Potatoes: Handle with care.

By Jenny Jobling

Potatoes are one of the world’s most important food crops. In Australia potatoes are the largest volume and highest value horticultural crop (excluding wine grapes) produced. Potatoes, compared to most horticultural crops have a long storage life. This difference is due to many physical attributes of potatoes. They are storage organs and so have many stored food reserves and also “nature” has designed them to last at least until the following season, to sprout again and begin the next generation. Potatoes, as a result are often regarded as tough or robust vegetables. This is a misconception and it does not mean that potatoes shouldn’t be handled with care. It has been estimated that losses due to physical wounding, such as cuts and bruises can be as high as 40%. This article aims to highlight the importance of handling potatoes carefully to avoid physical damage and as a result, minimise postharvest losses.

A recent survey of potato quality in the market place carried out by the Agriculture Victoria and the Victorian Farmers Federation showed that mechanical damage of potatoes was widespread with up to 49% of potatoes sampled having significant damage. The damage occurred both on the farm and post farm gate. This very high level of damage highlights the fact that handlers of potatoes all along the marketing chain need to take more care.

If potatoes are harvested when the stem and foliage is still green and vigorous or has just recently been cut, the tubers are immature and have very delicate skins. These potatoes are sometimes sold as ‘new potatoes’ and fetch a premium price. However they are difficult to handle as their natural skin is easily removed and is no defence against microbial infection and rots. Most potatoes are harvested later when the foliage dies and when the skin of the potato is more developed. At this stage the skin is much tougher but rough handling during harvesting and grading can easily damage the potato skin. This damage can detract from tuber quality, increases moisture loss and provide easy entry points for postharvest rots.

A recent HRDC project carried out by Sydney Postharvest Laboratory and Food Science Australia showed that wound type has a big influence on the development of postharvest rots. The severity of the disease infection increased as the level of damage increased. Scuffs, where the skin is broken and some bruising occurs, splits and skin grazes were all shown to be entry points for rots. Uninjured potatoes did not develop postharvest rots.

Postharvest rots

There two main postharvest rots of potatoes in Australia are bacterial soft rot and Fusarium rot.

**Bacterial soft rot (Erwinia sp.)** - Soft rotted tissue is characteristically creamy at first and later black. Under favourable conditions rotting can be very rapid and if there is development of a secondary infection (Clostridium sp.) Then a foul odour can also develop.

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Bacterial soft rot of potatoes.

The bacteria is usually present in the soil or can be present in the seed tuber. The disease normally enters the potatoes via wounds in the skin. The disease is therefore most effectively controlled by minimising physical damage during harvest and handling. Bacterial diseases can also be easily spread to other healthy potatoes so it is important to frequently clean and wash harvesting and grading equipment with chlorine. The chlorine wash water should also be regularly checked as chlorine is less effective in dirty dip tanks. Correct packaging and storage practices are also essential. Condensation on potatoes should be avoided at all costs. If the potatoes have been washed then they should be allowed to dry before packaging in plastic bags. The plastic bags should also have perforations to permit adequate air movement around the potatoes. Stacks of potatoes transported or exported to market should be shipped with adequate air flow to avoid around the stow so that condensation is avoided. The incidence of bacterial soft rot is also reduced by controlling the level of Fusarium rot as the presence of one disease can encourage the development of the other.

Fusarium rot (*Fusarium spp.*) - Fusarium rot is commonly called dry rot. The symptoms of this rot are that the rot forms cavities in the flesh which are lined with a pale covered mould and the skin tends to wrinkle as it loses water. The surface dries out over the infection and becomes a brown or black colour.

Fusarium rot of potatoes.

The fusarium fungi is present in the soil and the fungi enters the potato via physical wounds. Mature tubers can resist decay for a short period but often will begin to decay after several weeks in storage if there is any fungi present in the wounds of the potatoes. The main method of control is to avoid or minimise physical damage during harvesting and handling. Storage at 5°C also slows the development of this rot but it quickly develops on return to warmer temperatures. The potatoes should also be treated with a registered fungicide directly after harvest. Fungicide treatment will be ineffective if it is delayed as the fungus becomes established and resistant to the treatment.

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Curing

Curing is a process that is encourages the potato to naturally heal its own wounds. Curing potatoes before storage and transport has been shown to significantly reduce the incidence of postharvest rots. Potatoes can be cured by holding them for 5 days at 15 - 20°C and 90 - 95% RH. This can be done in a high humidity coolroom or conventional cool room could be used if the humidity was increased with an atomising nozzle and relative humidity controller. Curing is a very effective, non-chemical control method for both Fusarium and bacterial soft rot. If potatoes are to be stored for a length of time or exported by sea then it is essential that the potatoes are cured. Curing will ensure a quality out turn.

Harvest and handling

At all stages of harvest and handling physical damage must be avoided. Recent research has shown that most damage occurs in the packing shed rather than in the field. Potatoes are not as indestructible as many people imagine. Some practical measures that can be taken to prevent damage include minimising the height of drops and any sharp edges on trailers or conveyors should be smoothed. It is important that conveyors fill bins or trucks from the bottom to the top rather than staying at a constant height, this means that the potatoes are not dropped to great a distance into the bin. The height of the stack in the bin should not be allowed to get too high or too steep. A high, steep pyramid of potatoes means that the tubers can roll down the sides of the stack and be bruised. High stacks can also promote a cascading effect where many potatoes are dislodged and subsequently damaged and bruised.

The effect of the bruising and cutting potatoes during harvest and handling does not become evident until several weeks after harvest. This means that many growers may not be aware of the damage that a certain handling method causes. The Victorian survey showed that most damaged potatoes don’t get graded out during packing as nearly 50% of potatoes sampled at the retail level showed signs of significant damage. This damage is not a problem if the potatoes are consumed soon after harvest. However it does become a very important issue if potatoes are transported or exported over long distances. In these cases it is critical that the damaged potatoes must be graded out to ensure postharvest rots don’t ruin the load.

The type of packaging and the environment around the potatoes significantly influences the development of rots. For example, plastic packaging in comparison to hessian sacks has been shown to increase the level of rots. The high humidity inside plastic bags may minimise weight loss but it also encourages condensation which in turn promotes the development of rots. Even wounds containing minor tissue damage such as grazes and scratches have been shown to develop more rots in plastic packaging compared to hessian bags.
Storage

The optimum storage temperature for potatoes depends on their final use. It is recommended that fresh market potatoes are stored between 5 to 6°C. Potatoes that are used for making chips are stored between 7 and 10°C. The difference in temperature is due to the fact that potatoes for chips need to have low levels of sugars. Potatoes are mainly starch. At low temperature the starch is converted into sugars. This change detracts from the cooking attributes and flavour of the potatoes. High sugar levels result in chips with a dark brown colour rather than the golden colour consumers prefer.

There is enormous potential for the quality and volume of Australian fresh potato exports to increase. However this is only possible if the quality of the potatoes on arrival can be assured. The practical steps outlined in this article will help all members of the marketing chain handle potatoes with the care that is needed to ensure the final quality of this important product.

References


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