Reducing the risk of Red Drupelet Reversion (RDR)

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Rubus researcher and recent University of Tasmania graduate, Dr Max Edgley, has published his latest article in Scientia Horticulturae. This study concludes a series of field trials designed to assist the understanding of red drupelet reversion (or RDR), a postharvest physiological disorder in blackberries that causes drupelets on harvest fruit to turn from black to red.

Red Drupelets close up.
Photo Credit: Max Edgley

Red drupelet reversion (or RDR), is one of the least understood post-harvest challenges in blackberry production. The disorder can present as single red drupelets to affecting whole fruit and can affect up to 50% of a crop. RDR is a problem for blackberry growers and retailers as it reduces the marketability and shelf-life of the fruit.

Physiological disorders are particularly tricky to study as there is no single causal pathogen involved, rather it's a stress response from the fruit resulting from adverse conditions. What these unfavourable conditions are, and their interactions, are key to understanding if the physiological disorder presents or not.

In the trial spanning two years on the 'Ouachita' blackberry, Dr Edgley tested the theory that warmer temperatures and high nitrogen fertiliser make the fruit more susceptible to mechanical injury causing cell damage, leading to RDR.

Dr Edgley found that blackberries harvested during warmer weather were more likely to develop RDR. Specifically, fruit temperatures during harvest of more than 23°C were associated with higher incidence and severity of RDR. Temperature loggers and an IR temperature gun were used to monitor the conditions. Ambient air temperatures inside the poly tunnels were similar to the fruit skin temperatures in cooler conditions; but warmer than the ambient air under warmer conditions.

Max Edgley collecting measurements
Photo Credit: Michele Buntain

The study determined fertiliser rates applied at 'high N treatment' of 212kg ha-1 across the season and during harvest resulted in an increase of incidence and severity of RDR. Whereas, the application 'medium N treatment' of 106 kg ha-1 did not hold the same consequences, and its level of RDR was similar to that of the 53 kg ha-1 'low N treatment'.

Whilst, it's acknowledged that the high rates of N fertilisation are unlikely in a commercial setting, it has established that there is a window where nitrogen fertiliser can be used productively; and identified a nitrogen level that will trigger the RDR disorder post-harvest. Regarding the nitrogen fertilizer effects on yield, high N produced a 16% increase in yield in 2016 and 42% in 2017 compared to low N treatment. But, little yield gains were achieved over the medium N treatment in 2016.

Dr. Edgley also found that berry mass was also significantly affected by RDR; whereby the larger the fruit, the more likely RDR will present. Larger fruit were more likely to be produced from the 'high treatment' nitrogen levels during earlier parts of the season. Small fruit of less than 6.3 grams are less likely to exhibit RDR. He also noted that the newer, larger fruit varieties may struggle to fit conventional packaging punnets and considerations may need to be given to new package design.

Publication of this article is timely for the Rubus season, where growers can reconsider the production practices of their blackberries in respect to managing their risk of RDR.

Recommendations from Dr. Edgley's Nitrogen trial include:

1. Determine N application rates considering the factors of your specific commercial setting
2. Use an IR gun to measure the surface temperature of the fruit.
3. Harvest fruit in the early morning, before fruit temperatures reach 23°C

Wider implications of this study include increasing the shelf-life of the fruit and producing a fresh fruit of more consistent nutrition and quality. With food waste statistics scoring highest for retail and the last-mile of the supply chain, this research will be valuable to farmers, consumers, markets and the environment.

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