Relatively recent advances in unmanned aerial systems (UAS), or drone technology, as well as miniaturization of complex remote sensing systems, have enabled new approaches to precision agriculture. Specifically, imaging spectroscopy (hyperspectral) and light detection and ranging (lidar) can be used for agricultural disease detection, structural quantification, moisture stress assessment, and nutrient mapping. This talk will focus on RIT and collaborator (Cornell University, Nature Conservancy) efforts to develop robust analytical approaches to a range of precision agriculture challenges. We will highlight efforts to develop risk models for proactive management of white mold (*Sclerotinia sclerotiorum*) in snap beans, evaluate sustainable harvesting practices in southeastern USA deciduous forests, and present updates on vineyard moisture stress assessment. The specific study areas are located at the New York State Agricultural Experiment Station (Geneva, NY), southwestern Virginia, and Fox Run Vineyards (Penn Yan, NY). A DJI Matrice-600 UAS, boasting a high spatial resolution color camera, a Headwall Photonics imaging spectrometer (272 bands; 400-1000 nm), and a Velodyne VLP-16 lidar system, are used for this research. Initial findings from these various projects will be presented, while focusing on i) the need for proper calibration-to-reflectance of the imaging data, ii) identification of operational wavelength solutions from spectrally oversampled hyperspectral imagery, and iii) the benefit of fusing 3D lidar data with high fidelity spectral imagery. An example of the DJI Matrice-600 multi-modal platform also will be showcased, project-permitting.

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