

# Peppers

## Culture

Peppers are a warm-season crop, being sensitive to cold weather. Transplants normally are set in the field after the danger of frost. The sweet bell pepper is the most popular type; if allowed to ripen, the fruit turns red, orange, cream yellow or purple depending on cultivar, and remains sweet. In certain areas, red peppers are sought in the marketplace. Hot peppers are always pungent and vary in shape, color and degree of pungency.

Pepper seeds germinate best at 85-90°F. Seedlings develop best at 75°F during the day and 65°F at night.

To avoid transplant shock, harden the plants by only slightly reducing water and temperature, and increase the air movement to get them used to field conditions. Overhardened plants are slow to take off and can result in reduced yields. When setting transplants, be sure to use a starter fertilizer that is high in phosphorus.

To reduce the loss of fruit set: (1) select varieties reported to set under unfavorable conditions, (2) keep growth progressing uniformly, (3) do not field set too early and (4) meter the fertilizer.

Some fresh-market growers have significantly increased yields by planting double rows on black plastic mulch, with trickle irrigation laid under the plastic. This provides uniform moisture and fertility during the growing season. Also, extra magnesium and calcium nitrate can be added through the drip tubes.

Poor fruit set occurs when night temperatures are below 60°F or above 75°F. Daytime temperatures much higher than 90°F also cause pollen sterility.

## Varieties

<b>Bell types</b>	<b>Processing types (red bell)</b>	<b>Thin-walled types</b>	<b>Hot</b>
Aristotle	North Star	Cubanelle (frying)	Hungarian Yellow Wax
Paladin (phytophthora blight resistance)	Cardinal	Italian Sweet (frying)	Large Red Cherry
Revolution	Galaxy (trial-long season)	Banana Supreme	Hot Portugal
Declaration	Merlin	Sweet Set	Mitla (Jalapena)
Karisma (trial)			Jalapeno M
PSS9927141			
PX09941819			
Collosal			
X3R Wizard			
Camelot			
Lafayette (yellow)			
Melody (half long)			
Mayata (long)			
Early Sunsatton			

## Lime and Fertilizer

Maintain a soil pH between 6.0-6.8.

Peppers do best on a friable, well-drained, warm soil. Acid soils lead to problems such as calcium deficiency, blossom end rot and magnesium deficiency. Peppers do not require high soil fertility, but they also should not be starved. They need a constant supply of nutrients throughout the growing season. Fertilization too early results in excessive vine growth and limited fruit production.

The total recommended nitrogen is 100-130 lb/A. Phosphorus and potassium are applied according to soil test. Apply 2/3 of the fertilizer prior to planting. Some of this nitrogen can be applied in two or three sidedressings that should begin 2-3 weeks after transplanting.

For unusually long seasons and/or with leaching rains, additional sidedressings of N may be needed to keep plants producing fruit. Be sure to use a starter fertilizer, such as 10-34-0, 10-52-17 or 18-46-0, at transplanting. Starters provide phosphorus, which helps in early flowering and greater yields.

# Spacing and Seeding

Rows: 3-4 ft apart.

In-row: plants spaced 12-18 inches.

Many growers are now planting staggered double rows on black plastic mulch. The spacing between the plants is 12-18 inches with row centers 5 ft apart.

## Harvest

Bell peppers are harvested in the immature green stage after they have reached full size and arrive at maximum wall thickness. Use a pulling, twisting motion so the remaining plant is not broken. Average yields range from 400-800 bu/A.

Peppers can be brushed or washed before packing. If fruits are washed, they must be dried completely to avoid soft rot after packing. Waxed cardboard boxes with the farm name on the side are becoming more popular than wirebound crates. A typical box contains 25 lb of peppers.

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# Disease Control

## Damping off

Buy seed commercially treated with fungicide(s). If Pythium has been a problem, apply **Ridomil Gold EC** at 1 pt/treated A to soil at planting. (See label directions.)

## Mosaic Viruses (CMV and TMV)

Cucumber mosaic virus is spread by aphids from diseased perennial weeds, tomatoes, cucumbers, squash or melons. Eliminate weeds, especially pokeweed, for 150 ft around pepper plantings. Some varieties are reported to have some resistance to tobacco mosaic virus.

## Tomato Spotted Wilt Virus

This virus is carried by thrips and can cause major losses to peppers and tomatoes if the virus infects young plants. If southern-grown transplants are used, growers should be certain they are from inspected fields. Northern-grown transplants should be grown in isolation from ornamental crops. Control of thrips may slow spread of virus in the field and greenhouse. (Use insecticides labeled for thrips in the insect control portion of the processing tomato section. Monitor 4L listed in the tomato section is not labeled for peppers. Check label rates and days to harvest because differences occur between tomatoes and peppers.)

## Bacterial Spot

Plant only disease-free seed or transplants. The bacterial spot bacteria can be removed from seed lots with bleach treatment (see Seed Treatment). Use pepper varieties resistant to bacterial leaf spot races 1, 2 and 3. Examples include Admiral, Aladdin X3R, Alliance, Aristotle X3R, Boynton Bell, Brigadier, Camelot, Enterprise, Orion, Red Knight, Socrates, Wizard, Yorktown (bell); Pageant, Sweet Spot, Ihlara (banana); Key West (cubanelle); Agriset 4108, El Jefe, El Rey, Sayula, Tormenta (jalapeno).

Southern-grown transplants must be certified disease-free. Bacterial spot overwinters in soil; follow proper seed bed and field sanitation practices, and plow down residues immediately following harvest.

If disease threatens, spray weekly with fixed copper (0 days-PHI) according to label directions or tank mix fixed copper (1 lb a.i./A) and **Tanos** (8-10 oz/A) and spray every 7-10 days.

## Phytophthora Blight

Plant in beds (4-7 inches high) on well-drained soils. Surface drainage is essential for control. Do not rotate with any other solanaceous or vine crops within 2 years. Use a phytophthora-resistant variety such as Paladin, Revolution, Alliance, or Aristotle. These varieties are resistant to the crown rot phase of the disease, and fungicides should be applied to reduce the foliar phase under favorable (hot, rainy) conditions. Apply **\*Ridomil Gold SL** at 1 pt/A to soil at planting, followed by another application at 1 pt/A 30 days later (7 days-PHI).

To suppress the foliar and fruit rot phase, alternate two of the following. Except for Ridomil Gold/Copper, tank mix with a fixed copper product at the recommended rate for improved efficacy.

- \***Ridomil Gold/Copper** 2.5 lb/A (7 days PHI).
- \***Revus** 8.0 fl oz/A (1 day PHI).
- \***Presidio** 3-4 fl oz/A (2 days PHI).
- \***Tanos** 8-10 oz/A (3 days-PHI) tank-mixed with a fixed copper fungicide.

## Anthracnose, Early Blight, and Phomopsis Blight

Follow a 4-year rotation. Use disease-free seed. If disease threatens, apply fungicides:

- \***Quadris** 6.5-15.4 fl oz/A. Alternate with **Bravo Weather Stik** 1.5 pt/A (3 days-PHI).
  - \***Cabrio EG** 8-12 fl oz/A (0 days-PHI). Alternate with **Bravo Weather Stik** 1.5 pt/A (3 days-PHI).
  - \***Tanos** 8.0-10.0 oz/A (3 days-PHI).
  - TopCop S** 6F 4 pts/A (0 days-PHI).
- \*Follow guidelines for fungicide resistance management on the product label (see pages 58-59).

## Insect Control

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

### • At-planting or sidedress treatment

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

For flea beetles, whiteflies, and suppression of aphids.

Venom 70SG: 5-6 oz/A as a transplant drench, sidedress, or in drip irrigation.

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

For aphids, whiteflies, Colorado potato beetle, flea beetles, thrips.

Admire 2F, Alias 2F: 16-32 fl oz/A. Apply at planting or as sidedress. Limit 32 fl oz/A per year.

Admire Pro (4.6F): 7.0-14.0 fl oz/A.

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

For aphids, flea beetles, whiteflies.

Platinum 2SC: 5-11 fl oz/A.

Platinum 75SG: 1.66-3.67 oz/A. Limit 3.67 oz/A per year.

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

For aphids, whiteflies, flea beetles, fall armyworm, tomato fruitworm, beet armyworm, and other caterpillars.

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

### • Via drip (trickle) irrigation

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

For aphids, whiteflies, flea beetles, fall armyworm, tomato fruitworm, beet armyworm and other caterpillars.

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

### • Bait treatment

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

For cutworms, armyworms.

Sevin 5B: 20-40 lb/A or 7.3-14.7 oz/1,000 sq ft.

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

For slugs.

Deadline MP (4B): 20-40 lb/A.

Metaldehyde 7.5G: 20 lb/A.

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

For crickets, cutworms.

Ambush 0.5% Bait: 20-40 lb/A.

## Insecticides for Use on Peppers 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)	Cut-worms	Flea beetles	Aphids	White-flies	Beet army-worm	European cornborer	Fall army-worm	Corn ear-worm	Horn-worms	Stink bug	Pepper maggot	Mites	Impact on beneficial insects
<i>How often an insecticide has been needed on Ohio farms for this pest in the past&gt;&gt;</i>		rare	rare	occasional	occasional		multiple sprays every year	occasional	occasional	rare	occasional	rare	rare	
<b>ORGANO-PHOSPHATES</b>														
Dibrom (naled)	1	-	✓	✓	-	-	-	-	-	-	-	-	F	moderate/disruptive
dimethoate (Cygon)	0	-	-	G	-	-	-	-	-	-	-	G	(F)	disruptive
malathion (Cythion)	3	-	-	F	-	-	-	-	-	-	-	F	-	low/moderate
MSR (oxydemetonmethyl)	3	-	-	G	-	-	-	-	-	-	-	-	(F)	moderate
Orthene (acephate)	7	-	-	G	-	(F)	E	-	-	G	-	-	-	moderate/disruptive
<b>CARBAMATES</b>														
Lannate (methomyl)	3	G	-	G	-	F	F	G	-	✓	-	-	-	disruptive
Sevin (carbaryl)	3	✓	G	-	-	-	F	F	-	G	F	-	-	disruptive
Vydate (oxamyl)	7	-	-	✓	-	-	-	-	-	-	-	-	(G)	disruptive
<b>PYRETHROIDS</b>														
Asana (esfenvalerate)	7	-	G	-	-	F	F	-	G	-	-	-	-	disruptive
Baythroid (cyfluthrin)	7	-	-	-	-	F	G	-	G	-	-	-	-	disruptive
Brigade, Capture (bifenthrin)	7	G	G	-	✓	-	G	(G)	G	(G)	-	-	F	disruptive
Danitol (fenpropathrin)	3	-	-	-	-	-	-	-	✓	✓	✓	-	✓	disruptive
Delta Gold (deltamethrin)	1	-	✓	-	-	✓	✓	✓	✓	✓	✓	-	-	disruptive
Mustang (zeta-cypermethrin)	1	G	G	-	-	-	G	✓	✓	G	✓	✓	-	disruptive
Pounce (permethrin)	3	G	G	-	-	-	G	-	F	-	-	(F)	-	disruptive
Proaxis (gamma-cyhalothrin)	5	G	G	✓	✓	F	G	-	G	G	✓	-	✓	disruptive
Warrior (lambda-cyhalothrin)	5	G	G	✓	✓	F	G	G	G	G	✓	-	-	disruptive
<b>NEONICOTINOIDS (CHLORONICOTINYLS)</b>														
Actara (thiamethoxam)	0	-	G	G	G	-	-	-	-	-	G	-	-	low/moderate
Admire (imidacloprid)	21	-	F	G	G	-	-	-	-	-	-	-	-	low/moderate
Assail (acetamiprid)	7	-	G	G	G	-	-	-	-	-	-	-	-	low/moderate
Platinum (thiamethoxam)	30	-	G	G	✓	-	-	-	-	-	-	-	-	low/moderate
Provado (imidacloprid)	0	-	-	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	-	-	-	-	E	-	-	G	-	-	-	-	low/moderate
Beleaf (flonicamid)	0	-	-	✓	-	-	-	-	-	-	-	-	-	-
Fulfill (pymetrozine)	0	-	-	G	✓	-	-	-	-	-	-	-	-	low
Proclaim (emamectin benzoate)	7	-	-	-	-	E	-	✓	✓	✓	-	-	-	low/moderate
Pyronyl, PyGanic (pyrethrins)	0	✓	G	✓	✓	✓	✓	-	✓	G	✓	-	-	moderate
Radiant (spinetoram)	1	-	-	-	-	✓	✓	✓	✓	✓	-	-	-	-
SpinTor (spinosad)	1	-	-	-	-	E/G	G	G	✓	G	-	-	-	low
Thionex (endosulfan)	1, 4	-	G	G	✓	-	-	-	-	G	-	✓	-	moderate
<b>INSECT GROWTH REGULATORS</b>														
Confirm (tebufenozide)	7	✓	-	-	-	E	G	G	-	G	-	-	-	low
Dimilin (diflubenzuron)	7	-	-	-	-	✓	-	✓	-	✓	-	-	-	low
Intrepid (methoxyfenozide)	1	-	-	-	-	E	✓	✓	✓	✓	-	-	-	low
Neemix, Aza-Direct (azadirachtin)	0	✓	-	-	✓	✓	-	-	-	G	✓	-	-	low/moderate
Trigard (cyromazine)	7	-	-	-	-	-	-	-	-	-	-	-	-	low/moderate
<b>MISCELLANEOUS</b>														
Acramite (bifenazate)	3	-	-	-	-	-	-	-	-	-	-	-	✓	low
<i>Bacillus thuringiensis</i> (B.t.)	0	F	-	-	-	F	F	F	F	G	-	-	-	very low
Coragen (chlorant)	1	-	-	-	-	✓	✓	✓	✓	✓	-	-	-	low
cryolite (Kryocide)	14	-	✓	-	-	-	-	-	-	G	-	-	-	low
Movento (spirotetr.)	1	-	-	✓	✓	-	-	-	-	-	-	-	-	low
Oberon (spiromesifen)	7	-	-	-	G	-	-	-	-	-	-	-	✓	-
Portal, FujiMite (fenpyroximate)	1	-	-	-	✓	-	-	-	-	-	-	-	✓	moderate
Synapse (flubendi.)	1	-	-	-	-	✓	✓	✓	✓	✓	-	-	-	low

## • Foliar treatment

Note: European corn borer enters peppers at the edge of the fruit cap. In most years, a 5- to 10-day spray schedule is needed from late July to late August to prevent injury by the second generation of this pest. Make a special effort to cover the stem end. The spray schedule should begin within a week of when the new generation of moths begins to emerge, which is usually in late July. In warmer than normal summers, there is a third generation of borers that requires treatment throughout September. The moth population can be monitored by blacklight traps or pheromone traps. Traps can be used on farm, or growers can check trap catches reported weekly on the internet at various Ohio locations ([http://bugs.osu.edu/welty/veg\\_traps1/Veg\\_traps.html](http://bugs.osu.edu/welty/veg_traps1/Veg_traps.html) or <http://extension.osu.edu/~vegnet/vegipm.htm>). For sources of traps and lures, see page 63 in this bulletin, or more detailed information posted on the internet (<http://bugs.osu.edu/welty/pdf/TrapSources.pdf>).

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

For spider mites, broad mite, leafminers.

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

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

For aphids, European corn borer, hornworms.

Orthene 75SP: 0.7-1.3 lb/A for aphids on bell peppers; 0.7 lb/A for aphids on non-bell peppers; 1-1.3 lb/A for European corn borer on bell peppers. Limit 2.7 lb/A per season on bell peppers and 1.3 lb/A per season on non-bell peppers.

Orthene 97S: 4-16 oz/A. Limit 2.125 lb/A per season on bell peppers and 1.0 lb/A per season on non-bell peppers.

Bracket 90S: 0.25-1.1 lb/A for bell peppers; 0.5 lb/A for non-bell peppers.

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

For aphids, whiteflies, Colorado potato beetle, thrips, flea beetles.

Assail 30SG: 1.4-4.0 oz/A.

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

For hornworms, variegated cutworm.

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

Biobit HP WP (6.4% 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.

XenTari WDG (10.3% a.i.): 0.5-1 lb/A.

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

For spider mites.

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

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

For European corn borer, corn earworm, flea beetles, whiteflies, mites.

Brigade 2EC, Capture 2EC, Discipline 2EC, Fanfare 2EC, Sniper 2EC, Tundra 2EC: 2.1-6.4 fl oz/A.

Brigade 10WSB: 5.3-16 oz/A.

### **Bifenthrin + imidacloprid** (7 days-PHI)

For aphids, leafhoppers.

Brigadier 2EC: 3.8-9.8 fl oz/A.

### **Bifenthrin + zeta-cypermethrin** (7 days-PHI)

For European corn borer, corn earworm, fall armyworm, beet armyworm, stink bugs, flea beetles, whiteflies, pepper maggot adults.

Hero 1.24EC: 4-10.3 fl oz/A.

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

For cutworms, flea beetles, European corn borer, fall armyworm.

Carbaryl 90DF: 0.6-1.1 lb/A for beetles; 1.1-2.2 lb/A for worms.

Carbaryl 4L: 2 qt/A for cutworms; 0.5-1 qt/A for flea beetles; 1-2 qt/A for European corn borer, fall armyworm.

Sevin 50WP: 4 lb/A for cutworms; 1-2 lb/A for flea beetles; 2-4 lb/A for European corn borer, fall armyworm.

Sevin 80S: 2.5 lb/A for cutworms; 0.62-1.25 lb/A for flea beetles; 1.5-2.5 lb/A for European corn borer, fall armyworm.

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

For European corn borer, fall armyworm, beet armyworm, tomato fruitworm.

Coragen 1.67SC: 2-7.5 fl oz/A. Apply as a foliar spray or via drip irrigation.

**Cryolite** (14 days-PHI)

For hornworms.

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

Prokil Cryolite 96 (96% a.i.): 10-12 lb/A.

**Cyfluthrin and beta-cyfluthrin** (7 days-PHI)

For European corn borer and other caterpillars; flea beetles, stink bugs.

Baythroid 2EC: 1.6-2.8 fl oz/A. Limit 6 applications per year.

Baythroid XL 1EC: 1.6-2.8 fl oz/A.

**Cyromazine** (7 days-PHI)

For leafminers.

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

**Deltamethrin** (1 day-PHI)

Delta Gold 1.5EC: 1.0-2.4 fl oz/A for leafhoppers, hornworms. 1.5-2.4 fl oz/A for European corn borer, armyworms, tomato fruitworm, flea beetles, stink bugs. Limit 14.4 fl oz/A per season. Allow 5 days between applications.

**Dicofol** (2 days-PHI)

For mites.

Dicofol 4EC: 0.75-1.5 pt/A.

Kelthane MF (4EC): 0.75-1.5 pt/A.

**Diflubenzuron** (7 days-PHI)

For foliage-feeding caterpillars such as beet armyworm, fall armyworm.

Dimilin 25WP: 4-8 oz/A. Limit 24 oz/A per season.

**Dimethoate** (0 days-PHI)

For aphids.

Dimethoate 4EC, Dimate 4EC: 0.5-0.67 pt/A.

Dimethoate 2.67EC: 0.75-1 pt/A.

**Dinotefuran** (1 day-PHI)

For flea beetles, stink bugs, whiteflies, and suppression of aphids.

Venom 70SG: 1-4 oz/A. Limit 3 applications per season. Do not use as foliar spray if used in soil as transplant drench.

**Emamectin benzoate** (7 days-PHI)

For beet armyworm, fall armyworm, hornworms.

Proclaim (5WDG): 2.4-4.8 oz/A. Limit 28.8 oz/A per season.

**Endosulfan** (1 or 4 days-PHI, depending on rate)

For flea beetles, aphids, hornworm, whitefly.

Limit 2 applications per season.

Thionex 3EC; Endosulfan 3EC: 0.67-1.33 qt/A.

Thionex 50WP: 1-2 lb/A.

**Esfenvalerate** (7 days-PHI)

For flea beetles, European corn borer, corn earworm.

Asana XL 0.66EC, Adjourn 0.66EC: 5.8-9.6 fl oz/A. Limit 68 oz/A per season.

**Fenpropathrin** (3 days-PHI)

For fruitworm, stink bug, hornworms, spider mites.

Danitol 2.4EC: 10.7 fl oz/A. Limit 42.7 fl oz/A per season.

**Fenpyroximate** (1 day-PHI)

For two-spotted spider mite, broad mite, whitefly.

Portal 0.4EC, FujiMite 5EC: 2 pt/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 European corn borer, fall armyworm, tomato fruitworm, beet armyworm, hornworm.

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

**Gamma-cyhalothrin** (5 days-PHI)

For European corn borer and other caterpillars, flea beetles, stink bug; suppression of aphids, whiteflies.

Proaxis (0.5EC): 1.92-3.84 fl oz/A.

**Imidacloprid** (0 days-PHI)

For aphids, whiteflies, Colorado potato beetle.

Provado 1.6F, Pasada 1.6F: 3.75 fl oz/A. Limit 18.75 fl oz/A per year. Note: Do not apply Provado if Admire used at planting or as sidedress.

**Imidacloprid + cyfluthrin** (7 days-PHI)

For aphids, flea beetles, European corn borer, tomato fruitworm, hornworm, whiteflies, stink bugs.

Leverage 2.7SE: 3.8-5.1 fl oz/A.

**Indoxacarb** (3 days-PHI)

For tomato fruitworm, loopers.

Avaunt 30WG: 2.5-3.5 oz/A.

**Lambda-cyhalothrin** (5 days-PHI)

For European corn borer and other caterpillars, flea beetles, stink bug.

Warrior II 2.1 SC: 0.96-1.92 fl oz/A.

Warrior 1EC, Silencer 1EC, Taiga Z 1CS: 1.92-3.84 fl oz/A.

**Lambda-cyhalothrin + chlorantraniliprole** (5 days-PHI)

For European corn borer, fall armyworm, beet armyworm, corn earworm, stink bugs, leafhoppers.

Voliam Xpress: 5-9 fl oz/A.

**Malathion** (3 days-PHI)

For aphids, mites.

Malathion 5EC; Malathion 57EC (5EC): 1-2.5 pt/A, depending on brand.

Malathion 8EC: 1.5 pt/A for aphids; 0.5-1.0 pt/A for mites.

Malathion 8 Aquamul: 0.75-1.5 pt/A.

**Methomyl** (3 days-PHI)

For variegated cutworm, aphids, fall armyworm, European corn borer, beet armyworm.

Limit 10 applications/crop.

Lannate 90SP: 0.25-0.5 lb/A for cutworms; 0.5 lb/A for fall armyworm; 1.0 lb/A for corn borer.

Lannate LV (2.4WSL): 0.75-1.5 pt/A for cutworms; 1.5-3.0 pt/A for fall armyworm; 3.0 pt/A for corn borer.

**Methoxyfenozide** (1 day-PHI)

For European corn borer, beet armyworm, fall armyworm, hornworms.

Intrepid 2F: 4-16 fl oz/A. Limit 64 fl oz/A per year.

**Naled** (1 day-PHI)

For aphids, mites, flea beetles.

Dibrom 8EC: 1-2 pt/A.

**Oxamyl** (7 days-PHI)

For aphids, leafminer.

Vydate 2SL: 2-4 pt/A.

**Oxydemetonmethyl** (3 days-PHI)

For aphids.

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

**Permethrin** (3 days-PHI, bell peppers only)

For flea beetles, European corn borer.

Arctic 3.2EC, Permethrin 3.2EC: 4-8 fl oz/A for flea beetles; 8 fl oz/A for European corn borer. Limit 8 applications per season.

Ambush 25WP, Pounce 25WP: 6.4-12.8 oz/A for flea beetles; 12.8 oz/A for European corn borer. Limit 102 oz/A per season.

**Pymetrozine** (0 days-PHI)

For aphids, whiteflies.

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

**Pyriproxyfen** (14 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 European corn borer, hornworms, thrips.

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

**Spinosad** (1 day-PHI)

For European corn borer, armyworms, hornworms.

SpinTor 2SC: 3-8 oz/A. Limit 29 oz/A/year.

Entrust (80WP): 0.5-2.5 oz/A.

**Spiromesifen** (7 days-PHI)

For two-spotted spider mite, broad mite, whiteflies, psyllid.

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

**Spirotetramat** (1 day-PHI)

For aphids, whiteflies.

Movento 2SC: 4-5 fl oz/A. Limit 10 fl oz/A per crop season.

**Tebufenozide** (7 days-PHI)

For corn borer, fall armyworm, hornworms, black cutworm.

Confirm 2F: 6-8 oz/A for small plants; 8-16 oz/A for larger plants and heavy infestation. Limit 64 fl oz/A per year.

**Thiamethoxam** (0 days-PHI)

For aphids, flea beetles, stink bugs, whiteflies.

Actara 25WDG: 2-3 oz/A for aphids, flea beetles; 3-5.5 oz/A for whiteflies, stink bugs.

**Thiamethoxam + chlorantraniliprole** (14 days-PHI)

For aphids, potato leafhopper, Colorado potato beetle, flea beetles, caterpillars.

Voliam Flexi (20+20WDG): 4 oz/A.

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

For European corn borer and other caterpillars, beetles, stink bugs, pepper maggot.

Mustang 1.5EW: 2.4-4.3 fl oz/A.

Mustang Max (0.8 EC): 2.24-4.0 fl oz/A.

## Weed Control

### Preplant Incorporated

**Prowl H2O:** Controls most germinating annual grasses and some broadleaf weeds. Apply at 1 to 3 pt/A preplant incorporated, or as a preplant surface application prior to transplanting. *Do not apply prior to direct-seeded peppers or if the row is to later be covered with plastic.* 70 day PHI.

**Trifluralin:** Controls emerging annual grasses and some broadleaf weeds. Must be incorporated.

**Albaugh Trifluralin 4EC, Gowan Trifluralin 4EC, Treflan HFP, Trilin 4EC:** 1-2 pt/A.

**Gowan Trifluralin 5EC, Trilin 5EC:** 0.8-1.6 pt/A.

**Trific 60DF:** 0.875-1.66 lb/A.

**Treflan TR-10, Trilin 10G, Wilbur-Ellis Trifluralin 10G:** 5-10 lb/A.

**Command 3ME:** Controls germinating annual grasses and broadleaf weeds. Apply 0.67-2.67 pt Command 3ME. Incorporation is not necessary. Consult the label for tank mixing and restrictions. This is an Ohio Section 24C label and the label must be in possession of the applicator.

# Preemergence

## Row-Middle Applications Between Plastic Mulch

**Sandea:** For control of specified broadleaf weeds in row middles of peppers growing in plastic mulch, apply 0.5-1.0 oz/A. Do not spray the plastic. 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 2 oz/A per growing season.

# Postemergence

**Dacthal 75W:** Controls germinating annual broadleaf weeds and grasses. Applied after transplanting to clean cultivated land. Apply 10.6 lb/A Dacthal W 75. Irrigation or rain soon after applying Dacthal improves weed control.

**Devrinol 50 WP:** Controls germinating annual grasses and some broadleaf weeds. Incorporation improves control. Apply 2.4-4.0 lb/A Devrinol 50 WP. Incorporate with a cultivator to a depth of not more than 1 inch. Use lower rate on sandy and light-textured soils.

**Dual Magnum:** Controls germinating annual grasses and certain broadleaf weeds if applied before emergence. Apply 0.5-1.0 pt/A, Dual Magnum. Make a surface broadcast application with ground equipment prior to transplanting or a broadcast application within 48 hours after transplanting bell peppers. Use lower rates on coarse soils (sandy) and higher rates on heavy soils (silty, clay). See product label for specific information. Do not incorporate. Do not apply to direct seeded bell peppers. Make only one application per season and do not apply within 60 days of harvest. Note: Ohio 24(c) Special Local Needs label. The use of this product is legal only if a Waiver of Liability and Indemnification provided by Ohio Vegetable and Potato Growers Association has been signed by the grower, all fees have been paid, and a label is in your possession provided by the grower's association.

**Poast:** For postemergent control of annual and certain perennial grasses. Controls emerged annual and perennial grasses. Apply 1-1.5 pt/A Poast (20 days-PHI). Do not exceed 4.5 pt/A/season. Add 1 qt/A nonphytotoxic oil concentrate. Rate is dependent on grass species and stage of development.

**SelectMax:** Controls emerged annual and perennial grasses. Apply 8 fl oz/A (20 days-PHI). Do not exceed 32 fl oz/A/season. Add a crop oil concentrate at 1% on a volume basis (v/v).

## Row-Middle Applications Between Plastic Mulch

**Sandea:** For control of yellow nutsedge and specified broadleaf weeds in row middles of peppers growing in plastic mulch, apply 0.5-1.0 oz/A. Do not spray the plastic. Always include a nonionic surfactant (minimum 80% active ingredient) at 1-2 qt/100 g spray mixture. Crop oil concentrate and silicone-based adjuvants are not recommended. Avoid contact of the herbicide with planted 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 2 oz/A per growing season (30 days-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.

**Aim EC:** Controls emerged broadleaf weeds. Apply as a directed spray, using a shielded sprayer, to actively growing weeds up to 4 inches in height. Add non-ionic surfactant at 0.25% or crop oil concentrate at 1-2%. Formulations available include: **Aim EC:** Use 1-2 fl oz/A, and **Aim EW HERBICIDE:** Use 0.5 to 1.6 fl oz/A.

**Prowl H2O:** Controls most germinating annual grasses and some broadleaf weeds. Apply at 1 to 3 pt/A as a post-directed application to transplanted or established direct-seeded peppers. Do not apply more than 3 pt/A; do not apply within 70 days of harvest, and do not apply if row is to later be covered with plastic. Do not allow Prowl H2O-treated soil to come in contact with transplant area.