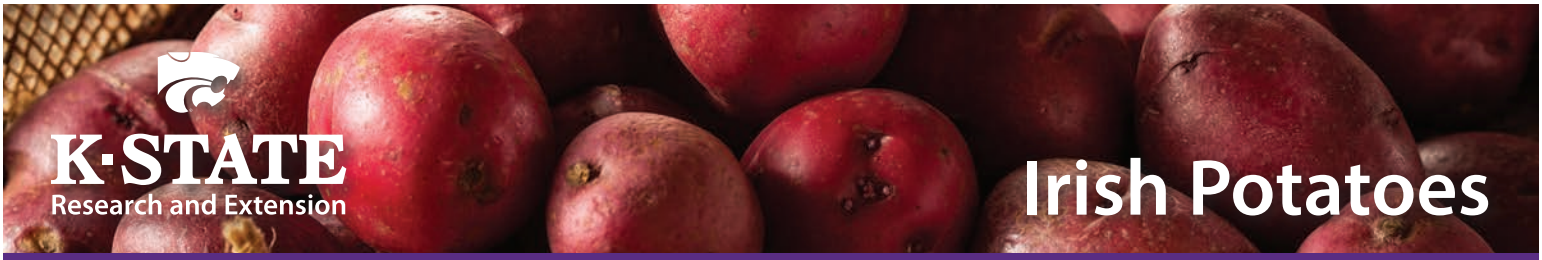

K-STATE Research and Extension

Irish Potatoes

MF488

Potatoes are one of the world's most important food crops. Grown in more than 100 countries, only wheat and rice are produced in higher quantities for human consumption. It is estimated that each person in the U.S. consumes about 121 pounds of potatoes per year on average.

Nutrition

Potatoes are an excellent source of vitamin C, and a good source of potassium, phosphorus, and iron. Though less fattening than many other foods, frying or adding butter or sour cream greatly increases their caloric value. French fries, for example, contain about five times as many calories as mashed potatoes.

Varieties

Potatoes differ in skin color, maturity interval, and disease resistance. Some varieties are best suited to certain preparation methods. To select a variety that meets your needs, see Table 1 on page 4. For instance, white-skinned Kennebecs sunburn easily but are good for baking as are Norgold Russets. The Norlands are a light red. Retailers typically buy from wholesalers or potato seed warehouses and may only offer one or two varieties. If you are looking to purchase a specific variety, contact your dealer early in the season or put in a request for the following year.

Using Potatoes

Potato quality is judged in terms of density. Specific gravity (the ratio of water to solids) is the measure of tuber density, which influences how potatoes are used. Specific gravity of tubers varies by variety, soil type, fertilization, and seasonal conditions. Potatoes grown early in the season and harvested before extreme heat will have a higher specific gravity as will potatoes that have been properly fertilized, watered, and cultivated. Storing potatoes at cool temperatures helps them retain high specific gravity and is recommended. Exceptions are the Norgold Russet and Kennebec, which make excellent mealy-fleshed baking potatoes.

Productivity or yield potential under Kansas growing conditions is an important factor in choosing a potato variety. Yields can vary in a given year based on location and growing practices. Table 1 on page 4 shows the average five-year yield for varieties grown at K-State test locations in Manhattan and Colby.

Always choose certified seed as indicated by the bright blue tag on the bag. A red tag indicates USDA #2 grade potatoes. If the tag is not prominently displayed, ask the dealer to show it to you. Use of certified seed avoids transmission of seedborne diseases, which not only reduce potato yields and quality, but can infest the soil so a disease recurs annually for years.

Soils and Fertilizer

Potatoes thrive in loose soils high in organic matter if drainage is adequate. Potatoes should not be planted in heavy, "sticky" soils or areas where water drains slowly or stands for long periods of time. Potatoes can be grown in fairly sandy soils if plantings are watered sufficiently during dry periods. Potatoes are usually planted early in the season when the soil is too wet to till. Fall tillage is recommended, with a light raking or harrowing in the spring just before planting. Organic matter can be incorporated easily in the fall. Deep tillage is important because it enables plants to develop a good root system.

For most small gardens, about 2 to 3 (4 to 6 cups) pounds of an all-purpose, balanced fertilizer (such as 10-10-10 or 12-12-12 per 100 square foot of area) is adequate. Broadcast the fertilizer over the plot before tilling in the fall. In larger plantings or sandy soils where nutrients may leach or wash out of the soil, fertilizer should be "banded" or applied in rows 2 inches below and 2 inches to one side of the seed piece. Use ¾ to 1 cup of the same or a similar fertilizer per 10 feet of row. Placing fertilizer near the root system reduces the amount needed and avoids fertilizing weeds between rows.

In years when spring rainfall washes nitrogen fertilizer from the soil, potatoes may benefit from a sidedressing of nitrogen fertilizer along the row. This application is particularly important in sandy soils. Use 2 tablespoons of a high-nitrogen fertilizer such as ammonium sulfate (21-0-0) or ¼ cup of all-purpose garden fertilizer such as a 12-12-12 for each 10 feet of row, sprinkling it about 4 or 5 inches from plants along the row. Do not grow potatoes in the same location every year. A three-year rotation is suggested to avoid pest problems that accumulate with continuous plantings in the same location and to take advantage of soil nutrients not used by other garden crops.

Planting

Early spring potatoes

Potatoes can be planted as soon as the soil can be worked in the spring, usually mid-March in most of eastern and central Kansas. In southeastern Kansas, early

March plantings are possible. Late March to early April plantings usually are best in extreme northwestern Kansas. Early plantings produce higher yields.

After procuring seed potatoes, cut them into seed pieces weighing about 1½ ounces each. Smaller pieces usually result in weaker plants, which reduces the ability of emerging potato vines to recover from injuries after a subsequent frost. Each seed piece must contain at least one eye. Seed potatoes yield about 8 to 10 seed pieces per pound on average. When deciding how much seed to purchase, plan on about 1 pound of seed potatoes for every 10 feet of row. To keep seed pieces from rotting, freshly cut seed pieces should be stored at room temperature (60 to 70˚F) with fairly high humidity for five to seven days before planting. During this healing process, freshly cut surfaces develop a protective coating to prevent seed decay after planting.

Seed pieces usually are planted in rows about 3 feet apart, but they can be planted closer together in small garden areas. In heavy soils, particularly during wet springs, plant seed pieces in a slightly mounded row. This allows water to drain away from the seed pieces and reduces decay. To encourage emergence, plant potatoes 3 to 4 inches deep. Once they begin sprouting, rake to remove the top 2 inches of soil, firming the soil around the seed pieces.

Fall potatoes

In most of Kansas, potatoes are planted in March or early April, but they can be grown in the fall garden. It can be difficult to find seed potatoes later in the season, so you may want to ask about availability for summer planting at the beginning of the year. Saving spring-purchased seed potatoes in cool storage or a refrigerator until planting time is another option. Seed pieces rot easily in hot summer soil, so potatoes for a fall crop should be healed before planting. If soil is dry, water regularly to moisten and cool the soil surface. Plant the seed potatoes 3 to 4 inches deep, then water regularly to ensure even emergence. Continue watering through August to help the fall crop withstand hot temperatures, strong winds, and lack of rainfall, which are normal this time of year.

Potatoes planted in June or July should be ready to harvest in early to mid-October, or they can be stored in the ground until December and dug as needed. Fall-planted potatoes are crisper or firmer, which makes them excellent for winter storage. Specific gravities of fall potatoes are about 10 percent higher than those of spring-planted crops, but plant yields tend to be lower. Vitamin C content usually peaks after harvest, so fall potatoes should contain more vitamin C through the winter storage period.

As the Crop Grows

Plants typically begin emerging in early to mid-April. In some years, edges of leaves can be burned by a late frost, but adequate seed pieces should recover quickly. Potatoes thrive in soils that remain fairly cool. The edible portion, or tuber, is a modified underground stem that develops from attachments to the stem above the seed piece. To develop the bearing area along the stem where the potatoes develop, potatoes should be kept covered with loose, cool soil. Rows should be "hilled" or mounded with soil gradually as potato plants grow. Begin to hoe or cultivate soil to the row when vines are 6 to 8 inches tall. Continue this process as the vines grow until the ridge or hill is about 10 to 12 inches high.

Vine Growth

In potatoes, the flowering process does not coincide with tuber development. Tubers are set early in the season, typically when plants are 6 to 8 inches tall. As plants grow and temperatures remain fairly cool, tubers expand as they accumulate starches. Maximum tuber development occurs during cool weather, so it is best to plant early. In Kansas, high temperatures can reduce tuber size and quality. Potatoes blossom at different times depending on the variety and growing climate. Some years blossoms develop into small, round, green fruit similar to small tomatoes, a related crop. Unlike tomatoes, the potato fruit do not enlarge or ripen and contain a bitter alkaloid, solanine, which can be harmful if eaten.

Controlling Weeds

Weeds compete with the potato crop and should be controlled while they are small. Shallow cultivation (less than 2 inches deep) during the "hilling" or ridging process is recommended to keep from damaging plant roots or small tubers. Hand cultivation and mulching are the best way to control weeds in small areas.

Watering

Soil moisture limits potato growth in many areas of Kansas. The amount of water plants require is influenced by soil type, temperatures, wind, and cultural practices. Normally, potato plants need about 1 inch of water per week until just before harvest, but may need special attention during critical periods. For example, when the vines are 6 to 8 inches tall and tubers start to develop, watering plants during dry periods is recommended to ensure an adequate number of tubers. In dry years, potato size and quality can be improved with a thorough watering one to two weeks before harvest. Regular watering throughout the season is suggested to avoid knobbiness or secondary growths, cracking, and hollow cavities in the center of tubers.

Harvesting

Potatoes can be dug fresh for use during the spring and enjoyed with spring garden peas. For maximum yields, do not dig until the vines have begun to die, ideally when vines are about half-dead. Potatoes dug earlier than this

will have to be handled carefully to prevent sloughing of tender skins. Waiting until vines are completely dead can also result in injury. For instance, potatoes can sprout prematurely during excessive heat when there are no vines left to shade and cool the soil. Potatoes that are planted in mid-March should be ready to harvest in early to late July, depending on the planting date, the earliness of the variety, and growing conditions. In northwestern Kansas, potatoes are usually harvested in late August.

To prevent sunscald and skin discoloration, freshly dug potatoes should be protected from heat, direct sun, and wind, then allowed to dry for 3-4 days in a warm, shaded, airy location before storing. Avoid digging potatoes during excessive heat in July or August, which can reduce storage quality. Potatoes should not be exposed to direct sunlight for more than 15 minutes.

Storage and Sprout Control

Select only the best fall potatoes for storage, and use defective or injured potatoes first. Optimum storage conditions are about 35° to 40°F at moderate humidity, such as an unheated cellar or basement. Avoid locations that can freeze. Store potatoes in the dark, checking them periodically. Potatoes dug in early summer should be stored in as cool a place as possible, or at a temperature of about 55° to 60°F. Any sprouts that occur should be broken off.

Store potatoes in the dark to keep tuber surfaces from turning green. Potatoes should stay firm for 6-8 months without developing sprouts if stored below 40°F. Starches are converted to sugars at these temperatures, giving the potatoes a peculiar sweet taste. This can be reversed by moving the desired quantity of potatoes and storing at room temperature of about 70°F for a week before use.

Several years ago numerous chemicals were available to control or prevent sprouting. Those materials are no longer available to homeowners, but researchers have found that spearmint oil, peppermint oil, and clove oil suppress sprouting by damaging the rapidly dividing cells within the sprouts. These products have been approved for this use by the FDA, resulting in several commercial applications. The only method deemed practical for homeowners was a low-tech wick method accomplished by saturating a small piece of blotter paper with spearmint or peppermint oil and placing it in a box with the potatoes. (Clove oil should not be used.) Research shows peppermint and spearmint oils to be equally effective in suppressing sprouts, but peppermint oil is less likely to affect potato flavor. Due to the high volatility, little to no residue remains on the potatoes. The products must be reapplied at 2-3 week intervals for continuous sprout suppression, with the first application before sprouting occurs. Blotter paper is available from herbarium supply houses.

Diseases

Potatoes are susceptible to several diseases caused by bacteria, fungi, nematodes, or viruses.

Early blight. Small circular brown spots with concentric rings on potato foliage may form a target board on potatoes. The blight usually develops late in the season and more rapidly in warm, damp weather. Foliar fungicide sprays are effective in controlling blight, but infected crop residues must be destroyed because blight can overwinter in plant debris.

Scab. Scab-like lesions on potato tubers are caused by bacteria. Bacteria can persist in soils for a long time, so crop rotation is important. If a location has had scab in the past, it may persist. Because the disease is also seed-borne, it is important to use certified seed. Non-acid soils can worsen the disease, so acid-forming fertilizers should be used to lower soil pH below 5.5. This disease is worse during drought.

Blackleg. Blackleg is caused by a bacterial organism, usually appearing as blackened stems at or below the soil level, with yellow, wilted plants. The disease is only a problem in damp years. Adequate soil drainage provides some control along with certified seed and crop rotation.

Virus diseases. Several virus diseases, including spindle tuber, are common and generally result in a distorted plant that grows upright. Several types of mosaic virus may result in spotted or mottled foliage and stunted plants. Although dead or brown areas usually do not appear on the foliage, plants appear distorted in some way. Certified seed and pest control are important in avoiding the spread of virus diseases by insects.

Environmental Problems

Heat necrosis. Exposure to high temperatures can lead to the development of black streaks in the vascular system of tubers about 1⁄8 to 1⁄4 inch below the skin. Harvest potatoes early and avoid high storage temperatures.

Blackheart. A darkening of the flesh near the center of tubers that can be reduced with cool-temperature storage.

Growth cracks. Healed cracks in the tubers occur with dry periods followed by sudden rains. Plants should be watered uniformly to alleviate this problem.

Second growth or knobs. As vines resume growth after a dry period or late fertilization, potatoes may be deformed with strange growths or knobs on the tubers.

Heat sprouts. In periods of extreme heat, late-harvested potatoes may break dormancy and begin to sprout in the ground. Sprouting may reduce storage quality.

Greening. Light exposure in the field or in storage can cause tubers to turn green. Tubers should be kept well covered with soil in the field and stored in the dark. Certain varieties turn green more readily than others. Green flesh is bitter and should be removed before cooking as it may affect the flavor of potatoes.

Insects

Potatoes are susceptible to the following insect pests.

Colorado potato beetle. The adult is a yellow, round beetle with black stripes. It lays eggs on the underside of potato leaves. Pink larvae and adults feed on foliage. Crop rotation reduces populations.

Flea beetle. These small beetles are usually black with enlarged hind legs for jumping. They can move into the garden from fields or waste areas, spreading diseases from plant to plant. Feeding by adults results in leaves with a fine, shothole appearance. Sanitation around the garden helps with control.

Blister beetles. These elongated beetles are usually brown, black or gray. Blister beetles move into gardens from waste areas or fields and feed on potato foliage later in the season after. Sanitation may help manage this pest.

Leafhoppers. Leafhoppers are small, green wedge-shaped flying insects that often move into Kansas late in the season. They feed by sucking plant juices on the undersides of leaves. Affected leaves often have a burned appearance called hopperburn.

Aphids. These small, soft-bodied insects suck juices from plant leaves and stems. Aphids are often green, and they are usually found on stems and leaves near the end of shoots. Aphids are important pests because they may carry virus diseases.

Grubs. Grubs occasionally are a problem in newly tilled lawns or waste areas. These large, white larvae eat large holes in tubers. They usually do not cause problems in well-cultivated garden plots or early planted potatoes.

Wireworms. This insect bores holes about the size of a pencil lead into potato tubers. The slender, jointed, glossy worms (larvae) can be found in the soil or boring into tubers. Wireworms are more common in freshly tilled grass or waste areas. This pest can be controlled with insecticides applied to the soil before planting.

Table 1. Potato varieties and uses

	Maturity	Depth of Eyes	Scab Tolerance	Storage Quality	Approx. Yield* *Pounds/10 ft. row*	Cooked Texture	Suggested Uses
White-skinned varieties							
Superior	early-mid	shallow	moderate	good	13.3	mealy	baking, mashing
Norchip	midseason	shallow	moderate	good	16.4	very mealy	baking, french fries
Irish Cobbler	early	deep	poor	good	13.4	mealy	baking, mashing
Kennebec*	late	shallow	poor	fair	152	mealy	baking, mashing
Red-skinned Varieties							
LaRouge	midseason	shallow	moderate	fair	17.4	waxy	boiling
LaSoda	early-mid	medium	moderate	good	15.3	waxy	boiling
Norland	early	shallow	good	good	10.9	waxy	boiling
Red Pontiac	mid-late	medium	poor	fair	17.0	soggy to waxy	salads, boiling
Russet-skinned Varieties							
Norgold Russet	early	shallow	good	fair	9.4	mealy	baking, boiling
Norkotah	midseason	shallow	good	good	13.0	mealy	baking, boiling

*Based on K-State research trials over 5-10 years.

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