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## Abstract

Measurement of key crop physiological traits using high resolution aerial imagery with unmanned aerial systems (UASs) holds enormous potential to increase consistency and accuracy of data collected for field evaluations. Here, we demonstrate temporal corn response to fertility treatments using repeated measurements followed by an area-under-the-curve progression analysis. Radiometrically calibrated multispectral datasets were used to calculate standard vegetative indices as well as to leverage models that approximate leaf area, nitrogen content, chlorophyll content, and canopy uniformity. In addition, digital elevation models can be employed to measure relative canopy heights and spatial variability in the field. Taken together, these digital assessments allow for a researcher to have significant insight into experiment outcomes during the growing season, including the identification of relative yield potential. This approach automates and standardizes the acquisition of key phenotypes that can be used to more efficiently evaluate field trials across multi-location programs.