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Potato Production in South Dakota

Cooperative Extension, South Dakota State University

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Potato Production

Potatoes were first mentioned in Spanish chronicles, after the conquest of Peru, in 1586. They are now grown in many parts of the world, including all 50 states and harvested 12 months a year. In former years, they were grown on most South Dakota farms. But in the last 20 years, the major local acreage has gradually shifted to the northeastern part of the state.

This area has a Sinai-Kransburg-Barnes (Sandy loam) soil, ideal for growing potatoes. In addition, high elevations cause cool nights, necessary for potato production, and rainfall is sufficient in most years. Potatoes need 2 inches of water per week during the season of heavy vine growth for the best yields. Even with the usually adequate rainfall, however, supplemental irrigation is now used by a number of growers.

The potato grower has felt a greater impact of technology in the past 15 years than most other crop producers. New labor saving machinery, such as mechanical seed cutters, harvesters, and unloaders, have, for the most part, taken the drudgery out of producing potatoes.

POPULAR VARIETIES

**Red Lasoda:** This variety is a clonal mutation selected from the LaSoda. It is bright cherry red in color and has medium depth eyes.

The LaSoda is a cross between Triumph and Katahdin, made by Dr. J. C. Miller of Louisiana, and was increased in South Dakota. Medium in maturity and a heavy yielder, it has good table quality. LaSoda is used by Louisiana, Alabama and other southern growers for seed. Its plants are vigorous, upright, and have purple flowers. Tubers are semi-round to slightly oblong.

**Red Pontiac:** A clonal mutation selected from the Pontiac, this variety was developed by the United States Department of Agriculture, and is a cross between the Katahdin and Triumph. It is medium to late in maturity and has vigorous upright plants with long, broad, medium to rough textured leaves. Blossoms have a reddish purple color. The tubers are round to oblong with intense red skin, medium deep eyes, and white flesh. The Pontiac will yield heavy under favorable conditions.

**Norland:** Norland is a new red skinned variety developed in North Dakota from a cross between Redkote and N.D. 626. It is early maturing, with large spreading vines and purple flowers. Tubers are oblong and smooth with shallow eyes. Norland produces a high percentage of U.S. No. 1 tubers, with good cooking qualities. It matures too early to produce heavily, but is popular because of its high quality. Norland is recommended for early potatoes in July and August.

**Irish Cobbler:** This is one of the old varieties but is still being grown extensively. The name “Cobbler” came about because the variety was reportedly first grown by an Irish shoemaker in Massachusetts. An early white variety, it has excellent table quality and is a good chipher. Tubers are round and tend to be flat in heavy soils. Eyes are deep, and plants have light bluish leaves, medium in length, and lilac colored flowers. The Cobbler is a fair yielder under good conditions.

**Early Ohio:** Originated in 1871, it is one of the oldest varieties still in production. Early Ohio has round oblong tubers with smooth pink to white skin and numerous medium deep eyes. The flowers have white blossoms. Although susceptible to most potato diseases, it has excellent table quality and makes good chips. Because it is a poor yielder compared to the LaSoda, commercial growers do not plant much Ohio. It is, however, a favorite of gardeners.

**Kennebec:** Developed by the USDA, Kennebec was released in 1948. It is a late variety in South Dakota. Blossoms are white. Tubers are elliptical to oblong with shallow eyes and white skin. Kennebec is a high yielder if moisture conditions are favorable, and is in demand by the chip trade.

**Russet Burbank:** The Burbank is a heavily netted, russet skinned, late variety. Its tubers are long and cylindrical. The variety is susceptible to late blight but somewhat resistant to scab. High in solids, it
makes a good baking potato. It does best under irrigation in South Dakota.

Bliss Triumph and Waseca are also occasionally grown in South Dakota but in small amounts. Snowflake and Superior are new white skinned varieties that might fit into South Dakota production but need further testing before they can be recommended.

**Production**

Potatoes require a sandy loam soil, not too heavy, with at least 1 or 2 inches of moisture per week during the growing season when tubers are setting and developing. Best results are secured if potatoes are not grown in the same field more than once every five years. Bacteria and fungi build up in the soil if potatoes follow potatoes. Summer fallowed fields are ideal since fallowing stores moisture and controls weeds. A good plan is to plow under a sweet clover green manure crop in June and then keep the field black the rest of the summer.

Potatoes require nitrogen and potash, as well as phosphorus for best growth. Even though South Dakota soils are high in potash, a complete fertilizer is recommended. This is necessary because the potato is a poor feeder and might not get enough potash unless the nutrient is added as fertilizer. If potatoes are being produced for the chipping trade, use sulphate of potash. This tends to increase the specific gravity or solids in the tubers. Too much nitrogen should be avoided as it promotes vine growth and the possibility of immature tubers.

Because soils vary, no general fertilizer formula will meet all conditions. A soil sample should be sent to the Soils Laboratory at South Dakota State College for testing and resulting recommendations followed.

**Seedbed**

A seedbed for potatoes should be well prepared and packed to retain moisture. Planting in dry soil will almost always result in many decayed seed pieces and poor stands. Depth of the planting will depend on soil and moisture conditions, but the usual depth is 3 to 4 inches. In sandy soils the furrows can be completely covered, but in heavy soils the covering should be shallow. This will help to check rhizoctonia and blackleg infection.

**Seed Treatment**

The value of seed treatment is not definite, but experience in South Dakota has proved that it pays. Treating helps kill surface borne diseases on the seed pieces, and results in better stands. Semesan Beil is a good easy-to-apply treatment. This is an instant dip and can be purchased at drug stores and supply houses. Other seed treatments are outlined in South Dakota Agricultural Experiment Station Pamphlet No. 8. It must be remembered, however, that seed treatment will not guarantee a scab free crop. If scab organisms are in the soil, tubers may be scabby regardless of treatment.

**Cultivation**

Many potato fields are ruined or seriously damaged by too much deep cultivation. Deep cultivation should be done only on the first time over. After that, use surface shovels, to avoid cutting feeder roots. Some growers use disk hillers the last time through, to keep tubers covered, avoiding sun-burn. But avoid heavy ridging, to prevent a loss in moisture.

Chemical control of weeds in potato fields is still in the experimental stage but has been successful in some states. About ½ pound of 2-4D may be used on red skinned varieties if most of the spray is directed at the base of plants, for the control of broad leaved weeds. If 2-4D is sprayed on the complete plant, leaves become distorted. Usually, however, they will recover and grow out new leaves.

**Harvesting**

Many good potatoes are ruined during digging, handling, and storing. Remember that a potato is a living thing, perishable, and cannot be thrown around like coal. Adjust the digger so enough dirt is carried on the chain or conveyor to prevent bruising. Every bruise or cut on a tuber means a defect and later, in storage, these injuries may become decayed, causing a No. 2 or cull potato.

Caution potato pickers and sack handlers not to drop the tubers. Pad truck beds with carpet or old sacks. Unloading conveyors are now used by most growers. When starting to fill a bin with the conveyors, try not to drop the tubers. Use care when feeding the potatoes to the unloader and run it at a low speed.

Vine beaters are used to destroy the plants to make digging and picking easier. Beaters are also used in early digging, so that tubers will mature faster and the skin will set.

Potato harvesting is being mechanized in the commercial areas. Harvesters dig one or two rows, elevate the tubers over endless chain rods, and deposit them in a hopper box on a truck. These boxes have an apron in the bottom to unload potatoes into a conveyor.

One-row mounted machines, depending on the type, either dig potatoes the same as two-row diggers or pick them up after they have been dug by a two-row’er and placed in a windrow. Leaving them
on the ground for a short period will dry them and allow skin to set. Three to six workers are needed on the 2-row machines to pick off clods and vines that pass over the rod chains. Growers estimate they can reduce harvesting costs by one-half by using a mechanical harvester.

Sunsклад is the worst enemy during early harvesting of potatoes. High temperatures and windy weather will cause sunscald even when tubers are shaded. Winds remove the moisture from feathered spots resulting in a discoloration. Growers should stop digging when the wind blows and the air becomes dry on windy days. Do not leave potatoes on the ground longer than 10 to 15 minutes in 80 to 85° temperatures. Before potatoes are dug, they are cooler than the surface temperature, but after digging they absorb heat. Never leave them in uncovered sacks, exposed to the sun or wind, in warm weather.

**STORAGE**

Winter storage for potatoes is necessary in South Dakota. Years ago, cheap storage houses were constructed in the ground and covered with hay or straw and earth. New warehouses are built above the ground and insulated. Bins inside the storage houses are built about 18 inches from the outside walls, leaving an air space to protect the tubers, and to supply ventilation. For best results, fans are needed to move the air in the storage house at the rate of one cubic foot per minute for each 160 pounds of potatoes in storage. Potatoes require cool storage but with about a 90% humidity.

Store potatoes that are to be kept until spring at temperatures below 40°. This is too cold, however, for chipping potatoes, as the starch turns to sugar at low temperatures and some varieties will not recondition even if kept for a period in warm storage. Chipping potatoes must also be harvested before they become chilled. Special bulletins on chipping potatoes are available at your county agent's office.

**DISEASES**

Potato disease control in many cases is based on prevention rather than cure. For this reason use certified seed.

Potato diseases are caused by viruses, bacteria, and fungi. Virus diseases are highly infectious and can build up quickly if infected plants are not rogued out. Viruses are spread from plant to plant by insects or by contact. Mosaic, leaf roll, and spindle tuber are the common virus diseases in South Dakota.

Mosaic causes plants to be dwarfed and foliage is mottled, crinkled and often yellowed. Mild cases are difficult to see in hot, bright, sunny weather but it can be easily seen on cloudy days if soil moisture is adequate.

Plants with leaf roll virus can also be detected in the field with a little experience. Plants are usually dwarfed, and leaves roll upward from the edges. Leaves may be thickened and leathery. The leaf roll virus causes dark thread-like streaks inside the tubers of some varieties.

Spindle tuber is difficult to determine. Sometimes plants are tall and spindly with the branches coming from the main stem at a sharp angle. Leaves may be dull in appearance. When infected plants are pulled, tubers will taper towards the stem and have prominent eyes.

Blackleg and ring rot are bacterial diseases. Blackleg causes young plants to die early in the season but may also cause injury to older plants. In wet seasons, the disease causes considerable loss. Because the organism can be carried over on the tuber, all seed should be treated. The stem of the plant turns black and the center rots out. Blackleg bacteria are normally present in many soils.

Ring rot bacteria overwinter in diseased tubers, storage bins, or sacks and grading equipment. Ring rot is probably the worst South Dakota disease, because it is highly infectious. Plants may be infected and not show symptoms during the first season. In the fields, infected plants may wilt and a greyish, milky type fluid can be squeezed from the cut end of the stem. In the tuber the rot first occurs in the vascular ring as a slight discoloration. As the rot advances, the discoloration becomes yellowish and cheezy. Cracks may appear on the outside of the tuber. There is no tolerance for ring rot in certified stock. One infected plant or one diseased tuber is cause for rejection of the entire field.

If ring rot is found in the warehouse, thorough disinfection is necessary to eliminate the disease-causing bacteria. All storage bins, sacks, knives, grading equipment, and the like must be disinfected. Use copper sulphate, formaldehyde or lylsol. Complete instructions can be found in the South Dakota Agricultural Experiment Station Pamphlet 7.

Several fungus diseases of potatoes commonly occur in South Dakota. Fungi are commonly called molds. These mold-induced diseases are early blight, late blight, rhizoctonia, wilt, and common scab.

Early blight does not usually cause much damage in South Dakota. Target-like dark brown spots about ¼ inch in size appear on the old leaves first. Occasionally the blight affects the tubers causing brown spots on the surface. This damage is not serious, but the injuries provide entrance for many rot-producing organisms.

Late blight occurs in cool, moist weather. Dry,
sunny weather, with days of 80° or above will check the spread of this fungus disease. Watch for late blight when vine growth is heavy and weather cool and moist. Tuber rotting at harvest time can result if the fungus is brought in contact with potatoes. Late blight is often confused with tip-burn or hopper-burn, a disease showing up after a dry spell when insects are not controlled.

Rhizoctonia is a fungus living in the soil. If plants are young when infected, they will die, while older plants may survive and grow into rough, erect, stiff-growing plants. Small tubers often develop in the main stem above the ground surface. Small black specks looking like dirt occur on the tuber. The specks will not wash off, and can be a serious grade defect.

The wilt fungus also lives in the soil. Plants infected with wilt fungus usually turn yellow, wilt and usually die. Tubers from diseased plants show a brown, discolored ring.

Common scab shows up on the tuber surface as a defect. The scab lesions may be shallow in the Russet varieties or a deep pit scab on several more susceptible varieties. The fungus causing scab is present in most soils and attacks during warm, dry development periods, while the tubers are forming.

**DISEASE CONTROL**

No treatment can control virus disease. In certified fields the diseased plants should be pulled out and removed from the field.

Good insect control, however, will check the spread of many virus diseases. Late blight and early blight can be controlled with regular applications of soil fungicides such as Tribasic Copper Sulphate, Dithane, Zerlate, or Parzate. Blackleg, Rhizoctonia, and scab diseases can be lessened by seed treatment, but since the organisms live in the soil, the disease may show up after the seed pieces have been treated.

Rotate so that potatoes are not planted on the same field more than once in five or six years. The planting of “B” size tubers from certified seed will insure better stands and reduce the amount of Rhizoctonia and blackleg. Planting of “B” size seed from uncertified stock is not recommended as many virus diseased plants produce only small tubers.

**INSECT PESTS**

The Colorado beetle, the flea beetle, and the leaf hopper, are the major South Dakota potato insects. Grasshoppers occasionally damage plants along field edges, and aphids and plant lice cause damage some years. White grubs are not a serious problem, while wire worms are usually serious in some fields. The wire worm is the larva of the click beetle. This insect damages by boring small holes in tubers, causing serious defects.

Grasshoppers can be controlled with Aldrin or Toxaphene. Flea beetles, Colorado beetles, and leaf hoppers can be controlled with DDT, Endrin or Thiodan. Spraying or dusting for flea beetles should start as soon as plants are 8 to 10 inches tall. Leaf hoppers usually appear later. Grasshoppers may also show up after the small grain harvest.

The insects causing the most tuber damage are wireworms and flea beetles. Do not plant potatoes on alfalfa ground as soil insects build up in unworked soil. Early fall plowing and working the soil before the winter freeze-up will help control all soil insects. Summer fallowed land usually has a low insect population.

Flea beetle larvae burrow under the skin of the tuber or straight into the tuber leaving small pin sized brown holes. Other disease organisms often enter these holes.

For more details on insect control consult Farmers' Bulletin No. 2618 “Controlling Potato Insects.”

**CERTIFICATION**

Certified seed is from fields officially entered for certification. This seed has passed all field and tuber inspections. Certification of South Dakota potatoes is handled by the South Dakota Potato Growers' Association under a cooperative agreement with the State Seed Certification Board.

A grower starts with certified seed or approved seed stocks and enters his acreage with the secretary of the Association. Fees are set just high enough to cover the cost of the work of the inspector.

Three or more inspections are made in the fields by the inspectors who are approved by the association and the Plant Pathology Department of the Agricultural Experiment Station at South Dakota State College. There is a slight tolerance for most diseases in the field but none for ring rot. If one ring rot plant is found in the field, the entire field is rejected. A portion of the lower stem of a suspected ring rot plant is sent to the Plant Pathology Department for examination under a microscope to determine if ring rot bacteria are present.

Certified seed must be graded and inspected as to grade before being tagged and sealed. Three grades are available in the blue, red, or green tag grades. Field readings are the same for all grades, but more defects are allowed in the tubers for the red and green tag grades.

Federal-State shipping point inspection of potatoes is available to South Dakota growers. Inspectors are located at Garden City and Watertown. These inspectors are under the supervision of the Federal Supervisor at St. Paul. Requests for inspection may be made to the secretary of the South Dakota Potato Growers Association at Watertown.