

Red drupelet reversion in blackberries: A complex of genetic and environmental factors

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Abstract

Red drupelet reversion (RDR; also referred to as red drupelet disorder) in blackberries is a physiological disorder that causes the postharvest reddening of individual or groups of drupelets, resulting in economic loss due to a reduction in marketability. This paper reviews recent advances in the understanding of RDR including the physiochemistry, causes of expression and genotypic variation in its incidence. RDR is associated with a significant reduction in anthocyanin pigment concentration, which can vary in severity causing degrees of partial or full colour change. This is associated with observations of disrupted cellular structural integrity and loss of membrane integrity. Drupelets affected by RDR are characterised by anthocyanin species containing disaccharides or acylated sugar moieties that are not degraded as readily as those containing monosaccharides and non-acylated sugars. Susceptibility to RDR is genotypically influenced, with identified links between cultivar texture, postharvest weight loss and incidence of RDR. Current findings indicate that RDR is primarily caused by mechanical injury to the fruit that has induced cell decompartmentalization, for example in one study 85% of handled fruit developed RDR relative to only 6% of non-handled fruit. We found that various methods have been employed for assessment of RDR and we propose a red drupelet index and/or image analysis approach that accurately reflects visual appearance and will enable comparison between studies. Gaps in knowledge are highlighted in relation to the mechanism for pigment degradation, and to investigate confounding genotypic and environmental effects (pre- and post-harvest) on incidence of RDR.