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Michigan State University Cooperative Extension Service
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Potato Production for the Home Gardener



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Introduction

The potato is native to the Andean region of South America and was first cultivated in the United States when it was brought from Ireland in 1719. Worldwide, potatoes are the fourth most important food crop and represent a valuable source of nutrients in a balanced diet. In the United States, more than 1.3 million acres are planted each year for commercial production. The potato is a member of the *Solanaceae* (nightshade) family, which includes eggplant, tobacco, tomatoes, peppers and petunias. It is raised as an annual crop; however, tubers left in the garden that are not frozen during the winter may emerge as "volunteers" (plants that develop from tubers left in the ground from the previous season's crop).

The enlarged, edible, underground storage portion of the potato plant is called a "tuber" and develops from underground stems called stolons or rhizomes. Tubers have lenticels that facilitate gas exchange. When soil is poorly aerated, the lenticels may enlarge and appear as white areas on the tuber skin. Dormant buds (eyes) develop at the base of rudimentary leaves with leafscars (eyebrows).

Tuber formation generally begins when plants are 6 to 8 inches tall, or about five to seven weeks after planting, and results from the production and movement of starch into the developing tubers. Tuber formation is not dependent on flowering, as was once believed. Many varieties do develop inedible fruits from the flowers. These fruits look like small green tomatoes. The fruits contain the true seed of potatoes; however, they are genetically different from the parent, and plants grown from this seed will not necessarily resemble the original variety.

Potato Types and Uses

Potato varieties vary according to shape, flesh color and skin appearance. They are classified according to tuber type similar to the following examples:

| | |
|-------------------|-------------------------------------|
| Round/White Skin: | Onaway, Superior, Sebago, Kennebec |
| Round/Red Skin: | Red Pontiac, Norland |
| Long/White Skin: | White Rose, Shepody |
| Long/Russet Skin: | Russet Burbank, Russet Norkotah |
| Yellow Flesh: | Michigold, Saginaw Gold, Yukon Gold |



Since potatoes grow under the soil, the fruits of your labor will become most apparent when you harvest your crop.

Yellow or golden flesh potatoes have been popular in many areas of the world. During the 1980s, interest in these varieties increased in the United States. In North America, we follow the British preference for white-fleshed potatoes, so the golden flesh potato is relatively new in the United States.

Table 1 presents information on different potato varieties and factors such as dry matter and texture that affect a variety's usefulness.

Soil Preparation and Fertility

Potatoes grow on a wide range of soils, but are best suited to a sandy loam or a loamy sand that is well drained. Very sandy soils may require supplemental watering to maintain adequate soil moisture. Fine-textured soils that are high in silts and clay may not be well drained, and they tend to produce poorly shaped potatoes.



Table 1. Characteristics and suggested uses for some potato varieties.

| Suggested Varieties | Dry Matter | Texture | Best Uses |
|---|------------|------------|--|
| Onaway, Russet Norkotah, Norland, Red Pontiac | Low | Soggy | Pan frying, salads, canning, boiling, baking |
| Yukon Gold, Saginaw Gold, Superior, Kennebec | Medium | Waxy | Boiling, mashing, baking |
| Michigold, Russet Burbank, Atlantic | High | Mealy, dry | Baking, chipping, french fries, boiling |

A soil test should be performed before planting. The best soil pH for potatoes is between 5.5 and 6.0. A pH above 6.0 may increase the incidence of common scab on tubers. Do not amend the soil with lime or manure in the same year that potatoes are to be grown in order to decrease the risk of scab associated with these practices.

If a soil test is not available, follow these recommended guidelines:

- 1) Rototill into the seedbed about 2 pounds per 50 feet of row of 12-12-12 (N-P-K) analysis fertilizer.
- 2) Beside the row, apply 1/3 pound per 50 feet of row of 46-0-0 (urea) fertilizer one week after plant emergence and again within 60 days after emergence, but before July 15. Instead of working the fertilizer into the soil, water thoroughly so the materials move into the root zone.

Variety Selection and Seed Preparation

Choice of a potato variety for growing in a home garden depends on such factors as space availability, desired uses and storage plans. Good early-maturing varieties are Superior, Onaway and Norland (a red skin variety). Suggested later-maturing varieties are Red Pontiac, Katahdin, Sebago and Kennebec. Later-maturing varieties tend to store better on a long-term basis (five to seven months) than do early-maturing varieties.

The Russet Burbank variety is difficult to grow because it requires supplemental water to insure a good tuber shape. If moisture is inadequate, there will be a high percentage of knobby and irregularly shaped potatoes. Russet Burbank also does poorly on silty or clay soil types (see MSU Extension Bulletin E-2222, "Selecting Potato Varieties for Michigan").

To ensure quality seed and maximum productivity, purchase certified seed tubers. Saving tubers from your garden will eventually result in decreased yields and small tubers due to the buildup of seedborne viral diseases. Do not use tubers from the grocery store, since they may be treated to prevent sprouting. Use uncut seed pieces to reduce post-planting tuber decay. Small tubers (1 to 2 inches in diameter) can be planted whole. Cut large tubers into block-shaped, 2- to 2 1/2-ounce seed pieces (about the size of an egg).

The seed pieces should be firm, with at least one "eye" per section and a maximum sprout length of 1/4 to 1/2 inch to ensure optimum germination. Seed tubers can be cut and planted on the same day, or cut four to seven days before planting to allow the cut surface to heal over and reduce the risk of seed piece decay. If seed pieces are to be planted into cold soils, allow healing to occur before planting.



Planting and Care

Potatoes are a cool-season crop and can be planted when soil temperatures are above 45 degrees F at a depth of 6 inches. If you plant when temperatures are below 45 degrees F or in very dry soils, decay or delayed sprouting may result. Cold, wet soil at planting time increases the risk of seed piece decay. The soil should be cultivated 6 to 8 inches deep in the spring. Remove large clods of soil. Ideal temperatures for crop growth are 65 to 80 degrees F during the day and 55 to 65 degrees F at night.

Plant tuber seed pieces 3 to 4 inches deep. Leaving 30 to 36 inches between rows and spacing seed pieces 9 to 12 inches apart in the row will generally produce an acceptable yield of medium-size tubers. Five pounds of seed potatoes should plant 40 feet of row, with 12 inches between seed pieces. You can expect 3 to 5 pounds of potatoes per hill. Larger tubers are produced at wider plant spacings, though some varieties, such as Yukon Gold, develop growth defects such as hollow heart at wider spacings.

Potato plants should be "hilled" when the plants are 8 to 12 inches tall. Mound the soil to a height of 2 to 3 inches and approximately 12 to 15 inches from the base of the plant. Use care to prevent damage to the plant roots, which may extend 8 to 12 inches from the base of the plant.

Hilling maintains suitable soil cover for tubers as they expand. Tubers that break the soil surface may have green areas that contain bitter tasting glycoalkaloids and should not be eaten.

Avoid planting potatoes in the same location year after year. To lower the risk of disease and insect problems, do not rotate to areas where radishes, beets, tomatoes, peppers or eggplants were grown the previous year.

Scab disease may be a problem. It can occur on potatoes where there are dry soil conditions when tubers start to develop and supplemental water is not available; or in gardens where animal manure or lime has been used in the same year that potatoes are planted. Consider planting scab-resistant varieties such as Onaway, Superior and Russet Burbank.

Water Requirements

Potatoes are very sensitive to soil moisture and do best with a consistent soil moisture level. Even soil moisture levels throughout the root zone should be maintained, though over-wet and saturated conditions should be avoided. In general, 1 inch of water per week from rainfall or irrigation is adequate. As much as 2 inches

per week may be required on sandy soils with low organic matter.

Dry soil alternating with periods of saturated soil can result in poor quality tubers with defects such as knobs, growth cracks, hollow heart and internal browning. Long periods of excess moisture, particularly near maturity, may lead to decreased yields and poor quality tubers.

Pest Control

You can help alleviate pest problems by changing the location in your home garden where potatoes are planted, through regular inspection, and by removing "volunteer" potato plants, which can serve as a host for diseases that can damage the new crop.

Shallow cultivation is preferred for weed control. For late season weed control, pull weeds instead of hoeing them to prevent tuber damage. Mulches may be beneficial in weed control and help maintain soil moisture.

Insects such as the Colorado potato beetle can be removed by hand when the numbers are small.

Harvesting

Time of maturity varies for each variety. Indicators of tuber maturity include complete vine death, "skin set" (tuber skin does not peel from the flesh when pressure is applied), and desired tuber size. Mature tubers store better and are less likely to bruise or decay than immature tubers.

New or small tubers can be harvested early without destroying the entire plant by careful digging and removing some of the tubers. The remaining tubers should be left to grow and reach full maturity.

Harvest potatoes before a severe frost. Use a spade or fork to loosen the soil and gently lift the tubers out of the soil. To prevent greening and sunburn damage, do not allow tubers to be exposed to light after harvesting.

Storage

For two to three weeks after harvest, store tubers in the dark at 55 to 60 degrees F with high relative humidity to heal bruised and damaged areas that could provide entrance for disease organisms. Store only sound potatoes that are reasonably free from soil.

After healing, proper storage conditions should include cool temperatures (near 40 degrees F), darkness to prevent greening, high humidity and adequate ventilation. Storing tubers in plastic bags (or any tightly sealed container) will restrict the movement of fresh air around the tubers and can lead to rot.



Disorders

The potato is subject to several seed, foliar and tuber disorders that may affect quality and appearance. See Table 2 for information on the disorders most common to home gardens.

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Table 2. Potato disorders, causes and remedies.

| Symptom | Possible cause | Remedy |
|--|--|---|
| <p>Seed disorders</p> <p>Rotted seed pieces</p> | <p>Soil at planting too wet and/or cold. Soil temperature at planting too hot and/or dry. Temperature of planted seed piece too different from soil temperature.</p> | <p>Plant whole seed. Be sure soil temperature is above 45°F and soil is not too wet or too dry. Avoid planting cut seed pieces on days with high temperature and high humidity.</p> |
| <p>Foliar disorders</p> <p>Sprout and below-ground stem and stolons develop reddish-brown decay and lesions.</p> <p>Inky, black, wet decay of lower stem of the plant, usually at ground level.</p> <p>Reduced plant growth with a pale green to yellowish color and inward rolling of the lower leaves of plant, which have a papery feeling.</p> <p>Leaf mosaics of light green to yellowish areas.</p> <p>Small, dark brown to black lesions with concentric rings on older leaves. Usually occurs on maturing or stressed plants.</p> <p>Dark, water-soaked areas on the leaves and stems that spread rapidly under wet conditions. A white mold growth is often seen on the underside of the infected leaves.</p> <p>Yellowing of the lower leaves and early leafdrop.</p> <p>Leaf and petiole defoliation; dark colored larvae of various size and/or large, yellow and black-striped adult beetles. Bright orange egg masses on the underside of the leaves.</p> | <p><i>Rhizoctonia</i>.</p> <p>Bacterial soft rot; referred to as "Blackleg".</p> <p>Virus leaf roll.</p> <p>Mosaic viruses.</p> <p>Early blight.</p> <p>Late blight.</p> <p>Plants normally maturing, or if too early for maturity, a nitrogen deficiency.</p> <p>Colorado potato beetle</p> | <p>Develops in cold, wet soils with too much soil (more than 3-4 inches) over the planted seed piece .</p> <p>Use sound, certified seed. Plant whole seed. Avoid adverse soil conditions at planting.</p> <p>Purchase new certified seed and control aphids to prevent current season spread.</p> <p>Purchase new certified seed.</p> <p>Apply the proper fungicide to protect the foliage. Avoid plant stresses such as moisture stress.</p> <p>Use resistant varieties. Use proper fungicides to protect the foliage.</p> <p>Apply additional nitrogen to the soil around the plants and irrigate.</p> <p>Hand pick the hard-shell adults and destroy to prevent further generations. Use proper insectide.</p> |



Table 2. Potato disorders, causes and remedies. (cont.)

| Symptom | Possible cause | Remedy |
|--|---|--|
| <p>Leaf margin appears dry and burned with upward leaf rolling with progressive severity.</p> <p>Irregular holes in the leaves; light green worms with white stripes on the sides.</p> | <p>Potato leafhopper: a small, lime-green insect that moves sideways very quickly when foliage is touched.</p> <p>Cabbage looper.</p> | <p>Apply proper insecticide for leaf-hopper control.</p> <p>Apply the proper insecticide for cabbage looper control.</p> |
| Tuber disorders | | |
| <p>Green skin.</p> | <p>Exposure to the sun or other light source. Develops over time.</p> | <p>Discard green tubers. Be sure hilling is adequate to completely cover growing tubers. After harvest, store potatoes in the dark.</p> |
| <p>Raised and/or pitted tan-to-brown corky areas.</p> | <p>Common scab.</p> | <p>Use certified seed. Avoid lime or manure the same year potatoes are grown. Use scab-tolerant and resistant varieties. Avoid carrots, beets and radishes as prior crops.</p> |
| <p>Enlarged lenticels—small, raised and corky tissue with whitish rings scattered over the skin.</p> | <p>Soil too wet.</p> | <p>Do not overwater. Select soil with good drainage.</p> |
| <p>Knobby and misshapen tubers.</p> | <p>Physiological from inconsistent moisture.</p> | <p>Provide uniform growing conditions. Proper variety selection.</p> |
| <p>Splits in the tuber that are healed over – "growth cracks."</p> | <p>Physiological (ex., inconsistent moisture levels).</p> | <p>Provide uniform growing conditions.</p> |
| <p>Large, shallow gouges in the tubers; large brown to cream-colored larvae, usually curled into a C-shape, may be visible on inspection.</p> | <p>White grubs.</p> | <p>Use materials to control soil insects. Garden areas that follow a long grass cover are at greatest risk.</p> |
| <p>Narrow, cylindrical holes in tubers.</p> | <p>Wireworms.</p> | <p>Use materials to control soil insects. Garden locations that follow a long grass cover are at greatest risk.</p> |
| <p>Brown cavities near the heart of the tuber – "hollow heart."</p> | <p>Physiological (seed pieces planted too far apart; inconsistent moisture levels during the growing season).</p> | <p>Plant seed closer to avoid oversized potatoes. Provide uniform and adequate water during the growing season. Proper variety selection.</p> |
| <p>Dry, coarse, decayed areas that penetrate in to tuber flesh. Grayish mold commonly associated.</p> | <p><i>Fusarium</i> dry rot.</p> | <p>Minimize bruising. Harvest tubers for storage from dead vines.</p> |



For more information on home gardening, consult the following publications, available from your county Cooperative Extension Service office:

- E-529, "Home Vegetable Gardening," 40 cents.
- E-760A, "Home Vegetable Garden Variety Recommendations," 40 cents.
- E-824-23, "Family Vegetable Garden: Potatoes & Sweet Potatoes," single copy free to Michigan residents.
- E-965, "Potato Insect Pests," single copy free to Michigan residents.
- E-1769, "Planning a Vegetable Garden," 50 cents.
- NCR 95, "Diseases of Potatoes," 45 cents.



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