



RECENT ADVANCES IN MEASURING, ESTIMATING, AND FORECASTING GRAPEVINE YIELD AND QUALITY

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Abstract:

Grapevine yield and fruit quality are two major drivers of input allocation and, ultimately, revenue for grape producers. Because yield and fruit quality vary substantially from year-to-year and within a single block, opportunities exist for optimization via precision management activities that could lead to more profitable and sustainable grape production. Here, we review recent advances in the techniques and technology used to measure, estimate, and forecast grapevine yield and fruit quality. First, we discuss direct “measurement” of yield and quality (i.e. ground-truth data generation), with an emphasis on potential for scalability and automation. Second, we discuss technology and techniques that do not directly measure yield and quality, but use correlated measurements for their estimation. These estimates are most commonly made by correlating some proximal and/or remote sensing measurement(s) to ground-truth measurements of yield and quality, but other indirect measurements can be used as well. Third, as wine grapes yield once annually, forecasting end-of-season yield and quality is of substantial interest to producers. Like estimation, forecasting uses sensor measurements that are correlated with ground-truth yield and quality, but has the additional challenge of predicting measurements into an uncertain future. We consider emerging techniques in machine learning that are relevant to both yield and quality forecasting and estimation. Finally, we provide an outlook on the commercial application of automated fruit yield and quality measurement, estimation, and forecasting.

Keywords: Grapevine, yield, quality, sensing, forecasting