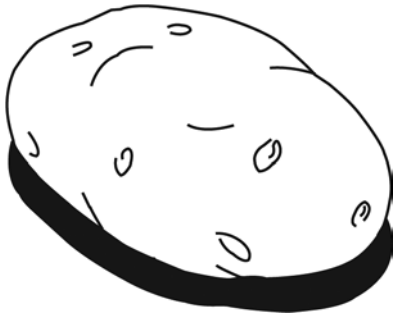


# CULTURE AND CULTIVARS

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

## Growing Potatoes



### SUGGESTED VARIETIES AND DESIRABLE CHARACTERISTICS

Variety	Maturity	Depth of Eyes	Scab Tolerance	Storage Quality	Suggested Uses
<b>White-skinned</b>					
Superior	early-mid	shallow	moderate	good	baking, mashing
Irish Cobbler	early	deep	poor	good	baking, mashing
Kennebec	late	shallow	poor	good	baking, mashing
Katahdin	late	shallow	poor	good	baking, mashing
<b>Red-skinned</b>					
Dark Red Norland	early	shallow	good	good	boiling
Red Pontiac	mid-late	medium	poor	fair	boiling
Viking	early-mid	medium	fair	fair	boiling
<b>White-skin Yellow Flesh</b>					
Yukon Gold	mid-late	medium	fair	fair	baking, mashing
<b>Purple-skin White Flesh</b>					
Purple Majesty	mid	medium	fair	good	baking, mashing

**P**otatoes can be grown successfully in Pennsylvania gardens without requiring any more care and attention than other vegetables. Potatoes do, however, have specific soil requirements and need thorough insect and disease control. An average potato yield is 10 pounds of usable tubers from each pound of seed pieces planted, but a good yield is 20 pounds of usable tubers. The practices suggested below can be used to help you obtain high yields of quality potatoes.

### SOILS

Potatoes yield the highest and produce tubers of the best quality on soils that are loose, easily tilled, well drained, and high in organic matter. Very dry sands, shales, or heavy clay loams should not be used for potatoes. If a cover crop such as rye, ryegrass, or wheat was planted the previous fall, it should be turned under before it exceeds 12 inches in height. This can be done by tilling 8 to 10 inches deep, depending on the depth of the topsoil. Potatoes require a porous soil to ensure an adequate oxygen supply for good tuber initiation and development. After tilling, level the surface slightly so that furrows can be made. Waiting 7 to 10 days before planting the seed pieces is recommended to allow the cover crop to begin decomposing.

Because scab disease (brown, corky tissue on the surface of tubers) may be a problem in alkaline or sweet soils, the soil pH should be kept around 5.5–6.0.

### FERTILIZERS

Home vegetable gardeners should have their soil tested to maximize garden productivity and to minimize any fertility imbalance that might have come about with previous overfertilization. If a soil test recommendation is not available, use the following fertilization guide.

Where the garden area has been well fertilized in previous years, use a 1-1-1 fertilizer ratio such as a 10-10-10 analysis fertilizer. Apply at the rate of 2.5 to 3 pounds per 100 square feet or 33 feet of potato row.

If the potatoes are to be planted in a new area not previously well fertilized, use a 1-2-2 ratio fertilizer such as a 5-10-10 fertilizer at the rate of 5 to 6 pounds per 100 square feet or 33 feet of row. If a 10-20-20 fertilizer is used, apply at half the rate indicated for 5-10-10.

The fertilizer, if applied broadcast, should be worked into the soil by spading or with minimum rototilling. For larger plantings, it is recommended that the fertilizer be “banded” or applied in rows 2 inches below the seed pieces and 2 inches to the side of the seed pieces at planting time. Use 4 to 5 pounds of a similar fertilizer per 100 feet of row. This banding method not only reduces the amount of fertilizer required, because it places it near the plant’s root system, but it also does not fertilize weeds between the rows. A sidedressing of nitrogen fertilizer along the row about 4 weeks after planting may be necessary if excessive rainfall during the spring may have leached, or washed, the nitrogen fertilizer from the soil. Use 0.5

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to 1 pound of a high nitrogen fertilizer such as ammonium nitrate (33-0-0) or 1 to 2 pounds of an all-purpose garden fertilizer per 100 feet of row, sprinkled along the row about 4 to 5 inches from the plants.

Potatoes should not be grown in the same location in the garden year after year. A 3-year rotation reduces pest problems that may accumulate with continual potatoes and allows for better use of soil nutrients.

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### LIME AND MANURE USE

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Often, applying too much lime and or too much manure at one time on potato ground contributes to a moderate to severe scab problem. If a soil test shows a pH of 6.0 or above and lime is recommended, do not apply the lime on the potato-growing area until after the potatoes are harvested. If the soil test shows a pH of 5.9 or below, do not apply more than 4 to 5 pounds of pulverized limestone per 100 square feet of area before or just after plowing, rototilling, or spading. The pulverized limestone, preferably one with a 5 percent or higher magnesium content, should be broadcast evenly and worked into the soil. If magnesium, but no lime, is recommended, apply 2 to 3 pounds of fertilizer-grade magnesium sulfate per 100 square feet of area.

Manure should not be applied to an area being prepared for potatoes unless previous experience has indicated that scab is not a problem. Whenever possible, make all lime and manure applications in the fall before planting potatoes. Where scab may be a problem, plant varieties with the most scab resistance.

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### PURCHASE QUALITY SEED POTATOES

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Only quality seed potatoes should be used for planting. Purchase certified disease-free seed potatoes from your garden or farm supply house. Certified seed is grown under rigid rules and is carefully inspected by state authorities. The potato is not a true seed, but is actually modified stem tissue known as a tuber. The true seed of the potato occurs in the small, inedible green fruit the plant produces during the midseason. Do not use potatoes produced in last year's garden or those sold for table use in the grocery or markets for seed.

### Seed Conditioning

Gardeners striving for a good crop should purchase their seed potatoes 2 to 3 weeks before the anticipated planting date. Place the seed potatoes one layer deep in a warm area (70°F) with exposure to sunlight. As the potatoes develop stubby sprouts, turn them to "green" most of the skin surfaces. This green sprouting will result in a 1- to 2-week gain in plant emergence.

### Seed Piece Size

After selecting seed potatoes, cut them into seed pieces weighing approximately 1.5 to 2 ounces. Smaller-sized seed pieces usually result in weaker plants and reduced "recovering" capabilities when a late frost injures emerging potato vines. If you can buy "B"-size seed, no cutting is necessary—just plant each whole "B" seed. Each cut seed piece should be block-shaped and should contain at least one eye or short sprout. In cutting seed, it is preferable to make the first cut lengthwise to divide the cluster of eyes that are evident at one end of the potato.

Each pound of seed contains an average of eight to ten seed pieces. In estimating how much seed to purchase, remember that it takes about 9 to 10 pounds of seed potatoes to plant 100 feet of row.

An important practice to discourage rotting of seed pieces is to "heal" the freshly cut pieces by storing them at room temperature (60–70°F) with fairly high humidity for 5 to 7 days before planting. This allows the freshly cut surfaces to develop a protective coating that will help prevent seed decay.

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### PLANTING

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Potatoes can be planted early in the spring as soon as the morning soil temperature is 48 to 50°F at a 4-inch depth, and the weather forecast indicates a warming trend. During a wet spring and in heavy soils, a slightly mounded row allows water to drain away from the seed pieces and can reduce decay. Shallow plantings encourage fast emergence, so plant potatoes about 3 to 4 inches deep and cover with 2 inches of soil. As soon as a cluster of green leaves develops aboveground, additional soil cover can be worked into the row when cultivating. If a late, severe frost is forecast, the emerged plants can be protected with a temporary cover of straw, newspapers, or other material such as polypropylene row covers.

Some gardeners do not cover the seed pieces with soil but apply 3 to 4 inches of straw, cornstalks, or other mulch-type material. You might try this method for comparison on one short row. The only word of caution is that slugs can be a problem under mulches.

### Row and Seed-Piece Spacing

A good row spacing for potatoes is 34 to 36 inches between rows. If desired, spacing rows as close as 30 inches for the earlier varieties is satisfactory. Seed-piece spacing in the row depends on the variety, depth of soil, soil fertility, amount of fertilizer applied, and amount of moisture available during the season. The seed pieces should be spaced 9 to 12 inches apart.

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### CULTIVATION AND WEED CONTROL

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Potatoes thrive when the soil remains fairly cool. The edible portion of the potato is the tuber, a modified underground stem that develops from attachments to the stem above the seed piece. To provide a bearing area along the stem for potatoes to develop, as well as to keep them covered with loose, cool soil, potato rows are gradually "hilled" or mounded with soil as the plant grows. When plants are 6 to 8 inches tall, begin to mound or hill soil around the base of plants to form a ridge or hill. By the time the plants are 15 to 18 inches tall (at last cultivation), the ridge or hill should be 4 to 7 inches high.

Weeds in the garden not only rob crop plants of moisture, light, and food but also can harbor insects and create an ideal microclimate for the development of many diseases. A general rule is to avoid using herbicides for weed control in the garden because no one available herbicide can be used safely on all kinds of vegetables growing in the garden. Also, herbicides are difficult to apply at proper rates in small areas.

During the process of hilling, cultivation is easily accomplished because small weeds are covered with soil. Cultivation should be shallow (less than 2 inches) to avoid damaging plant roots, which may slow growth or damage small developing tubers. Mulching is another effective measure for weed control. Few weeds can push through a heavy organic mulch, and if they do, they are straggly and easily pulled. Mulching also helps conserve soil moisture and to maintain a more uniform soil temperature.

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## VINE GROWTH

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Flowering in potatoes does not coincide with tuber development. Tubers are set 1 to 2 weeks before flowering, usually when the plants are approximately 12 inches tall. As the plants grow, and if temperatures remain fairly cool, these tubers expand as starches accumulate in them.

When potatoes blossom depends on variety and climate. In some years the blossoms develop into small, round, green fruit similar to small tomatoes, a related crop. These fruits should not be confused with tomatoes because they never enlarge or ripen. Potatoes also contain a bitter alkaloid, solanine, which may be harmful if eaten.

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## WATERING

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Soil moisture can limit potato growth. The amount of water required is influenced by soil type, temperatures, wind, and cultural practices. A general rule of thumb is to provide 1 to 1.5 inch of water weekly until just before harvest.

Several critical periods need special attention. When the vines are 6 to 8 inches tall, tubers start to develop and watering during periods of dry weather will help ensure adequate numbers of tubers. In dry years, the size and quality of potatoes can be improved by a thorough watering 1 to 2 weeks before harvest. Regular watering throughout the season is suggested, however, to help prevent problems such as knobiness, second growths, cracking of tubers, and hollow cavities in the centers of tubers. Drip irrigation can be used successfully with potatoes and may even lessen disease pressure by reducing the amount of moisture on plant leaves.

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## HARVESTING AND STORAGE

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Potatoes can be dug fresh to use early, especially to enjoy with spring garden peas. For the highest yields and best storage, potatoes should not be dug until 2 weeks after the vines have naturally died down. This allows the skins to set and reduces skin peeling, bruising, and rot in storage. When harvesting at temperatures above 80°F, potatoes should be picked up immediately and put in a dark place. Allow potatoes to dry 3 to 4 days in a warm, shaded, airy spot before storing. Potatoes exposed to the sun and high temperatures will turn green and may rot.

Select only the best fall potatoes for storage. Potatoes with injuries or other defects should be used first. Optimum storage conditions for potatoes are 35–40°F at moderate humidity. An unheated cellar or basement is suggested. Avoid locations where freezing will occur. Potatoes should be kept in darkness and checked periodically.

Store potatoes dug in early summer in as cool a place as possible, about 55–60°F. If sprouts occur, break them off. Store in the dark so tuber surfaces will not turn green.

Potatoes stored at temperatures below 40°F should remain firm for 6 to 8 months without developing sprouts. At temperatures below 40°F, starches are converted to sugars and give potatoes a peculiar sweet taste. This can be reversed by moving potatoes to an area where it is 70°F or room temperature about a week before they are used. No chemicals are available to the home gardener for controlling sprouts after potatoes are dug.

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## USING PLASTIC MULCHES AND DRIP IRRIGATION

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Potatoes can be grown successfully and with earlier production on raised plastic-mulch beds using drip irrigation, similar to the way other vegetables are grown. The plastic mulch and drip irrigation tape can be applied using a raised-bed plastic mulch laying machine. Black, red, or silver plastic mulches can be used in conjunction with a drip irrigation tape that has the following specifications: 8 mil thick, emitting orifices spaced 12 inches apart, and a flow rate of .4 gpm. The finished raised beds are approximately 4 inches high, 30 inches wide, and 6 feet apart.

Potato seed pieces can be hand planted 8 to 12 inches apart and 4 to 5 inches deep on two rows 15 to 18 inches apart. Place the drip irrigation tape down the center of the raised bed and bury it 3 to 4 inches deep. Planting holes can be made using a hand bulb setter. In addition, placing a floating row cover material, such as Tyvar, over the plantings increases soil and air temperatures and thus further encourages plant emergence and growth. The potatoes can be fertigated (adding soluble fertilizer via the drip irrigation system) using a simple venturi-type injector if additional fertilizer is needed.

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## DISEASE IDENTIFICATION AND CONTROL

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Color photos of disease symptoms can be found in *Potato Diseases in Pennsylvania*, a publication for sale from the College of Agricultural Sciences Publications Distribution Center or from your county extension office.

### **Early Blight**

Typical features of this disease, found on the potato foliage, are small, circular brown spots with concentric rings that have a “target board” or “target spot” effect. Although early blight can occur anytime during the growing season, it usually develops mid- to late season when plants are weakened by disease and insect attack and when they are using much of their energy for tuber formation. Early blight develops rapidly under warm, damp weather conditions and can be controlled with foliar fungicide sprays. Because the disease may overwinter in plant debris, it is best to destroy infected crop residues to reduce the source of inoculum. Crop rotation, as well as planting early-blight-susceptible crops once in 3 years, are key preventive measures. Early-blight-susceptible crops include potatoes, tomatoes, and eggplant. Controlling weed hosts such as black nightshade and henbane is also important.

### **Late Blight**

The name late blight is misleading because the infection can occur any time during the season when conditions are favorable. Such conditions include cool nights, periods of rain, lingering dews, fog, or relative humidity above 90 percent. The disease is commonly initiated from tubers infected the previous season. Symptoms appear as brownish purple, water-soaked lesions usually beginning at the tips or edges of the lower leaves. When favorable blight conditions exist, a white mildew appears on the lower leaf surface at the outer edge of the lesion.

Plant healthy seed potatoes and destroy any old potatoes from the previous season. The use of foliar fungicide sprays is recommended for controlling late blight.

### **Common Scab**

Common scab is a widespread and frequent problem on potato tubers. The bacteria cause abnormally high amounts of cork to form on the tuber surface. Under severe disease conditions these scabby lesions can become

quite deep. The bacteria can survive for long periods in the soil in the absence of potatoes and can also attack beets, carrots, turnips, and radishes. Young tubers are most often attacked. The disease is more severe if undecomposed organic matter is present in the soil when tubers are forming. Because the disease is also seed-borne, it is best to use certified seed. The disease is worse in nonacid soils, so the use of acid-forming fertilizers may lower the incidence of scab. Since scab seems more severe during periods of drought, ensure that proper moisture is available to the crop.

### **Blackleg**

Blackleg usually affects young plants; it begins below the soil line as a wet, black stem lesion. The lesion eventually may expand to the aboveground portion of the stem. Cool, wet soil conditions favor blackleg development by retarding healing (suberization) of cut surfaces of seed pieces and by slowing early growth and vine development. Plant disease-free-certified seed on well-drained sites. Practice at least a 3-year rotation, avoiding susceptible crops such as beans, carrots, cucumbers, turnips, and beets.

### **Virus Diseases**

Several virus diseases are common, generally resulting in very distorted, upright-growing plants. Several types of mosaic viruses may result in spotted or mottled foliage, and may also stunt plants. Mottling can range from mild to severe, and plants will appear distorted in some way. Using certified seed is important. In addition, virus diseases may be spread by insects, so controlling insects is a key strategy in controlling viruses.

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## **INSECT IDENTIFICATION AND CONTROL**

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### **Flea Beetles**

These small beetles, with well-developed hind legs for jumping, are usually black and may move into the garden from fields or waste areas. They can carry diseases from plant to plant. Feeding by adults causes the leaves to have a fine, shot hole appearance. Practicing good sanitation around the garden helps control this insect.

### **Colorado Potato Beetles**

The adult is a black-and-yellow-striped round beetle. It lays bright orange, oval-

shaped eggs on the undersides of potato leaves in masses of several orderly rows. The larvae are reddish orange, black-spotted, and grublike. Like the adults they feed on the foliage. It is best to control the adults before eggs are laid. Rotation helps reduce populations of this insect.

### **Leafhoppers**

Leafhoppers are small, green, wedge-shaped flying insects that often move into Pennsylvania from the south. Leafhoppers are very active insects and the adults fly or readily jump when disturbed. When exposed, the similar but smaller and wingless nymphs run sideways in a crablike manner over the edge of leaves to the undersides. Both nymphs and adults feed by sucking plant juices on the undersides of leaves. At the same time, they introduce toxins into the plant that result in the condition known as hopperburn. At first, this damage appears as a small, triangular brown spot at the leaf tip. Eventually, the margin of the entire leaflet turns brown and rolls upward as though scorched by fire or drought. Usually the older leaves are the first to be affected, but in serious outbreaks all leaves of a plant may show hopperburn.

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## **EUROPEAN CORN BORERS**

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Although the European corn borer prefers corn, it may also attack weeds, flowers, and other crops, including potatoes. The damage is done by the immature stage of a moth. The borers are gray to pink and reach 1 inch in length when fully grown. Feeding occurs within the stalks of the potato plant, resulting in reduced plant vigor. Larvae may also feed on tubers, particularly those that are exposed. The insects overwinter as full-grown larvae in the stalks of host plants. Pupation occurs in spring. Typically, adult moths emerge in June. Females deposit about 400 dark-colored eggs in masses of 15 to 20 on the undersides of leaves. Larvae hatch in a few days and chew their way into the stems. Once larvae are in the stalks, little can be done to prevent potato injury.

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## **APHIDS**

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These small, soft-bodied, green, sometimes gray or pink insects suck juices from plant leaves and stems. They usually are found on stems and leaves near

the terminal ends of shoots. They are important pests because they may carry viral diseases.

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## **GRUBS**

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A garden area previously in sod may harbor white grubs and other soil insects. These insects eat large holes in the tubers. They are usually not a problem in well-cultivated garden plots and in early planted potatoes.

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## **WIREWORMS**

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This insect bores holes about the size of a pencil lead into potato tubers. The slender, jointed, glossy larvae or worms may be found in the soil or boring into the tubers. They are more common in gardens that were previously in grass or sod or used as a waste area.

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