

How to:

Reduce the impact of potato bruising on your profitability



What is potato bruising?

Potato bruising is a coloured blemish on or just under the potato skin. It is a major cause of consumer complaints.

Bruising is a serious problem and is a huge economic drain on the industry, costing the potato industry hundreds of millions of dollars every year. Most of this cost is eventually passed back to the grower with lower prices, reduced demand and increased storage costs.

Understanding the causes of potato bruising will make it easier for you to take steps to avoid bruising.

There are **four main types** of potato bruising:

Shatter Bruise

Shows as **cracks and fractures** in the potato skin. They are visible without cutting into the potato. They occur when potatoes are harvested and handled in **colder temperatures**. If a potato receives a physical blow, the force reverberates through the potato, fracturing the flesh and cracking the skin.



Blackspot Bruise

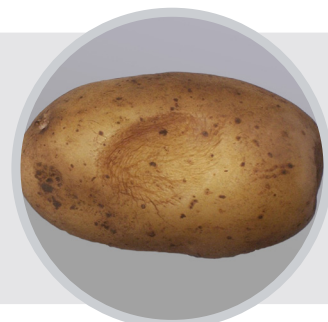
Shows as **grey spots** on potato flesh. They are visible when the skin is removed. If a potato receives a physical blow in dry or warm conditions, the potato's deep tissue is impacted but the skin does not break. The damaged internal cells leak their contents and the enzyme reaction causes the grey/black discoloration. The reaction takes time; damage is usually visible one to three days after cell damage.



Pressure Bruise

Shows as tissue discoloration along with a **flattened or squashed** area. This happens when potatoes are near the bottom of a large pile of potatoes. The **weight of the potatoes on top** causes depressions and flat areas on the potato's surface. Skin can also appear dull and wrinkled.

Pressure bruising is sometimes confused with natural flattening that occurs if growing conditions are challenging (poor soil preparation, deep planting or clods/stones in the soil).



Skinning & Feathering

When unripe potatoes are handled, the skin can become scuffed and start rubbing off. The 'skinned' area can turn dark if exposed to wind, sunshine or dry air. This significantly reduces their visual appeal and the potatoes are less likely to be accepted by consumers.



References: http://vric.ucdavis.edu/pdf/POTATOES/potato_storage.pdf; <http://www.cals.uidaho.edu/edcomm/pdf/bul/bul0725.pdf>

How to avoid potato bruising

Best practices for potato harvesting and processing vary around the world, depending on conditions and potato variety. This guide offers broad insights about potato handling. For specific advice for your conditions, please seek independent advice.

It is difficult to completely avoid bruising, these helpful hints can minimise the risk:

Before Planting



- Choose land that is best suited for growing potatoes, with as few rocks as possible.
- Avoid cultivation practices that create clods, especially clods that will not break down during the season.

During Planting



- Be careful using nitrogen based fertilizers. They can increase the likelihood of bruising during harvest.
- Use potassium and calcium in your fertilizer. These nutrients help potatoes heal wounds and fight disease.

During Growing Season



- Keep soil loose and well drained.
- Replenish the nutrients used by the plants so they grow to their full potential.
- Water potatoes well.
- Maintain a well-balanced fertilisation programme to keep vines green before the vine kill.

Pre-harvest Prep



- Keep harvesting staff up-to-date with bruise prevention methods.
- Put pads on chains used during harvesting and handling for extra protection. Check padding regularly and replace when worn.
- Reduce potato watering for two weeks prior to harvesting. This toughens their skins and makes them less susceptible to bruising.
- Make sure all equipment is in good running order. Regular service and maintenance is important for gentle produce handling.

Harvesting



- Harvest potatoes when tuber pulp temperature is >10°C (50°F).
- Minimise produce drop; no more than 150mm (6").
- Avoid harvesting equipment with chain shakers for separation of soil and clods as chains can damage potatoes.

Gentle Handling



- Make sure potatoes are handled gently throughout your post-harvest line (*see next page for more information*).
- During processing, potatoes should be >8°C (46°F).
- Where possible, use 'soft-tip' tippers.
- Use equipment that is proven to handle potatoes in the most appropriate way.

Storage



- Keep humidity high to avoid rot (95% humidity is ideal).
- Ideal temperature for long-term storage is 3 - 5°C (37°F - 41°F).
- Keep potatoes in a dark place.
- Store potatoes in a stair-step manner to avoid rolling.
- To reduce the risk of pressure bruising, keep potato piles under 3.5m (138") high, depending on variety.
- Do not overfill crates/boxes. Do not stack overfilled boxes on top of each other.

Dealing with potato scabbing

Potato scabbing is a common problem too. Light potato scabbing can be removed by a Vege-Polisher, but scabs caused by the zoosporic pathogen *Spongospora* cannot. If you have potato scabbing, research the best solution for you or seek independent advice.

Gentle potato handling

Gentle
Handling



All produce should be handled with care and potatoes are no exception. From preparing the soil for planting, to how potatoes are stored, every step along the way is important. Potatoes should not be handled cold. Ideally they should be between 8°C - 10°C (46°F - 50°F), to minimise bruising.

If you have questions about gentle post-harvest handling, find a provider with extensive knowledge of complete produce lines. They will be able to provide advice on every aspect of your line.

Processing

Bulk Unloading: If unloading in bulk (from trucks or storage), make sure conveyors are run full and potatoes flow, to minimise effective drop heights over transitions. Use **Troughed Conveyors** where possible to maximise flow.

Tipplers: For gentle tipping onto a conveyor, choose a tipper with a lid to minimise produce drop. **Soft-tip Bin Tipplers** gently tip produce from field bins in the infeed of your processing line. **Super-tip Bin Tipplers** can be used for tipping directly into water; they are especially efficient when using forklifts.

Waste Removal: To remove dry soil or debris, use suitable equipment to minimise damage. Rollers or finger separators can be aggressive. **Horizontal Hedgehogs** are gentle and effective.

Wet Hoppers: When potatoes enter your processing line, they can be received into water-filled **Wet Hoppers**. Tipping into water is very gentle, and excess dirt is removed before potatoes travel through your line. **Mini Wet Hoppers** are good for handling small tonnages.

Conveying: Avoid using conveyors and elevators where possible as transitions are potential damage points. If **conveyors** are necessary, keep drops below 150mm (6") and use soft landings and angled chutes to minimise the impact of the transition. **Flumes** are a gentle way to transport potatoes between stages of your line. **Flumes** can be designed to suit your exact needs; with optional flow dividers, gates and dewatering traces.

Destoning: It is important to remove stones and clods from your produce flow early on so they don't damage produce or equipment. **Destoners** usually use water for gentle destoning action.

Washing, Brushing & Polishing: There is a range of equipment available for **Washing, Brushing & Polishing** produce. Polishing is more gentle than you may think. If potato skin is intact after harvesting, it can be put through a **Vege-Polisher** set up for potatoes. If potato skin is damaged during harvest, a **Flat Bed Brusher** can be used. This is a modular system so there are no drops between sections and it can be combined with **drying** and conveying modules. **Barrel Washers** are another trusted option for gentle handling.

Cooling: Keeping potatoes cool is important for extending shelf-life and retaining produce quality. For potatoes that are harvested in hot climates then processed straight away, **Hydro-Coolers** quickly and effectively reduce field temperature. For gentle handling choose a **Hydro-Cooler** where potatoes travel partially or fully submerged in water. Some Hydro-Coolers are also designed to cool produce in bins/boxes if required.

Filling: When your potatoes are ready to be placed in bins or buffer tanks, gentle filling is needed. **Filling equipment** often has sensors to help maintain a small produce drop throughout the filling process.

Storage: **Bunkers** and bins are both common choices for in-line buffer storage. **Bunkers** are often deep (3m (12')). When considering different types of storage ensure that your potato variety can handle the pressure and make sure there is enough ventilation to prevent produce sweating. **Automatic bin handling systems** are another reliable option, providing gentle filling, less pressure on produce and greater storage flexibility. They also reduce transition points.

Line Layout & Design

Your whole line should be designed with gentle handling in mind. Choose a provider with in-depth experience in post-harvest **line solutions**. They should consider how your produce is handled throughout your line - from gentle receiving, to minimal produce drop at transition points. Ask for a custom designed solution for your exact needs.



About the Author:

Penny Bateman is the Group Marketing Manager at Wyma Solutions. She manages the global marketing strategy and enjoys the challenge of adapting plans to various markets. Penny has over ten years marketing and communications experience in both New Zealand and Australia with a number of high profile, international brands. Penny is passionate about maximising ROI and thoroughly enjoys helping customers to reach their full potential in their business.



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