

# Influence of growing seasons on metabolic composition, and fruit quality of avocado cultivars at ‘ready-to-eat stage’

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Scientia Horticulturae 265: 109159. (2020)

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## Abstract

The aim of this study was to relate the untargeted and targeted metabolites to the number of days taken to reach ‘ready-to-eat stage’ ripeness based on firmness and incidence of anthracnose in five avocado cultivars (‘Hass,’ ‘Lamb Hass,’ ‘Pinkerton,’ ‘Fuerte,’ and ‘Ryan’) harvested at different growing seasons (early, mid and late season). Cultivar ‘Ryan,’ harvested at early and mid-seasons, took longer (7 days) to ripen and showed the lowest incidence of anthracnose, whilst cv. ‘Fuerte’ ripened faster (4 days) and showed the highest incidence of anthracnose. UPLC-MS, together with principal component analysis, demonstrated clear groupings of the samples according to their cultivars. Major heterogeneity in the untargeted metabolome profile was observed in cv. ‘Ryan.’ Supervised Orthogonal Projections to Latent Structures Discriminant Analysis (OPLS-DA) approach showed a unique biomarker ( $[M-H]^-$  17.48 at  $m/z$  331.23 (Laricitrin) separated cv. ‘Ryan’ from the other cultivars. Different growing seasons of cv. ‘Hass’ were separated based on unidentified markers [early ( $[M-H]^-$  17.62 at  $m/z$  420.31), mid ( $[M-H]^-$  18.48 at  $m/z$  325.18) and late ( $[M-H]^-$  9.90 at  $m/z$  329.23)]. Targeted metabolites including  $C_7$  *D*-mannoheptulose, skin epicatechin, ferulic, *p*-coumaric, chlorogenic, caffeic, (-)-*L*-chicoric, caftaric, palmitic (16:0), oleic (18:1) and linoleic (18:2) acids contents and antioxidant activities were highest in cv. ‘Ryan’ at ready-to-eat stage irrespective of the seasons. Thus, cv. ‘Ryan’ could be a useful candidate for the avocado oil industry due to its higher fatty acid composition. The higher concentration of unsaturated fatty acids and  $C_7$  *D*-mannoheptulose at ready-to-eat stage in cv. ‘Ryan’ avocados provides health benefits. The observed reduction in anthracnose decay in cv. Ryan avocados was attributed to the higher concentration of epicatechin in the skin and the pool of phenolic metabolites in the mesocarp.