

SEED AND PLANTING MANAGEMENT

[William H. Bohl](#), [Nora Olsen](#), [Stephen L. Love](#), and [Phillip Nolte](#)

GUIDELINES FOR SELECTING SEED

Selection of High Quality Seed

Much information can be obtained about the quality of a prospective seed lot by visiting the seed grower's farm. Visits should be made during the growing season to see how the fields look. Later, after harvest, equipment, storages, and the seed lot itself can be inspected.

Inspection of Equipment and Storage Facility

Seed handling equipment and storage facility should be in good repair and clean. The area around the storage facility should be free of cull piles and other potato debris. Many seed producers have temperature-recording devices to keep accurate records of storage conditions. These records can be reviewed to determine that storage temperature has been managed properly.

Inspection for Sprouting or Mechanical Damage

Sprouted seed potatoes may suffer performance problems. Broken sprouts may produce excess and weaker stems, which in turn produce more tubers per plant with reduced tuber size.

Inspection for Diseases

The presence of several important diseases can be detected by visual inspection or with a simple test.

Late Blight: A careful visual inspection must be completed of any seed produced in an area where reports of late blight have occurred during the previous growing season.

Fusarium Dry Rot: Symptoms of severe infestations of *Fusarium* dry rot can be visually detected, but seed will not be certified if it contains more than 2 percent serious damage by dry- or moist-type *Fusarium* dry rot.

Soft Rot: The level of infestation should not exceed 1 percent. More than this amount could be an indication of potential problems for seed piece decay.

Rhizoctonia Canker and Black Scurf: On seed potatoes, *Rhizoctonia sclerotia* (the "black dirt that cannot be washed off") should not cover more than 20 percent of the tuber surface. Sclerotia are seldom responsible for more than cosmetic damage to the infected tuber but are the source of inoculum for the more damaging canker form of *Rhizoctonia*, which has the potential to cause significant losses.

Bacterial Ring Rot: Seed certification standards have a zero tolerance for bacterial ring rot. In most cases, inspectors can detect ring rot infection during the certification and shipping point inspections.

Silver Scurf: Silver scurf does not usually cause yield losses, but may lead to reduced quality in fresh packed potatoes. Transmission of the disease can occur through seed.



Examination of Certification Records

Before making a final decision on a seed lot purchase, growers should examine seed certification records. In Idaho, growers can obtain seed certification records from the Idaho Crop Improvement Association (ICIA), with the consent of the seed grower. Seed buyers should examine the summer field inspection reports, the ICIA storage inspection reports (available in January), and results of the winter grow-out test conducted in California (available in early March).

A document called a plant health certificate (to view a copy go to: <http://www.umaine.edu/paa/Certification/2003%20NASPHC.xls>) is used by the certification agencies in the U.S. and Canada and can be requested from the responsible agency in the state where the seed was grown. It lists such information as summer and winter test results, certification pedigree of the seed, certification lot numbers, seed class, and farm history.

All seed potatoes should have passed a shipping point inspection and must be sealed and properly tagged by a federal-state inspector. All transport trucks must be sealed with a metal seal by a shipping point inspector. Growers must verify the certification number before accepting a shipment to be certain that the potatoes being delivered are the same ones purchased.

SEED TUBER AND SEED PIECE SIZE

Seed Tuber Size

Tubers used for cutting into seed pieces should be 3.5 to 10 ounces.

Average Seed Piece Size and Distribution

The cutter can be adjusted as needed to optimize seed piece size and distribution.

Average Seed Piece Size

The optimum seed piece size depends on factors such as seed availability, cost of seed, in-row spacing, and market incentives. In most cases, seed lots with seed pieces averaging 1.5 to 2.5 ounces in size will provide optimum returns. Planting seed pieces averaging 1.5 to 2.5 ounces is acceptable for most varieties, but acceptability of this size range for individual varieties depends on the number of eyes per seed tuber. Average seed piece size should be frequently checked during the cutting operation. Collect and weigh a sample of about 15 to 20 pounds cut seed pieces, then count the number collected, and divide the weight of the seed pieces in ounces by the number of seed pieces to determine the average size.



Seed Piece Size Distribution

At least 72 percent of the seed pieces should weigh 1.5 to 2.5 ounces. This will require weighing each seed piece individually to determine if it weighs more or less than the target size, or weighs within the target size.



SEED AGE

Chronological and physiological are two terms used to describe seed tuber “age.” A brief discussion will be presented here on this topic, but the reader should refer to **Potato Production Systems** book for more detailed information ([Order Potato Production Systems](#)).

Chronological Age

Chronological is the duration of time from seed tuber harvest the previous fall to planting the following spring.

Physiological Age

Physiological age of a tuber (not easily determined) involves a complex interaction of environmental and cultural conditions that occur during the seed growing season and during storage, in conjunction with chronological age. Physiological age can be broadly defined as the physiological status of the tuber as it affects productivity. In general, the most influential factor affecting physiological aging is the accumulation of heat units or exposure to warmer temperatures. Unfortunately, exact relationships between occurrence, type, and duration of temperature exposure and physiological age are not well established.

Performance of Physiologically Aged Seed

Some performance characteristics of physiologically older seed include earlier emergence, multiple stems, increased number of tubers per plant, and earlier senescence. Extremely young seed exhibits slower emergence and earlier growth. Planting older seed will result in a reduction in plant stand, vigor, and yield. The seed tuber age resulting in optimum performance potential is located somewhere between these two extremes in physiological age. The ideal seed age range will vary with each variety and end-use.

Factors Influencing Physiological Age of Seed

A relative estimate of seed physiological age may be determined based on the following:

Growing Conditions of the Seed Crop

Many environmental and cultural conditions during the growing season may influence seed physiological age; unfortunately, solid relationships have yet to be established. In general, the warmer the growing season, the greater the potential for aged seed.

Handling of Seed Tubers

Generally, as seed tubers are handled, the physiological age of the tuber increases. Rough handling that promotes bruising, wounding, or stress on the tuber can impact the age management practices might help predict performance potential.

Temperature During Seed Storage

Typically, seed potatoes are stored at approximately 38°F to minimize sprouting, decrease transpiration (water losses), and minimize physiological aging. Warmer storage temperatures will increase physiological age. Depending on the year and variety, slight differences in storage temperatures may or may not significantly impact seed performance.

Cutting and Transporting

When transporting seed, minimize extremes and fluctuations in temperatures and limit the amount of time in trucks.

Estimating Physiological Age of Seed

Since researchers have not discovered a measurement of physiological seed age, it is difficult to know how any lot of seed will perform. The best way for growers to estimate physiological age is to evaluate the seed growing and storage conditions. Regardless of any other indicator, seed that is sprouting before being shipped or cut should be considered physiologically aged.

Management Considerations

If growers want to increase the physiological age of seed potato to increase tubers per plant and decrease tuber size, the storage temperature needed to age the seed will differ with each season. *Please refer to **Potato Production Systems** book for more detailed information ([Order Potato Production Systems](#)).*

SEED CUTTING AND SEED PIECE TREATMENTS

Seed Cutter Maintenance and Adjustments

The seed cutter must be properly adjusted and maintained to produce quality seed pieces for planting.

Cutter Knives

Sharp cutter knives will produce smooth cuts on all seed pieces. A dull knife leaves an uneven cut surface, much like “fish scales,” that will not heal as rapidly as a smoothly cut surface.

Cutter Adjustments

Initial alignment of the sponge drum, cross knife, and cutting discs should be made before cutting any seed tubers according to the owner’s manual. These adjustments will likely need to be changed when changing seed lots.

Cleaning and Sanitation

Some potato diseases can readily spread during the cutting operation. Thoroughly clean and disinfect the cutter at least once a day and certainly when changing seed lots.

Seed Piece Treatments

Because of the time required for seed pieces to heal, researchers often recommend seed piece treatment fungicides to protect cut seed until the wound barriers can be established. Several treatments are on the market, each having advantages and disadvantages. Regardless of which seed piece treatment growers select, some general guidelines need to be followed to make the most efficient use of the product. Complete coverage of the seed piece is likely the most essential factor. Treatment will only protect healthy seed pieces from becoming infected.



Pre-Cutting Seed

Pre-cutting has some advantages, but growers need to know about the challenges associated with pre-cutting.

Advantages

It allows growers time to focus on the cutting operation without being concerned about planting. If soft rot has been a problem in the field, then precutting offers an advantage because the seed pieces can heal which will stop soft rot from invading the seed pieces.

Challenges

The biggest challenge to pre-cutting is to provide the necessary conditions for wound healing. Seed should never be piled higher than approximately 6 feet. It is also important to supply adequate amounts of moist air because dry seed pieces will not heal properly, and wound healing requires oxygen. Temperature of a pile needs to be carefully regulated by keeping it between 50° and 55°F. *Please refer to **Potato Production Systems** book for more detailed information ([Order Potato Production Systems](#)).*

PLANTING

Establishing a Uniform Plant Stand

Several factors must be considered when establishing a uniform stand.

Time of Planting

Planting date is more a function of soil temperature than calendar date. Soil temperature should be above 45°F for rapid emergence and to minimize seed piece decay. Planting in cool soils will likely not get the crop out of the ground earlier than waiting for warmer soil temperatures. If necessary, producers could irrigate fields before planting. Beware that water applied after planting seed pieces will likely enhance seed piece decay.

Seed Piece Spacing

The ideal seed piece spacing depends on variety and end use. Growers need to know the end use and the most desirable size category of the finished crop.

Planting Depth

A common planting depth is 6 inches. It may be tempting to plant seed pieces deeper than this to reduce the amount of green tubers, however, research at the University of Idaho has shown that planting deeper may cause a yield reduction in some

varieties. Growers may use tillage practices for weed control, but research to date indicates that these practices may be marginally effective for controlling greening.

Planting Seed Pieces Accurately

Two main factors contribute to planting accuracy: seed size distribution and planter speed. Other minor factors influence how accurately a planter places seed pieces, but paying particular attention to these two main factors will help optimize seed placement.

Seed Size Distribution

Potato planters will generally place seed pieces more evenly when the seed pieces are a uniform size. Producers should determine seed piece size distribution frequently during the planting operation.

Planter Speed

Planter speeds may vary from about 2 to 5 mph. Planters that are properly adjusted and operated correctly should place 75 percent or more of the seed pieces within the desired spacing. Seed pieces placed within 3 inches of the desired spacing are considered accurately planted.



Other Planter Adjustments

Several planter adjustments can be made to achieve a higher planting accuracy including, for example, seed bowl level or pick arrangement.

Determining Planting Accuracy and Average Seed Piece Spacing

Routine seed placement evaluations are needed to be sure the planter is performing as desired. Evaluate 25 feet of row behind each planting unit. Steps in determining planting accuracy include:

1. Uncover the seed pieces
2. Measure distance between seed pieces
3. Measure the total distance between first and last seed piece in each row
4. Total the number of spaces that are too narrow, accurate, and too wide
5. Total the seed piece intervals in each row
6. Calculate planting accuracy and average seed piece spacing

Please refer to *Potato Production Systems* for more detailed information ([Order Potato Production Systems](#)).