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NAPPN Annual Conference Abstract: Opportunities for replacing inefficient but direct measures with rapid, indirect predictors of fruit quality in field grown strawberry with digital sensors.

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Holistic assessment of fruit quality is an essential component of producing Strawberry varieties that will succeed in the marketplace and improve consumer satisfaction. However, several key quantitative traits are notoriously slow and expensive to assess using standard procedures, namely acidity and aroma, which require titration and gas chromatography and mass spectroscopy compared to others: brix, anthocyanins, and vitamin C, which are measured by refractometer and parallelized plate reader assays. Scaling up evaluations for acidity and aroma has been difficult as the techniques require 5 and 40 mins/sample, respectively, and sample preparation is equally intense, requiring multiple trained hands working for 10-hour sessions to create the sample series for 100 entries. We evaluated the ability (R^2 , RMSE) of a handheld near infrared (NIR) spectrometer, measuring 125 wavelengths between 800 and 1600 nm, and an electronic nose, measuring the reaction of 32 electrochemical sensors that respond to various compounds in gas samples, on 4,000 diverse strawberry accessions to determine if the 5 and 40 min/sample assays can be replaced with a 1 (0.33%) sec/sample (NIR) and 2 (5%) min/sample (E-nose) assay that require no additional sample prep. We also assess the NIR's ability to predict brix, anthocyanins, and vitamin C. With these two sensors, we will be able to increase the scale of early generation evaluation from hundreds to thousands of samples in early generations, produce full datasets prior to deadlines in the breeding program, and make more reliable genetic gains for quality traits affecting marketability and consumer acceptance.