

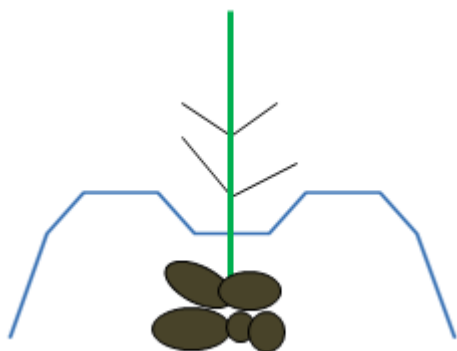
Potatoes

Grow with USask



Tips for Planting

- Plant only certified potato seed, preferably from a local seed producer.
- Plant potato seed when the soil temperature is 10°C or warmer. Planting into cold soils encourages seed rot and other diseases.
- Rather than planting early into cold soil, try 'green sprouting' your potato seed. Approximately, 4 weeks prior to the normal planting date, place your seed at 20°C in the dark until you start to see sprouts beginning to emerge – then move the tubers into a spot where they will receive 10+ hours of gentle light each day. After about 2 weeks of this treatment the seed tubers will form short, stubby green sprouts that will stay intact during planting and give you a headstart on early emergence of your potato crop.
- Emerging potato plants are frost sensitive but following a frost event, the plants will eventually regrow from stems protected under the soil.
- Planting small whole potato seed tubers is preferred to cutting larger seed. If you must cut larger tubers into seed, ensure that there is at least one live sprout/seed piece.
- Plant potato tubers 10-15cm deep. For irrigated potatoes, place tubers 30cm apart within the row and 1m apart between rows. For dryland potatoes, increase in-row spacing to 45cm.
- Form small hills of soil over tubers at planting time. When plants emerge, hoe up soil around the potato plant being careful not to cover the emerging plant. Two to three weeks later (late in June), pull more soil from between the rows to expand the hill around the plant. The potato plant should be growing in the lower centre of an 'M' shaped hill. Hilling plants will encourage tuber production along the underground stem.



Recommended Growing Conditions and Practices

- Potatoes prefer sandy loam to loam soils for good tuber production.
- Although potatoes produce well in fertile soils, too much nitrogen, especially early in the season, will encourage excessive top growth at the expense of tuber set.
- Make sure any manure added to your garden is well composted. During the composting process, microorganisms convert nutrients in the manure into usable forms for the plants. Uncomposted manure can contain high levels of certain nutrients, like nitrogen, that can burn plant tissue. Uncomposted manure can also contain bacteria like E. Coli. E.coli is not something you want on your fresh vegetables.
- A steady supply of soil moisture will promote production of a vigorous potato crop capable of producing optimum yields of well-shaped tubers. Irrigate actively growing potato plants 2.5cm water/week
- Keep the potato patch weed free to produce maximum yields and to reduce problems with disease and pests like aphids and Colorado potato beetles.

Harvest

- Potatoes can be harvested as soon as the tubers reach the desirable size for eating.
- Removing the potato tops at least one week prior to harvesting encourages good skin set on the tubers. Good skin set ensures that the tubers will resist dehydration and disease during subsequent storage. If the tops have been frozen or have senesced naturally prior to harvest there is no need to remove the tops prior to harvesting.

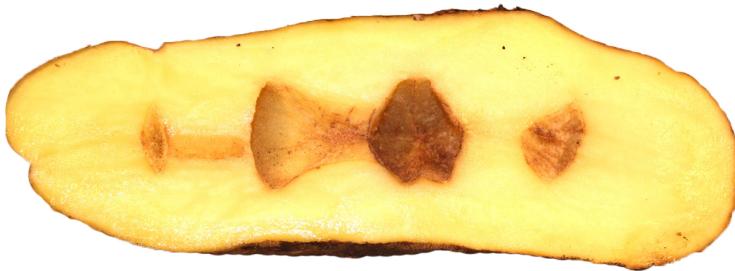
- Should I dry my harvested potatoes in the sun? Allowing freshly harvested potatoes to briefly dry in the field will help in the removal of adhering soil. However, more extended exposure to sunlight is not recommended. Light, of any kind, encourages the potato to turn green and produce glycoalkaloids which give the potato a bitter flavour.
- Are green potatoes poisonous? Potatoes tubers turn green after significant exposure to light. The green colour indicates chlorophyll synthesis. While this may indicate the presence of glycoalkaloids, usually these glycoalkaloids are located just beneath the tuber skin. By peeling away the green skin and underlying green flesh, the tuber should be safe to eat. If the potatoes taste bitter, they may be high in glycoalkaloids. Cooking at temperatures higher than 350°F partly destroys glycoalkaloids. When in doubt – throw it out.

Storage

- Ideal storage conditions for potatoes are about 4°C and 90-95% humidity with regular air exchanges.
- Black spots in the potato flesh indicate a lack of oxygen to the tuber tissues, resulting in cell death. Tubers exposed to flooding during growth or insufficient air exchange/oxygen supply during storage commonly show this disorder.
- Do not store apples next to potatoes. The ethylene from the apples will cause the potatoes to sprout.

Disorders

- ‘Hollow heart’ in potatoes refers to a spot of brown flesh or a hollow area in the centre of the potato. Hollow heart is caused by rapid fluctuations in growing conditions – such as sudden and extreme fluctuations in field temperatures or a heavy rain after several weeks of drought. Potato cultivars, like Viking and Shepody, which tend to produce only a few large tubers are more prone to ‘hollow heart’ than other potato cultivars.



- ‘Knobby potatoes’ refer to knobs or outgrowths forming off to the side of a main tuber. Like hollow heart, this disorder is exacerbated by fluctuating growing conditions i.e. hot and dry followed by cool and wet. The cultivar Russet Burbank is very prone to knobby growth.



Potato Pests

Colorado Potato Beetle(CPB) (*Leptinotarsa decemlineata*)

Life Cycle:

- Adults overwinter in the soil in the previous year's potato fields or in surrounding grassy areas.
- Overwintering adults appear in the late May or early June; feed for a few days on the emerging potato crop and then mate.
- Individual females lay 300-500 eggs from June to late July. These eggs will be found in yellow clusters on the underside of potato leaves.
- Once the eggs hatch, larvae appear as 3-5mm long yellow-orangey red soft bodied organisms. The larvae feed heavily on the leaves for the next 3-5 weeks and then burrow into the soil.
- Pupation occurs in the soil and new adults emerge in 1-2 weeks.
- The new adults feed for a few days and then begin to look for a protected spot to hibernate through the coming winter.
- In Saskatchewan there is usually only one generation of Colorado potato beetle per growing season.

Management:

- Whenever possible, avoid growing potato plants in or near the same area of the garden for a minimum of three years.
- Pick the first flush of adult beetles by hand – this will reduce eggs laid, larvae and the number of adult beetles later in the season.
- Rototill in fall to expose the overwintering adult beetle to cold and dehydration.
- For larger gardens, consider digging a plastic lined trench around the potato patch. The beetles will become trapped in the plastic lined trench as they are unable to climb the steep, slippery walls of the trench.

Wireworms (*Agriotes sp.*)

Description:

- Tunnel into potato seed pieces and developing tubers.
- Holes that look like a sharpened pencil has been stuck in the potato are characteristic of wireworm damage.
- Potato wireworm infestations can be especially problematic in newly broken land that was previously in prairie or sod.
- To determine the level of wireworm infestation in a new potato patch, place carrot pieces, buried 10cm deep, throughout the area you plan on planting to potatoes. After three or four days, dig up the carrot pieces and count the number of wireworms. If an average of one or more wireworms is encountered per station, damage to the coming potato crop can be severe.

Management:

- To prevent wireworm infestations, avoid planting in newly cultivated soils.
- Employ a minimum three year rotation with crops such as corn and beans.
- Minimize irrigation in infested soils as wireworms do poorly under dry soil conditions.
- Rototill the potato plot deeply (10cm+) and late in the fall to expose overwintering larvae.
- Wireworm problems in the typical garden tend to decline with time, as the wireworms move out of the garden and into other more preferred food crops such as grasses.

Potato Diseases

Scab

- **Common scab** (*Streptomyces scabies*) is a bacteria type organism that causes the formation of roundish, irregular, brown lesions on the tuber surface. As the name suggests, the lesions resemble scabs.
- **Powdery scab** (*Spongospora subterranea*) is a fungal disease characterized by smaller and rounder warty, raised lesions on the tuber surface. The scab lesions caused by powdery scab are very similar in appearance to common scab – and the two diseases can only be accurately differentiated under the microscope. Both types of scab can survive in the soil for many years.
- Neither type of common scab causes any loss in yield or quality of the potato crop – aside from their negative impact on tuber appearance.

Prevention:

- There are no chemical treatments for either type of scab and the best way to avoid scab is to prevent it from entering your garden by:
- Purchasing only certified, scab-free potato seed.
- Placing your potato patch in a minimum 3 year (preferably 4-5 year) rotation with other vegetable crops.
- Scab problems may be exacerbated by high organic matter content in the soil; ensure that all organic matter and manure is well composted before adding it to garden soil.
- If common scab is a problem, try irrigating slightly more than normal, especially when the crop is just setting tubers (hint – this occurs when the crop is starting to flower). By contrast, if powdery scab is a problem, avoid over-irrigating your potato patch.
- Grow potato cultivars that are resistant or less susceptible to scab.

Resistant cultivars: most russets (ex. Russet Burbank, Russet Norkotah, Goldrush), Viking (red skin), Norland

Susceptible to scab: Shepody, Yukon Gold, Pontiac, Sangre

Rhizoctonia or Black Scurf (*Rhizoctonia solani*)

- when potatoes are planted into cold wet soil, this soil and seed-borne fungal disease attacks the emerging sprouts, resulting in slow crop emergence and development of a small weak plant. If cool wet conditions persist into the growing season, Rhizoctonia affected plants produce reddish-brown stems with rolled purple/red leaves. They may eventually begin to form tubers above the soil surface.
- As the potato crop matures, the Rhizoctonia fungus produces black resting spores on the surface of the tubers. These spores resemble soil – but as they adhere tightly to the surface of the tuber they look like “soil that won’t wash off”.

Management:

- Plant certified seed tubers that are free from rhizoctonia. Grow potatoes on a minimum three rotation in the garden; do not include any other solanaceous crops in that rotation (ex. Pepper, eggplant); plant tubers into warm, dry soil where there will be rapid emergence; delay irrigation until the crop has emerged.
- Harvest as soon as the crop is mature as the severity of Rhizoctonia infection of the tubers increases rapidly once the tops begin to die-back.
- Tubers affected by Rhizoctonia may not be attractive, but they are edible

Early Blight (*Alternaria solani*) vs Late Blight (*Phytophthora infestans*)

- Early blight is a common disease among potatoes and other solanaceous crops like tomatoes. Late blight also affects potatoes and other solanaceous crops. While late blight is not as common in Saskatchewan as early blight it is a much more devastating disease when it does occur.
- Symptoms of early blight include: small, brown, lesions consisting of concentric rings. The lesions take on an angular shape as they are limited by the leaf veins. Pale yellow margins often border the lesions. Early blight is typically seen first on the older, lower leaves. While early blight typically shows up late in the growing season every year in Saskatchewan, it rarely has any impact on yields or crop quality.

Preventing early blight:

- Management practices that keep the potato crop healthy and vigorous will also protect it against early blight. Plant high quality certified seed into fertile soil and keep the crop well watered.
- Symptoms of late blight include: lesions appear on older leaves following several days of warm, wet or humid weather. Late blight lesions begin as dark green, water-soaked areas at the leaf tips. A yellowish-white halo will often surround these lesions. The lesions grow rapidly and do not stop at the leaf veins. A white fungal growth can sometimes be detected on the underside of infected leaves, especially on dewy mornings. Under wet, warm conditions, late blight spreads rapidly and can kill an entire potato patch in a few days. Tubers at or near the soil surface will be infected by late blight spores. Tubers infected with late blight display sunken
- lesions (especially around the eyes) that become reddish and granular. Soft rot bacteria quickly invade late blight damaged tubers, turning the entire potato storage into a mushy, rotting mess.

Preventing Late Blight:

- Late blight can only overwinter on the Canadian Prairies in living potatoes. Infected tubers culled from the crop should be buried or frozen. Never plant potato tubers that are suspected of carrying late blight.
- Potato plants infected by late blight should be immediately removed from the garden and buried. Tubers not affected by rot can be eaten.
- As there have been incidences of greenhouse grown tomato transplants spreading the late blight fungus early in spring: ensure that your tomato transplants are grown by a reputable greenhouse grower.
- Foliar copper sprays can help prevent late blight infection but are useless once a late blight infection becomes established. The sprays must be re-applied immediately after every rain/irrigation event.

Dry Rot (*Fusarium* sp.)

- The fusarium fungus causes the development of a slow growing greyish/black dry rot in stored potatoes.
- The best way to prevent dry rot is be very careful during harvest, as this disease can only gain entry to the potato through a wound.
- Maintaining low temperatures throughout the storage period will slow but not stop development of the dry rot.

Soft rot

- Can be caused by several different organisms that naturally occur in the soil.
- Soft rots most commonly invade tubers through the cuts and bruises that occur during harvest. Potatoes damaged by frost or flooding are also susceptible to attack by soft rot bacteria.
- Development and spread of soft rot depends on warm moist conditions.

Prevention:

- Grow potatoes in well drained soils. Time the harvest so the crop is lifted during cool conditions (ie; less than 10°C) but well ahead of heavy frost. Harvest carefully to avoid damage to the tubers. Store only mature tubers with good skin set. Hold freshly harvested potatoes for a week or so at 10°C to promote wound healing – then cool to the final storage temperature of 4°C. Maintain steady air flow through the potatoes during wound healing and long-term storage. If washing potato tubers prior to storage, use clean, cool water and ensure that potatoes are dry prior to storing.



Rhizoctonia or Black Scurf (Rhizoctonia solani)



Common scab (Streptomyces scabies)



Early Blight



Late Blight

POTATO CULTIVAR INFORMATION

Every potato cultivar has been bred for a particular purpose. For example, boiling potatoes don't necessarily fry well and baking potatoes don't necessarily boil well.

Boiling potatoes usually have a high water content and waxy texture so that they don't turn 'mushy' during the boiling process.

Norland – red skinned, white fleshed, oval potato recommended for boiling. Early maturing with good yields. Well suited to Saskatchewan soils and growing conditions.

Viking – red skinned, white fleshed, oblong-round recommended for boiling. Early maturing. Produces a limited number of tubers/plant so the tubers tend to be very large.

Purple Viking – purple skinned, white fleshed, oblong-round cultivar recommended for boiling. Slightly later maturing than Viking. Tubers tend to oversize. Yields are lower than Norland.

Caribe – purple skinned, white flesh, oblong potato that matures in mid-season. Yields tend to be slightly lower than Norland. Sensitive to scab.

Sangre – dark red-skinned, white fleshed, oval potato recommended for boiling. Mid-season maturing with average yields. Tubers are slow to oversize. Sangre is more susceptible to scab than Norland or Viking.

Peregrine Red – relatively new, dark red-skinned, white fleshed oval potato recommended for boiling. Mid to late season maturing with excellent tuber set and good yields. Tubers do not oversize and the tubers store better than Norland. Peregrine Red is more susceptible to scab than Norland or Viking.

Pontiac – red skinned, off-white fleshed oval-round potato. This variety has been around for many years. Pontiac matures slowly and tends to produce oversize tubers. Pontiac is very susceptible to common scab.

Bintje – a white skinned, yellow fleshed oval potato. This mid to late season maturing cultivar has medium sized tubers with average yields. Taste is excellent and it is recommended for boiling.

Shepody – a white-skinned, off-white fleshed, oblong potato recommended for boiling, baking and frying. Shepody matures early

to mid-season. Oversize tubers are prone to hollow heart. Shepody is high yielding and has good flavour but is very susceptible to a range of diseases including scab.

Baking potatoes have a higher level of solids in their flesh, resulting in a firm dry texture after baking.

Russet Burbank (a.k.a. - Netted Gem) – a russet-skinned, off-white fleshed, oblong potato that is recommended for baking and French frying. As Russet Burbank matures slowly its yields and quality can be disappointing in a short or dry growing season. Russet Burbank is susceptible to hollow heart and knobiness, especially if the growing conditions fluctuate. Russet Burbank is resistant to scab.

Russet Norkotah – a dark russet-skinned, uniform, oblong potato with off white flesh. Russet Norkotah matures mid-season and produces excellent yields of very uniform sized potatoes. Russet Norkotah shows little hollow heart or knobiness. The flavour of Russet Norkotah flavour is not as good as other baking cultivars – especially after long-term storage. Russet Norkotah is resistant to scab.

Goldrush – a russet-skinned, oblong potato with off-white flesh and good flavour. Goldrush matures in mid-season and yields are excellent. Goldrush is very resistant to scab and is recommended for baking.

Yukon Gold – a white-skinned, yellow fleshed, round to oblong potato recommended for baking and frying. Yukon Gold matures early and tubers tend to oversize. Yukon Gold has good flavour. Yukon Gold tubers tend to rot easily if damaged and it is very susceptible to scab.

Fries/Chip potato cultivars have a high percentage of solids in their flesh and low sugar content. The high solid content insures the potatoes will stay crisp after frying while the low sugar content prevents the potatoes from becoming too dark when fried.

Shepody (see above)

Yukon Gold (see above)

Atlantic – a light russet skinned, oval potato with off-white flesh. Atlantic matures in mid-season and yields are excellent. Atlantic is recommended for potato chips, French fries and baking.