TECHNICAL GUIDANCE

Blackheart

Blackheart is an internal disorder which cannot be seen and therefore only comes to light after delivery to the customer or even the consumer. AHDB Potatoes has recently funded a 3 year trial* on the problem with support from the Fresh Potato Suppliers' Association, to identify the major risk factors which can lead to its development.

Symptoms – recognising blackheart

Blackheart is a physiological disorder of potatoes. In affected tubers, internal tissues become necrotic and cavities may form. It is a particular problem for the fresh potato industry because the outside of the potato usually remains sound, so they appear healthy even if blackheart is present.

Symptoms (below) usually occur close to the centre of tubers and appear dark brown to inky blue-black, with an irregular shape and a defined border. The affected tissue remains firm and without odour. The onset of the disorder has been poorly understood but it is usually associated with oxygen deprivation and tends to occur more in large tubers.

Fig. 1. Initial discolouration and advanced cavitation symptoms of blackheart.

Testing for blackheart risk

AHDB Potatoes' research* has established a test protocol for blackheart risk in long-term storage. The test induces symptom development to assess the susceptibility of a stock. This is done by putting samples into a sealed chamber (Fig. 2) and incubating at 30°C for 60 hours. After this time, cut tubers in half longitudinally and, after allowing to stand for 24 hours, assess for symptoms. The test should be carried out a month or so after loading and repeated in the spring.

Fig. 2: Induction chamber

*R456 Blackheart: an emerging problem

When blackheart occurs

Blackheart is usually absent in new crop. It may develop in store but this is rare. Typically it occurs after storage, during handling and marketing of pre-packed potatoes.

In storage trials at SBCSR, in susceptible stocks, blackheart symptoms generally appeared in washed potatoes during the shelf-life period of pre-packed potatoes. There was a marked seasonal trend with the risk of the defect increasing with the length of the storage period (Fig. 3). The occurrence of blackheart did not relate solely to respiration rate.

Blackheart incidence and the number of affected stocks were lowest in Maris Piper under best practice conditions (storage at 3.5°C). Colder storage at 1.5°C resulted in more stocks being affected by the defect and a higher incidence of blackheart within them, especially late in storage. A similar trend was observed in the variety Marfona.

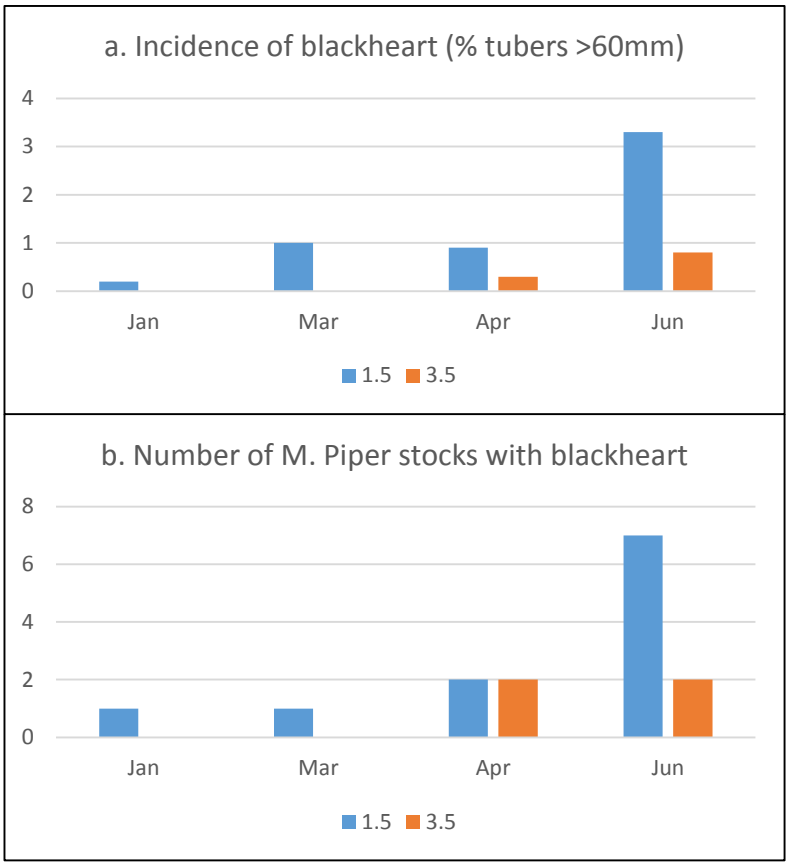

Fig. 3. Incidence and number of stocks affected during shelf-life (20°C for 2 weeks in punched polythene packs) following storage of 10 stocks of Maris Piper at 1.5°C or 3.5°C in 2012/13 trials.

Risk factors for blackheart

Blackheart is associated with oxygen depletion so it can be linked to factors across a range of a growing, storing and processing conditions. Any that increase the respiration rate, or limit gas movement through the potato tuber, should be avoided. Here are some high risk factors:

- **Very low storage temperature.** Avoid storage conditions below 3°C. But don't forget, even at an average storage temperature of 3.5°C, parts of the store may be significantly colder.
- **Condensation**. Avoid rapid changes in temperature that create a condensation layer. This can limit the rate of gas movement in and out of the potatoes (as well as encourage disease).
- **Ethylene**. If ethylene is used, always ensure its initial introduction is very gradual (ramped) and in accordance with recommendations.
- **Variety**. Susceptibility to blackheart varies between varieties. Recent experimental work focused on Maris Piper and Marfona. Both were susceptible. No data is available for other varieties so further testing is needed to establish their susceptibility.

It is recommended that stocks in long term storage are tested for blackheart susceptibility. Wherever possible, the most susceptible stocks should be marketed first. For further advice, please contact **Sutton Bridge Crop Storage Research** on **0800 02 82 111**.