

CULTURE AND CULTIVARS

FOR THE GARDENER,
BEDDING PLANT GROWER,
GARDEN CENTER SUPPLIER,
AND DIRECT MARKETER

Growing Peppers



CULTURAL PRACTICES

Starting Seedlings

Pepper seedlings can be grown at home, but growing them requires more attention than tomato seedlings. If pepper seedlings are watered excessively or given insufficient light, they are more likely to rot off at the soil line than tomato seedlings grown under similar environmental conditions. Pepper seeds germinate rapidly only if the soil temperature is 80 to 85°F. Germination is very slow at 60°F and is severely restricted below 55°F. Sow seed 0.25 to 0.5 inch deep in peat pellets or other growing media in a greenhouse about 7 to 8 weeks before planting. If seeds are sown too early, the plants will grow too large and they will be held back or planted too early. In either case, expect poor results.

Soil Fertility and pH

Peppers grow best at a pH between 6.2 and 6.8. If using compost, incorporate it into the soil well in advance of soil testing. We strongly recommend fertilizing and liming as directed by soil test results. Soil-testing kits can be purchased from the cooperative extension office in your county or from a garden supply center. In the absence of a test, for each 100 square feet, apply 3.5 pounds of 5-10-5 fertilizer plus either 1 pound of 0-20-0 (regular superphosphate) or steamed bone meal (approximately 2-29-0). Then mix into the soil before transplanting. Assume that potash levels are adequate to excessive wherever wood ashes, manures, or high rates of complete fertilizers were applied previously.

Planting

Generally, June 1 is the time to transplant in central Pennsylvania. Transplant about 2 to 3 weeks earlier in warmer regions of the state and about June 10 in colder regions. Plants should be no more than 8 weeks old and air temperatures should average 65 to 70°F during the day; chilling injury and stunting can occur below 40°F.

A good transplant is disease free, slightly hardened, and 6 to 9 inches tall, with a sturdy stem. Transplants

should be medium dark green; stem and leaf texture neither soft nor woody, but strong and firm.

Before transplanting, slightly toughen plants by slowing down their rate of growth to prepare them to withstand such conditions as chilling, dry winds, shortages of water, or very high temperatures. Withholding water—but not to the point of wilting—and slightly lowering the optimal growing temperature by 10°F or less in the week prior to planting are the best ways to harden plants.

If possible, transplant into moist, but not wet, soil in late afternoon or early evening or on a cool, cloudy day and then shade plants for a day or two to prevent wilting, which may occur in direct sun. Apply liquid fertilizer, compost, or plant starter solution at transplanting time. Dissolve a 10-55-10, 12-48-8, or similar high-phosphorus, all-soluble fertilizer at the rate of 1 tablespoon (0.5 ounce) per gallon of water. Pour 1 cup of solution in each hole, set plant, and press soil lightly around roots.

Spacing

- Between rows: 1.5 to 3 feet
- Between plants in rows: 1 to 1.5 feet; a wider spacing may encourage sunscald on fruit

Special Precautions

Young pepper transplants are more sensitive than tomatoes to extreme temperatures, wind, and direct sunlight. They do not recover readily from any serious shock or stunting.

Night temperatures below 60 or above 75°F often result in poor fruit set; blossom drop is common during periods of abnormally cool or hot weather.

Avoid fertility practices that lead to excessive nitrogen or low calcium, magnesium, and pH. Low calcium levels, or pH levels below 6.0, when coupled with deficiencies or excesses of moisture at blossom time, can result in blossom-end rot.

Suggestions


































Consider using black or IRT (infrared transmitting) green plastic mulch early, or use straw mulch or other organic mulches after all danger of frost has passed. Plastic mulch will

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SUGGESTED CULTIVARS AND DESIRABLE CHARACTERISTICS

<i>Cultivars</i>	<i>Days to Maturity</i>	<i>Disease Resistance</i>	<i>Suggested Uses</i>	<i>Comments</i>
Bell				
 X-3R Red Knight*	64	BLS-1,2,3, MR, PVY	G	4 inches by 4 inches; green to red; compact plant
 Gypsy*	64	MR	G	3-lobed; yellow/orange/red; thin wall; colors early; AAS 1981
 Vivaldi*	64	MR	G	5 inches by 4 inches; green to red; very early, large
 King Arthur*	67	BLS-2, MR, PVY, TEV	G	4.5 inches by 4.5 inches; green to red
 Early Sunstation*	70	BLS-1,2,3, MR, PVY	G	4.5 inches by 4-inches; green to yellow
 Jupiter types	70	MR	G	Earliest nonhybrid bell
 Bell Boy*	72	MR	G	Excellent; old standard; AAS 1967
 Big Bertha*	72	MR	G	7 inches by 4 inches; green to red; very long bell
 Paladin*	72	MR, PHY	G	4.75 inches by 4.5 inches; shiny, smooth and tasty; silver speckling possible
 Valencia*	72	BLS-1,2,3, MR, PVY	G	4.5 inches by 4.5 inches; green to bright orange
 Summer Sweet 8610*	73	BLS-1,2,3, MR, PVY	G	4.5 inches by 5 inches; green to bright yellow
 X-3R Wizard*	73	BLS-1,2,3, MR	G	4.5 inches by 4.5 inches; green to red
 X-3R Camelot*	74	BLS-1,2,3, MR	G	4.5 inches by 4.5 inches; green to red
 Boynton Bell*	75	BLS-1,2,3	G	Large, very thick walls; productive; glossy green to red
 Gourmet*	85	MR	G	Green to orange; compact plant
Roasting, Grilling, Sweet Salad, or Frying				
 Aruba*	62		G	7.5 inches by 2.5 inches; lime to orange to red; fruity with a hint of heat
 Biscayne*	63		G	Hybrid cubanelle; 7 inches by 2 inches; frying; greenish yellow to red
 Sweet Italian*	65	MR	G	7 inches by 1.75 inches; thick-walled; green to red; excellent for frying and roasting
 Super Red Pimento	70	MR	G	5.75 inches by 3.25 inches; 0.5-inch-thick flesh; flat; stuffing, roasting, grilling
 Pageant*	71	BLS-1,2,3	C, G	9 inches by 1.75 inches; yellow to red; sweet banana; high yielding
 Giant Marconi*	72	MR, PVY	G	8 inches by 2.5 inches; medium thick walls; best grilled when red; excellent raw; green to glossy scarlet; AAS 2001
 Yellow Cheese Pimento	73		G	Squash shaped; green–yellow–orange–red; 0.5-inch thick flesh
 Carmen*	77		G	7 inches by 2.5 inches; green to scarlet; glossy; very sweet at red stage; AAS 2006
Hot				
 False Alarm*	62		G	Jalapeño flavor with little heat
 Mariachi*	65	MR	C, G	Fruity; mild-hot; light yellow to red; don't confuse with sweet 'Gypsy'; AAS 2006
 Mesilla*	68	MR, PVY, TEV	G	8.5 inches by 1.5 inches, thick cayenne; medium-hot
 Hungarian Wax	70	APT	C, G	Standard yellow to crimson; nonhybrid
 Thai Hot*	70	APT	D, G	13 times hotter than 'Jalapeño M'; easy to dry; 1.5 inches by 0.25 inch; nonhybrid
 Jalapeño M	75	APT	C, G	3.5 inches; dark green; pungent
 Super Chili*	75	APT	C, D, G	Ornamental plant; decorative edible fruit; very hot; AAS 1988
 Large Hot Red Cherry	80	APT	C, G	1.25-inch round fruit; green fruit mild, red fruit very hot; nonhybrid
 Holy Mole*	85–99	MR	C, D, G	8 inches by 1.5 inches; green to dark chocolate; mild-hot with smoke flavor; AAS 2007
 Habañero	100	APT	C, D, G	1.5 inches by 1.5 inches; one of the hottest known; nonhybrid

* = F1 Hybrid



DM SA = also recommended for direct market and sustainable agriculture enterprises since it has high yield potential, pest resistance/tolerance and very good eating quality

Disease resistance: **APT** = apparent pest tolerance—little or no pest damage over several years of observation; **BLS-1,2,3** = bacterial leaf spot resistant to strains 1, 2, and 3; **MR** = mosaic resistant or tolerant; **PHY** = phytophthora resistant/tolerant; **PVY** = potato virus Y tolerant; **TEV** = tobacco etch virus tolerant

Suggested uses: **C** = canning; **D** = drying; **G** = fresh from the garden

Comments: **AAS** = All America Selections winner

help manage weeds, increase soil temperature early in the season, eliminate soil packing and crusting, and maintain a more uniform distribution of moisture throughout the season. Straw mulch will allow water to pass through to the soil, eliminate crusting, suppress weeds, reduce water evaporation, and cool the soil (only apply after entering the frost-free period). Be sure soil is adequately moist and apply fertilizer or compost before laying the plastic or straw. Never lay plastic mulch on dry soil.

HARVESTING

Bell (or sweet) peppers can be picked either at the green mature stage when they reach full size or after they turn red (in some cases, golden yellow, orange, white, lilac, or purple). Hot peppers vary in size and shape. They are green in early maturity but quickly turn yellow, orange, or red. Pick when they are firm and glossy green or after they have changed color. Both sweet and hot peppers are edible at all stages of growth. At harvest, cut sweet peppers from the plant; the branches usually are brittle and will break easily if pulled. Hot peppers generally detach from the plant much more easily than sweet peppers, and plants are less brittle.

WEED MANAGEMENT

Dense weeds not only rob vegetable crops of moisture, light, and nutrients, but can also harbor insects and create an ideal environment for the development of many diseases. Eliminate young weed seedlings with shallow hoeing or cultivating. Never allow weeds to become more than 1 or 2 inches tall. Always pull or mow weeds before they form seeds. Place mulch (such as straw) around plants and between rows to reduce weeds and conserve moisture. Perennial weeds near and in the planting provides a location for disease causing organisms (viruses and mycoplasmas) to overwinter and should be eliminated whenever possible.

To help keep weeds and weed seeds out of the planting during the fall and winter months, sow a cover crop (for example, annual ryegrass or spring oats mixed with hairy vetch) in late summer or fall. Turn the cover crop under about 1 month before spring planting.

As a general rule, avoid using herbicides for weed management in the home garden for several reasons. First, no one herbicide is available that can be safely used on all kinds of vegetables growing in the garden. Second, herbicides are difficult to apply at proper rates in small areas with hand sprayers. In most cases, some areas will receive too little herbicide for effective weed control and other areas may receive such heavy rates that the crop will be damaged or killed. You also risk damaging or killing other plants from spray drift when using herbicides. Finally, avoiding herbicides eliminates potential adverse health affects.

Direct marketers desiring any chemical pest management should consult the *Pennsylvania Commercial Vegetable Recommendations* guide (available through the cooperative extension office in your county).

DISEASE IDENTIFICATION AND MANAGEMENT

Color photos of disease symptoms may be seen in the publication *Identifying Diseases of Vegetables*, for sale by the Publications Distribution Center, 112 Agricultural Administration Building, University Park, PA 16802, or from county cooperative extension offices.

Bacterial Spot

Small, dark spots develop on leaves and fruit. When young leaves are affected, leaves tear around the leaf spots as leaves expand.

Phytophthora Blight

Affected plants wilt, and severely wilted leaves and branches die. Roots frequently are rotted. Large rot areas can develop on leaves and fruit; at least 50 percent of an individual fruit can be affected. A whitish-gray mold can appear on affected areas of fruit

during wet periods. Under severe disease pressure and where soil is wet, entire plants can die rapidly.

Viruses

Symptoms vary depending on the virus or strain, the plant, the time of year, and environmental conditions. The range of symptoms may include leaf mottling, puckering, or curling; stem and petiole streaking; rough, deformed, or spotted fruit; stunted plants; and leaf, blossom, and fruit drop.

Controls

1. When possible, plant cultivars that have resistance to diseases of concern. Many cultivars are resistant to TMV(MR), the most important virus, spread by contaminated hands or tools that rub against leaves. A few cultivars are resistant to the PVY and/or TEV viruses, which are spread by aphids and rubbing leaves. A few are resistant to some strains of the bacterial spot pathogen, which affects both leaves and fruit.
2. Start with disease-free seed and transplants from reputable producers. Bacterial spot can be introduced with seed and transplants.
3. Plant peppers where peppers and tomatoes have not been grown for the past few years. The bacterial spot and phytophthora blight pathogens can survive in soil for several years.
4. Plant peppers in locations that are unshaded. Bacterial spots are promoted when plant surfaces remain wet for long periods.
5. Plant peppers in locations with good moisture drainage. Phytophthora blight can occur where soil remains wet for long periods.
6. Do not work in plantings when leaves are wet. The bacterial spot pathogen becomes sticky when wet and can be carried from plant to plant on hands, tools, and clothing.
7. Try to prevent aphid problems near and in the planting. Aphids pick up and carry some viruses; it takes only 1 minute for an aphid to transmit a virus to a plant.

Aphids

Several species of aphids infest peppers; green peach aphid and melon aphid are common. Aphids are soft-bodied insects, round to oblong, about 1/8th inch long, that feed by inserting their needle-like mouthparts into plants and sucking out the sap. Both winged and wingless forms can be present. Aphid outbreaks tend to be most frequent in hot, dry weather, while heavy rains (or directed sprays of water) will often reduce the aphid population to acceptable numbers. Colonies develop on undersides of leaves or on plant terminals. Direct damage by aphids is assumed to be

minimal until populations build to high levels, but they transmit viruses. Consider removing plant parts with aphid colonies, and remove plants that show signs of virus infection. Aphids are often controlled by natural parasites and predators that rely on these slow-moving insects as a host resource. Beneficial insects can be released to help clean up an aphid population if caught early. Insecticides are not necessary unless numbers increase rapidly. High populations can be reduced with insecticides labeled for aphid control. Insecticidal soaps can also reduce populations.

European Corn Borers

Borers are up to 1 inch long, cream- or flesh colored, and marked with

numerous small, round, brown spots. They are the larva of moths that overwinter and have multiple (typically two) generations in Pennsylvania. Although moths strongly prefer corn for egg-laying sites, they will also lay eggs on leaves in peppers, and larva bore into the fruit under the calyx. A statewide monitoring network gives flight catches determined from pheromone traps. Contact the cooperative extension office in your county for more information. The flight information is presented as maps at www.pestwatch.psu.edu. The larvae feed in inside the pepper fruit. The typical time to control the first brood with sprays is during the last two weeks of June. The typical time to control the second brood is during August.

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