray per season.

### **Bifenthrin** (3 days-PHI)

Brigade 2EC, Capture 2EC, Discipline 2EC, Fanfare 2EC, Sniper 2EC, Tundra 2EC: 2.6-6.4 fl oz/A for cucumber beetles, aphids, leafhoppers, caterpillars; 5.12-6.4 fl oz/A for mites.

Brigade 10WSB: 8-16 oz/A.

### **Buprofezin** (7 days-PHI)

For whiteflies.

Courier 0.7EC: 6-9 oz/A.

**Carbaryl** (3 days-PHI)

For cucumber beetles, flea beetles, leafhoppers, pickleworm.

Note: The repeated use of carbaryl may cause a buildup of aphids. Carbaryl may cause injury to young cucurbit plants if applied during periods of high humidity.

Carbaryl 90 DF: 1.1 lb/A for beetles; 0.6-1.1 lb/A for worms.

Carbaryl 4L; Sevin XLR Plus (4EC); Sevin 4F: 1 qt/A for beetles and leafhoppers; 0.5-1 qt/A for pickleworm.

Sevin 80S: 1.25 lb/A for beetles and leafhoppers; 0.67-1.25 lb/A for pickleworm.

Sevin 50WP: 2 lb/A for beetles and leafhoppers; 1-2 lb/A for pickleworm.

**Chlorantraniliprole (Rynaxypyr)** (1 day-PHI)

For pickleworm and other caterpillars.

Coragen 1.67SC: 2-7 fl oz/A. Apply as a foliar spray or via drip irrigation.

**Cryolite** (14 days-PHI)

For flea beetles, pickleworm, loopers, cucumber beetles.

Kryocide (96% a.i.): 8-12 lb/A.

**Cyfluthrin and beta-cyfluthrin** (0 days-PHI)

For cucumber beetles, pickleworm.

Baythroid 2EC: 1.6-2.4 fl oz/A for pickleworm; 2.4-2.8 fl oz/A for cucumber beetles. Limit 11.2 fl oz/A per year.

Baythroid XL 1EC: 0.8-2.8 fl oz/A.

**Cyromazine** (0 days-PHI)

For leafminers.

Trigard 75WP WSP: 1/6 lb (1 packet)/A.

**Deltamethrin** (3 days-PHI)

Decis 1.5EC, Delta Gold 1.5EC: 1.0-2.4 fl oz/A for cutworms, leafhoppers. 1.5-2.4 fl oz/A for cucumber beetles, flea beetles, grasshoppers, pickleworm, stink bugs. Limit 14.4 fl oz/A per season. Allow 3 days between applications.

**Dicofol** (2 days-PHI)

For mites.

Limit 2 applications.

Dicofol 4EC: 0.7 pt/A.

Kelthane 50WP: 1.25 lb/A.

**Dinotefuran** (1 day-PHI)

For aphids (suppression), thrips, whiteflies, leafhoppers, cucumber beetles.

Venom 70SG: 1-4 oz/A. Limit 6 oz/A per season.

**Endosulfan** (2 days-PHI)

For cucumber beetles, flea beetles, aphids, pickleworm, loopers.

Limit 6 applications per year or 4 qt/A per year.

Thionex 3EC; Endosulfan 3EC: 0.7-1.3 qt/A.

Thionex 50WP: 1-2 lb/A.

**Esfenvalerate** (3 days-PHI)

For cucumber beetles, leafhoppers, cutworms, pickleworm, loopers.

Asana XL 0.66EC, Adjourn 0.66EC: 5.8-9.6 fl oz/A. Limit 48 fl oz/A per season.

**Fenpropathrin** (7 days-PHI)

For striped cucumber beetle, spider mites.

Danitol 2.4EC: 10.7-16 fl oz/A.

**Flonicamid** (0 days-PHI)

For aphids.

Beleaf 50SG: 1.2-2.8 oz/A. Limit 3 applications per year.

**Flubendiamide** (1 day-PHI)

For pickleworm and other caterpillars.

Synapse 24WG: 2-3 oz/A. Limit 9 oz/A per crop season.

**Indoxacarb** (3 days-PHI)

For pickleworm.

Avant 30WG: 2.5-6 oz/A. Limit 24 oz/A per crop.

**Lambda-cyhalothrin** (1 day-PHI)

For cucumber beetles, leafhoppers, pickleworm.

Warrior 1CS: 2.56-3.84 fl oz/A.

Warrior II 2.08CS: 1.28-1.92 fl oz/A.

**Lambda-cyhalothrin + chlorantraniliprole** (1 day-PHI)

For cucumber beetles, leafhoppers, pickleworm.

Voliam Xpress: 6-9 fl oz/A.

**Malathion** (1 day-PHI)

For cucumber beetles, aphids, thrips, mites, pickleworm.

Note: May cause injury if applied before plants start to vine. Do not apply unless plants are dry.

Malathion 5EC; Malathion 57EC: 2 pt/A for beetles; 1.5-2 pt/A for aphids, mites, pickleworm.

Malathion 8EC; Malathion 8 Aquamul: 1.5-1.75 pt/A for beetles; 1-1.75 pt/A for aphids, thrips, mites, pickleworm.

**Methomyl** (1 or 3 days-PHI, depending on rate)

For cucumber beetles, flea beetles, aphids, variegated cutworm, pickleworm, loopers, fall armyworm.

Limit 12 applications/crop.

Lannate 90SP: 0.5-1 lb/A.

Lannate LV (2.4WSL): 1.5-3 pt/A.

**Methoxyfenozide** (3 days-PHI)

For caterpillars: pickleworm.

Intrepid 2F: 4-10 fl oz/A. Limit 4 applications or 64 fl oz/A per season.

**Oxamyl** (1 day-PHI)

For aphids, leafminers.

Vydate L (2WSL): 2-4 pt/A.

**Oxydemetonmethyl** (3 days-PHI)

For aphids, mites.

MSR (Metasystox-R) 2SC: 1.5-2 pt/A. Limit 2 applications per season.

**Permethrin** (0 days-PHI)

For cucumber beetles, cutworms, pickleworm, loopers.

Pounce 3.2EC, Arctic 3.2EC, Permethrin 3.2EC: 4-8 fl oz/A. Limit 64 fl oz/A per season.

Ambush 25WP; Pounce 25WP: 6.4-12.8 oz/A. Limit 102 oz/A per season.

**Pymetrozine** (0 days-PHI)

For aphids.

Fulfill 50WDG: 2.75 oz/A. Limit 5.5 oz/A per season.

**Pyriproxyfen** (7 days-PHI)

For whiteflies.

Esteem 35WP: 2.5-3 oz/A. Limit 2 applications or 6 oz/A per season.

**Spinetoram** (1 day-PHI)

For pickleworm, thrips.

Radiant 1SC: 5-10 fl oz/A. Limit 6 applications per crop.

**Spinosad** (1 day-PHI)

SpinTor 2SC: 4-8 fl oz/A for caterpillars; 6-8 fl oz/A for leafminers, thrips. Limit 29 fl oz/A per year.

Entrust (80WP): 1.25-2.5 oz/A.

**Spiromesifen** (7 days-PHI)

For two-spotted spider mite, whiteflies.

Oberon 2SC: 7.0-8.5 fl oz/A. Limit 3 applications per crop season.

**Thiamethoxam** (0 days-PHI)

For aphids, flea beetles, cucumber beetles.

Actara 25WDG: 1.5-3 oz/A for aphids, flea beetles; 3-5.5 oz/A for suppression of cucumber beetles.

**Zeta-cypermethrin** (1 day-PHI)

For cucumber beetles, pickleworm.

Mustang Max 0.8EC: 2.8-4 fl oz/A.

Mustang 1.5EW: 3-4.3 fl oz/A.

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## Weed Control

### Preplant Incorporated For cucumbers

**Prefar 4E:** Controls germinating annual grasses. Apply 4-6 qt/A Prefar 4E preplant incorporated or preemergence if irrigation is used.

**Command 3ME:** Controls annual broadleaf weeds and grasses. Apply 0.4-1.0 pt/A. Incorporation is not necessary.

### Preemergence For cucumbers

**Alanap 2L:** Controls germinating annual broadleaf weeds. Apply 4-8 qt/A either preemergence to seeded crop or postemergence to transplanted crop. Can be applied immediately after transplanting or just prior to vining. Soil must be weed free at time of application. Tank-mix with Prefar for broader spectrum weed control.

**Sandea:** For control of labelled broadleaf weeds apply 0.5-1.0 oz/A after seeding but before ground crack. Use the lower rate on light textured soils with low organic matter. Two applications of Sandea are permitted per crop cycle, for example a preemergence application followed by a postemergence, up to a maximum rate applied of 1.66 oz/A per growing season.

### For cucumbers, melons and watermelons

**Strategy:** Apply 2-6 pt/A, depending upon soil type. Controls annual broadleaf weeds and grasses. Strategy must be applied after seeding but before weed emergence. A banded application between the rows can be applied after crop emergence or transplanting. Rainfall or irrigation is required to activate the herbicide.

### Postemergence For cucumbers

**Sandea:** For control of yellow nutsedge and labelled broadleaf weeds, apply 0.5-1.0 oz/A after the crop has reached the 2-5 true leaf stage, but before first female flowers appear. Always include a nonionic surfactant (minimum 80% active ingredient) at 1-2 quarts/100 g spray mixture. Crop oil concentrate and silicone-based adjuvants are not recommended. For transplanted cucumbers, delay application for at least 14 days. Use the lower rate on light textured soils with low organic matter. Two applications of Sandea are permitted per crop cycle, for example a preemergence application followed by a postemergence, up to a maximum rate applied of 1.66 oz/A per growing season. The PHI is 30 days.

### For cucumbers, melons and watermelons

**Curbit:** Controls germinating annual grasses and broadleaf weeds. Apply 3-4 pt/A prior to crop and weed emergence. Do not apply later than 2 days after seeding. Do not incorporate prior to planting. Use the low rate on coarse soils (sandy) and the higher rate on fine soils (clay, clay loams). Not for use on soils containing more than 10% organic matter.

# Preemergence and/ or Postemergence

## For watermelons and muskmelons

### Row-Middle Application Between Plastic Mulch

**Sandea:** For control of labeled weeds, apply 0.5-1.0 oz/A between rows of direct-seeded or transplanted melons. Avoid contact with crop foliage. With postemergence applications, always include a nonionic surfactant (minimum 80% active ingredient) at 1-2 quarts/100 g spray mixture. Crop oil concentrate and silicone-based adjuvants are not recommended. A maximum of 2 oz/A may be applied in a single growing season. PHI is 57 days.

## Postemergence

**Poast:** Controls emerged annual and perennial grasses. Apply 1-1.5 pt/A Poast (14 days-PHI). Do not exceed 3 pt/A/season. Add 1 qt/A nonphytotoxic oil concentrate. Rate is dependent on grass species and stage of development.

**Select:** Controls emerged annual and perennial grasses. Apply 8 fl oz/A (14 days-PHI). Do not exceed 32 fl oz/A/season. Add a crop oil concentrate at 1% on a volume basis (v/v). Select can be used on watermelons.

## Preemergence

### Cantaloupes, Honeydew Melons, Crenshaw Melons

**Sandea:** For control of labelled broadleaf weeds, apply 0.5-1.0 oz/A after seeding but before ground crack. Use the lower rate on light textured soils with low organic matter. Sandea can be applied Preplant under plastic mulch before transplanting melons—apply 0.5-1.0 oz/A after beds are formed and just before laying plastic. Wait 7 days after application before transplanting the crop. Two applications of Sandea are permitted per crop cycle, for example a preemergence application followed by a postemergence, up to a maximum rate applied of 1.66 oz/A per growing season.

## Postemergence

### Cantaloupes, Honeydew Melons, Crenshaw Melons

**Sandea:** For control of yellow nutsedge and labelled broadleaf weeds apply 0.5-1.0 oz/A after the crop has reached the 2-5 true leaf stage but before first female flowers appear. For transplanted cantaloupes, honeydews, and Crenshaw melons wait 14 days after transplanting before applying Sandea. Always include a nonionic surfactant (minimum 80% active ingredient) at 1-2 quarts/100 g spray mixture. Crop oil concentrate and silicone-based adjuvants are not recommended. Use the lower rate on light textured soils with low organic matter. Two applications of Sandea are permitted per crop cycle, for example a preemergence application followed by a postemergence, up to a maximum rate applied of 1.66 oz/A per growing season (57 day PHI).

## Directed/shielded application

**Gramoxone Extra:** Controls emerged annual weeds and top growth of perennials. Apply 1.5 pt/A between rows after crop establishment. Prevent contact with crop otherwise crop injury will result. See the label for specific precautions.