Screening table grape cultivars using cell wall ELISA and glycan microarrays for berry firmness and quality parameters.

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Abstract (250 words)

The crunchy texture of table grapes is one of the key quality parameters during production. This varies from cultivar to cultivar, stage of harvest and vineyard performance. Cell wall properties are key drivers of berry quality (e.g., pericarp firmness and intactness) at harvest and beyond. Common practise amongst producers is to continuously monitor firmness by evaluating pericarp appearance of cross-sectioned berries prior to harvest. These qualitative methods can be quite arbitrary and imprecise in their execution, but more quantitative, yet simple and high-throughput methods to evaluate these cell wall polymers are not yet readily available. A promising avenue is to link carbohydrate arrays targeting cell wall polymers with more traditional biochemical methods with rapid infrared spectroscopy tools to 'chemotype' the cell walls of cultivars at specific stages of development (ripeness). We have integrated immunochemical datasets from over 15 different cultivars, such as 'Crimson Seedless' and 'Prime' which are well-known: with less well characterised cultivars such as 'Autumn Crisp' and 'Sugar Crisp' offering a means to 'snapshot' or 'fingerprint' the cell wall chemotype using spectroscopic methods. The ultimate aim would be to both provide new knowledge on berry cell walls of important cultivars as well as progressing the potential development of infrared sensing technology for predicting table grape cell wall quality (predicting if grapes will progress to soft or firm berries). The datasets and predictive models produced from this survey will be correlated with firmness and textural analysis performed on grape berries from different varieties and stages of ripeness.

Keywords: Cell walls, ripeness, berry firmness, spectroscopy, cultivars