

# Maximizing Crop Potential with Proper Seed Handling

Updated April 14, 2023. Compiled by Ryan Barrett (ryan@peipotato.org)

## Managing Seed for Optimum Yield Potential

There are few decisions as vital to producing a profitable crop of potatoes than purchasing high quality seed. Likewise, if you grow your own seed, ensuring that seed will provide you with the greatest potential for a large and high quality commercial crop is of the utmost importance.

Factors to consider when purchasing seed include:

- Physical Condition (injury/bruise)
- Disease-free seed
- Delivery Timetable
- Fertility of seed crop
- Tuber size distribution
- Seed storage management

Not all seed is created equal. Seed of poor quality or that is poorly handled can reduce potential yield by more than 30 percent!

### Preparation for Seed Cutting

It is important to pay close attention to seed physiology prior to cutting. The physiological age and maturity of your seed has a direct influence on stem number, tuber set counts, and tuber size profile at harvest. Ensure that the physiological age of seed matches the variety and end use for your crop.

If you are cutting seed (as opposed to planting whole seed), it is important to pay attention to the shape and size distribution of seed pieces coming out of your set cutter.

Generally, sets with larger weight (2.5 to 3.0 oz) are associated with improved emergence and performance. Conversely, small slivers and small tubers under 1.5 oz should generally be discarded, as their performance potential is often limited.

Additionally, having fewer cut surfaces per seed piece is also associated with higher yield potential. A seed piece with fewer cut surfaces is less susceptible to bruising or seed piece decay, and can better partition energy for wound healing.



*Seed slivers and chips that should be removed at cutting. Pieces less than 1.5 oz generally don't produce profitable plants.*

### Set Cutter Maintenance and Calibration:

Growers should sample the profile of seed coming out of the seed cutter frequently to see if adjustments need to be made. Diagnosis of cutter adjustment problems can be done while the cutter is operating, saving time and keeping cutting volume steady.

Mechanical aspects of the set cutter to pay attention to:

1. Sizing Roller Spacing: get the right size ranges on the proper part of the cutter
2. Adjust flow volumes so potatoes don't bump each other out of line ahead of the knives. **Don't overload any level of the cutter.**
3. **Keep cutting knives sharp** to avoid jagged edges.
4. Check the horizontal knife for equal halves.
5. Open chip eliminator rollers to **discard pieces less than 1.5 oz.**



*A consistent run of seed exiting the cutter. Chips and slivers have been removed, cut surfaces are clean, and seed piece size is consistent.*



*An example of loading seed with minimum drop height from the bin piler.*

### **Bruise Reduction is Key:**

All seed potatoes, and especially those that are cut, are very susceptible to bruise. A bruise is the result of impact energy that exceeds the elastic properties of the tuber tissue. **Past trials have shown that heavy bruising in a seed lot can amount to up to 20% yield reduction.** In addition, the average cut seed piece has eight new bruises that were not present before cutting at the time of planting!

Why is this important? Primarily, almost all seed decay diseases (fungi, bacteria) enter the seed piece through bruises and cuts, impacting the emergence and vigor of seed.

Some helpful hints to remember to reduce bruising and mechanical damage of seed:

- Carefully examine your cutter, treater, conveyors, elevators, trucks, planter loaders, and planters for drop distances and impact surfaces.
- Use let downs in place of free-fall drops, and use carefully selected cushioning to reduce bruising.
- **Drops of 6 inches onto an edge or corner will cause bruising 100% of the time at 10°C.**
- Likewise, even a 3 inch drop will bruise tissue 90% of the time at 10°C.
- With colder temperatures, potato tissues become more brittle. **Adjust seed tissue temperatures to within 1-2°C of the soil temperature** in your field at seed depth. Otherwise, wound healing and suberization will be limited.

Many producers are used to handling the Russet Burbank variety, which has a reputation for being more forgiving when it comes to seed handling. It is fair to note

that many newer varieties being grown in Prince Edward Island today need to be treated more carefully than Russet Burbank, as they are more susceptible to black spot bruising, shatter bruising, and secondary infections (like Fusarium or bacterial soft rot).

### **Pre-Cutting Seed:**

Several varieties grown in Prince Edward Island (ie. Mountain Gem Russet, Althea) have shown in recent trials by Cavendish Farms Research Division to produce better marketable yields when pre-cut and stored for 14 days at 10°C. Please consult your variety profile to determine whether it is advised to pre-cut seed rather than plant fresh-cut seed.

**Pre-cutting seed followed by sufficient time for suberization helps to eliminate some of the risk** that can come from putting a freshly cut seed piece in the soil. These fresh cut seed pieces are more at risk of soft rot diseases and poor emergence, particularly if the soil is cool and wet. Pre-cutting (or planting whole seed) is particularly recommended for earlier planted acres.

When storing pre-cut seed, **ensure that seed is not piled too high (4-5 feet)** with sufficient air flow moving through the pile. Recommended temperature for fast suberization is 10°C.

**Do not leave fresh-cut seed on trailers** for more than a few hours. This is a recipe for disease spread and reduced seed vigour.

**Finally, it is important to have seed warmed up sufficiently before cutting.** This will reduce the risk of bruising while handling seed, speed up wound healing, and it will also produce fewer jagged cut surfaces that can attract pathogens.



*This producer is doing a great job of eliminating drop height when piling pre-cut and treated in the seed storage. However, the height of the pile should ideally be reduced to ensure maximum air flow through the pile.*



## Avoiding Seed Piece Decay through Treatment

Seed emergence can be significantly impacted by seed piece decay after planting. Seed piece decay is primarily caused by bacterial soft-rot (*Pectobacterium* spp.) or by a fungal dry rot caused by pathogens like *Fusarium* spp. There are multiple species of both that occur in Prince Edward Island, with some species of *Fusarium* showing resistance to conventional seed piece treatments in recent years. A 2011 trial in PEI using seed infected with *Fusarium sambucinum* resistant to Senator (thiophanate-methyl) and Maxim (fludioxonil) showed very high levels of emergence when products which include difenoconazole or prothioconazole are added. Another study in 2015 showed improved emergence rates with the use of talc as a drying agent.

### Best Management Practices for Preventing Seed Piece Decay:

1. Use clean seed and store in a disinfected facility. Try to **avoid cutting in a storage previously treated with CIPC**. Studies in New Brunswick showed 10% and greater yield reduction with even very limited exposure of seed to CIPC residue.
2. **Warm seed tubers prior to cutting** to promote rapid healing.
3. **Remove diseased tubers prior to cutting** to prevent disease spread in the seed lot.

**Disinfect cutting and handling equipment often**, and ensure that knives are sharp to make clean cuts that heal quickly. In recent years, some producers have added disinfection sprayer kits to their seed cutters to reduce the risk of disease spread during cutting. Particularly for varieties that are more susceptible to bacterial soft-rot diseases like blackleg, this can be an effective management strategy.

4. Don't store cut seed for too long (more than 2 weeks).
5. **Use a registered fungicide seed treatment on cut seed**. Liquid treatments like Cruiser Maxx Potato Extreme and Titan Emesto have proven effective on all *Fusarium* strains on PEI.
6. Seed disease diagnostic tools are locally

available! Contact the PEI Analytical Lab for more information on available services.

7. Plant when soil temperature promotes rapid sprout growth and emergence.

8. **Reducing seed wetness is key to managing decay** caused by soft-rot bacteria. Seed treatments will not control bacteria, and it's important to use a drying agent if using a fungicide seed treatment. Stick to label rates and water volumes, and store seed in a well-ventilated pile (not too high). Avoid "caking," which can create an anaerobic environment which promotes bacterial growth.



*An example of a disinfection sprayer system added to a seed cutter, mounted directly ahead of the knives for periodic disinfection (every 10-15 min).*

Additional resources on seed handling and seed production topics are available on the PEI Potato Agronomy website at [www.peipotatoagronomy.com](http://www.peipotatoagronomy.com).

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