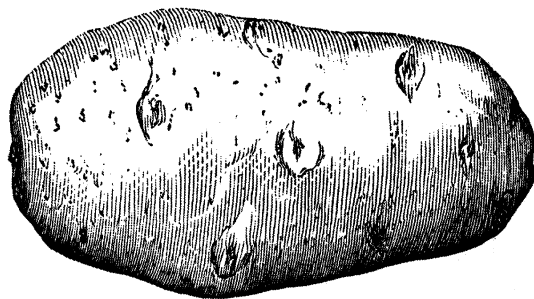


Potato Facts



Selecting, Cutting and Handling Potato Seed

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Bulletin #2412

Generally, a “five percent rule” applies with seed lots. A seed lot with five percent or more total defects is too high to use.

Selection of good seed is a critical decision faced by every potato grower. A good crop starts with good seed. The same amount of fertilizer, pesticide and effort is put into a crop from poor seed as into a crop from good seed. Choosing seed that is both physiologically as well as physically healthy is important. Disease-free seed is essential to a good crop. Seed that is physiologically young, has been handled gently and stored carefully is also important.

Choose Disease-Free Seed
Inspect seed for disease symptoms. Some disease symptoms can be treated, but the presence of others should be grounds to reject the seed. If more than 20 small or 10 large *Rhizoctonia* sclerotia are visible on one side of the seed tuber, consider using a different seed source. Seed with less than 20 small or 10 large sclerotia should be treated before use.

Seed lots with less than one half of one percent (0.005) of tubers with *Fusarium* symptoms can be used if the diseased tubers are removed before cutting and seed treatments are used on the remainder of the lot.

Tubers with five percent or more of the surface affected with silver scurf should not be used for seed. No seed treatment has been shown to be highly effective in controlling the pathogen that causes this disease.

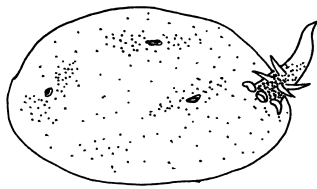
Seed lots with more than one percent of the tubers showing blackleg symptoms or soft-rot symptoms should not be used. The presence of pinkeye, early blight or late blight lesions on the tubers could act as inoculum for new crop infections. This seed should not be used. Know the source and history of a seed lot and try to avoid those that have had heavy infection with *Verticillium* spp.

Seed-borne scab can contaminate a field without a history of scab and should be used only in fields with a history of scab. Seed with scab should be treated to control this disease. High levels of scab on the seed warrant rejection of the seed lot. Adjusting pH of the fields greatly aids in the control of scab.

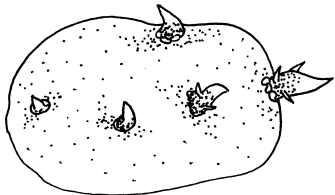
Generally, a “five percent rule” applies with seed lots. A seed lot with five percent or more total defects is too high to use. Seed is a large investment. Each grower should strive to use the highest quality seed obtainable.

Physiological Age of Seed

The physiological age of seed is an important factor in choosing potato seed. Factors affecting the physiological age of tubers include growing season stress, storage temperature and time. Temperature is very important because warmer storage temperatures will speed the aging process of the tubers. Since precutting seed also ages the seed physiologically, it helps to understand the stages of aging.



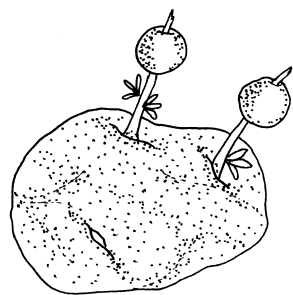
Young seed piece



Middle-aged seed piece



Old seed piece



"No top"

To determine the physiological age of seed potatoes, gather a sample, place them indoors and allow them to sprout. Observe the sprouts that come from the sample to determine the physiological age of the seed. There are distinct stages through which potato seed passes.

Dormant Seed:

If the potatoes do not sprout at all, they may still be in a period of dormancy. Most potatoes undergo a dormant or resting period. The length of dormancy varies with the variety. There are chemical and nonchemical means to break or greatly reduce the dormancy period.

Young Seed:

Young seed is characterized by apical dominance. Young seed will have one or just a few sprouts. These sprouts emerge from eyes on the apical or bud end of the tuber. There is a strong, internal inhibitor that keeps eyes on the center and stem end of the tuber from sprouting. Eyes distant from the apical end may never sprout. Young seed will produce a plant with few stems. A low stem number leads to a low tuber set. Larger, but fewer, tubers would be expected from young seed.

Middle-aged Seed:

Middle-aged seed will have multiple sprouts. All the eyes on the potato could sprout. There is no clear apical dominance; eyes from the bud end, the middle and the stem end will sprout. Middle-aged seed produces plants with multiple stems that lead to high tuber sets.

Old Seed:

Old seed will have branched sprouts that can appear hairy. These sprouts are weak, and they will not produce a vigorous plant. Typically, plants from old seed will produce high tuber sets, but the plants lack the vigor to bulk the tubers to a desirable size.

Potato No Top:

Seed can be so old that small tubers form on the sprouts once they emerge from the eyes. "Potato No Top" is the name given to this disorder of extremely old seed. Seed with "Potato No Top" disorder should not be used. Any stress during the growing season produces potatoes that are physiologically older than those grown without stresses.

Precutting Seed

Once good seed is selected, the decision must be made whether or not to pre-cut the seed. Precutting seed potatoes involves warming the tubers, cutting them to size and cooling the seed pieces back down to a holding temperature. Not all seed potatoes should be pre-cut.

Only seed of young or middle physiological age should be pre-cut, since precutting ages the seed. Seed that is young can be pre-cut up to one month before planting. If the seed has previously sprouted, the seed should be cut only two weeks ahead. Middle-aged seed can be pre-cut up to two weeks ahead of planting only if it has not sprouted. Middle-aged seed that has sprouted and been desprouted is old seed. Seed that is physiologically old should not be pre-cut. Old seed should only be cut a few days ahead of actual planting. Cutting any earlier may cause aging and "Potato No Top."

The temperatures at which to warm the seed and hold the cut seed vary for different aged seed. The younger the seed, the higher the cutting and holding temperatures. Young seed can be cut and held at about 50 degrees F. Older seed should not be warmed or held above 45 degrees F. Since sprouting ages the tuber, temperatures should be lower for seed that has already sprouted.

Precutting offers several advantages that will help potato seed overcome adverse soil conditions at planting and avoid dormancy factors of some varieties. Precutting seed potatoes

advances the physiological age of the tubers. Also, it allows the cutting operation to begin earlier, when labor is less in demand, before planting starts. Precut potatoes may have a better opportunity to cure under controlled storage conditions. Properly cured cut seed, if held for three or four weeks, will overcome dormancy and give more uniform sprouting. Precut seed will provide earlier emergence, vigorous early growth and higher plant and stem populations. Varieties that have slow seed curing ability, such as “Atlantic” and “Kennebec,” are good candidates for precutting.

Delayed emergence, slow, uneven establishment and reduced plant stands are all symptoms of planting seed in soil that may have been either too cold, too wet or even too dry. Freshly cut seed planted under these unfavorable conditions often fails to heal properly; it becomes dehydrated or infected by decay organisms and is not capable of good growth. Erratic and slow plant growth also interferes with timely herbicide and hilling practices; missing hills and smaller plant canopies later in the season offer less competition to weeds.

Adhere to temperatures and timing set by the physiological age carefully. Keep in mind that the cutting, the warming and the holding will all advance the physiological age of the seed. Remember, precutting is not for all seed. Planting fresh cut seed is recommended when seed needs to be planted right away.

Cutting Seed Pieces

Once good seed has been selected and the decision to cut has been made, proper seed cutting and handling is essential. Properly cut seed pieces feed correctly in the planter and provide uniform plant stands. Mechanical cutters can handle large volumes of seed and cut tubers into two or four pieces. Hand cutting minimizes the

Precutting and Holding Temperatures for Precutting Seed				
Seed Age	Not Desprouted Seed		Desprouted Seed	
	Precutting Time	Holding Temp.	Precutting Time	Holding Temp.
Young	1-2 months	50° F	2 weeks	45° F
Middle	1-2 weeks	45°-50° F	No	No
Old	No	No	No	No

number of blind pieces, but is slow and labor intensive.

Potatoes should be warmed prior to cutting. Seed tubers should not be washed. Do not try to salvage diseased potatoes or those that are breaking down. Grade out bent or very rough tubers for hand cutting. Size seed potatoes before cutting. Tubers under 1.5 ounces should not be planted. Tubers weighing between 1.5 ounces but under three ounces should be planted whole. Three- to five-ounce seed tubers should be cut into two pieces. Five- to seven-ounce tubers should be cut into three pieces. Sort out seed over 10 ounces for cutting by hand, or, preferably, for sale to other markets.

Disinfect all equipment before each seed cutting session and between seed lots. Calibrate the seed cutter daily and between lots. Keep the seed cutter knives sharp and straight to prevent ripping the potato surface. Ripping provides an ideal area for disease organisms to attack the seed.

Proper Seed-Piece Size

The size of a potato seed piece affects early plant vigor a great deal. Larger seed pieces usually emerge faster than smaller ones.

Cut seed tubers into blocky pieces about 1.75 ounces in size. Discard poorly cut seed pieces, such as slivers or slabs. Remove seed pieces ripped or torn by dull knives. Each seed piece should have at least one eye. For varieties with poor eye distribution,

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such as “Atlantic” and “Shepody,” consider cutting seed pieces closer to two ounces each.

An ideal seed size range is between 1.5 ounces and two ounces. Seed pieces should average slightly larger at two to 2.5 ounces for “Russet Burbank” and similar varieties, with larger spacing between seed pieces. Seed pieces smaller than 1.5 ounces should not be used. Seed pieces larger than three ounces may have some difficulty feeding through a planter. Planters require that at least 70 percent of the seed be in the 1.5 to three-ounce range.

Higher total yields are generally associated with larger seed pieces, but at some point the seed piece size will not result in increased yield. Bruise problems are more severe with very large seed pieces. Excess bruising increases the risk of seed decay problems. There is a greater cut surface area per seed piece with large seed. More stored energy will be used for wound healing and less is left to support new plant growth. Emergence will likely be slowed and plants will be less vigorous. A good rule is to keep the number of cut surfaces per tuber to a minimum.

Undersized seed pieces can contribute greatly to the number of doubles or triples planted. Oversized seed pieces can cause skips and are also prone to fall out of the planter.

To assess your seed cutting operation, assess the weight distribution of the cut seed. If hand cutting, demonstrate the proper seed sizes and shapes to seed cutters. No more than 10 percent should be less than one ounce or more than 2.5 ounces. If there are 100 seed pieces in 10 pounds, the average size is 1.6 ounces; if there are 91 seed pieces, the average size is 1.75 ounces; if there are 80 seed pieces, the average size is two ounces. Count out 100 seed pieces and weigh them — 9.4 pounds would have

an average size of 1.5 ounces, 10.9 pounds would have an average size of 1.75 ounces, and 12.5 pounds would have an average size of two ounces.

Curing Cut Potato Seed

Cool the cut seed to 38 to 40 degrees F (<45 degrees F), and do not pile it more than six feet deep. Good air circulation will keep the temperature uniform and prevent carbon dioxide buildup, which interferes with wound healing. Relative humidity levels of 85 to 95 percent are needed to promote healing and prevent dehydration.

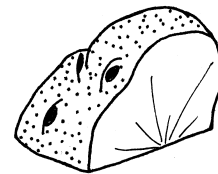
Six to 10 days at these conditions will complete the curing process. If there is too much air flow and not enough humidity, a thin skin may form on the cut surfaces. This thin layer is not enough to provide wound protection and can be easily sloughed off when handled.

Warm the seed tubers before taking them from storage, unless sprouting is a problem. Re-warm seed again for two days before planting to get sprouts growing again and to avoid condensation on the seed. Remember that this practice does not overcome deficiencies of poor quality seed.

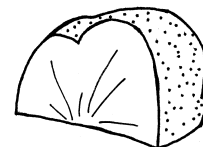
Seed Treatments

Chemical seed treatment is often used as insurance against disease.

Chemical seed treatment is recommended if seed is to be planted in very wet, very dry or very cold soils. Seed-piece treatments with a ground tree-bark component appear to aid in wound healing and prevent cut pieces from sticking together. This provides better flow of seed at planting. One pound of seed treatment material per 100 pounds of cut seed is too much, one half pound of material per 100 pounds of cut seed is not enough.



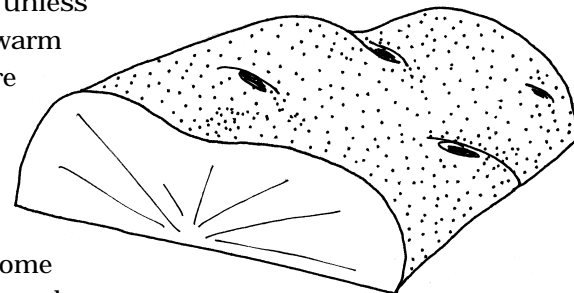
Good seed piece



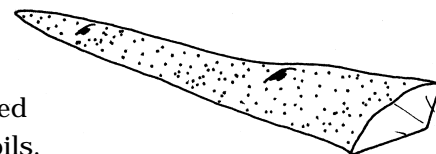
Blind



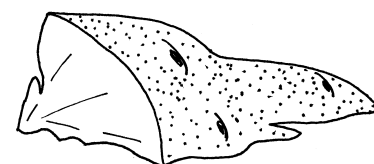
Undersized



Slab



Sliver



Ripped

Handling Cut Seed

Care in handling cut potato seed is perhaps the most underrated aspect of commercial potato production. Cut potato seed is much more easily bruised than whole potatoes of similar weights. The most vulnerable areas of the seed pieces are the edges of the cut surfaces. Very small impacts can damage cells on the edges of the cut seed. These damaged areas allow decay organisms present on the seed or in the soil to infect the seed piece. Damaged cells may not heal.

Seed-tuber and seed piece bruise is beginning to be recognized for its importance. Bruise problems are more severe (both before and after cutting) with larger seed tuber sizes. As seed tuber size increases, there are more cut surfaces, more right angle cuts and greater cut surface areas per seed piece. The number of cut surfaces on

the seed piece affects the rate of emergence, the rate of early growth, stem numbers, set, grade and final yield. The more cut surface area on the seed piece, the greater the seed decay potential, the slower the emergence, the more stored energy in the seed that is dedicated to wound healing and suberization and, therefore, the less that is left to support new plant growth.

Planting Quantity per Acre

The quantity of seed required per acre depends on the average seed piece size and the seed piece spacing. Larger seed has been shown to produce bigger yields in some varieties. Keep in mind, however, that many other factors besides seed piece size and physiological age of the seed piece determine the final yield. These include soil temperature at planting, accuracy of the planter, soil moisture, fertility and diseases.

Seed per Acre Requirements at 34- and 36-Row Spacing
with Plant Spacing from 7 to 12 Inches

Row Spacing (in inches)	Plant Spacing (in inches)	1.75-oz. Seed Cwt./Acre	2.0-oz. Seed Cwt./Acre	2.25-oz. Seed Cwt./Acre	Seed Pieces per Acre
34	7	28.8	32.9	37.1	26,356
	8	25.2	28.8	32.4	23,061
	9	22.4	25.6	28.8	20,499
	10	20.2	23.1	17.3	18,449
	11	18.3	21.0	26.0	16,772
	12	16.8	19.2	21.6	15,374
36	7	27.2	31.1	35.0	24,891
	8	23.8	27.2	30.6	21,780
	9	21.2	24.2	27.6	19,360
	10	19.1	21.8	24.5	17,424
	11	17.3	19.8	21.8	15,480
	12	15.9	18.2	20.4	14,520