

Enhancing Phenotypic Trait Data Collection and Analysis for Faster & Better Selections in Wheat Breeding Using High Resolution Drone Imagery

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Rationale

- Breeding program selections take significant time and resources to collect data on different characteristic of the plants (bigger leaves, shorter plants, etc) on different populations
- Provide greater amount of information in less time than ground based measurements

Objectives

- Enhance the Michigan State University breeding program's ability to make selections (in close collaboration with Dr. Eric Olson)
- Develop procedure for effective vegetation indices.

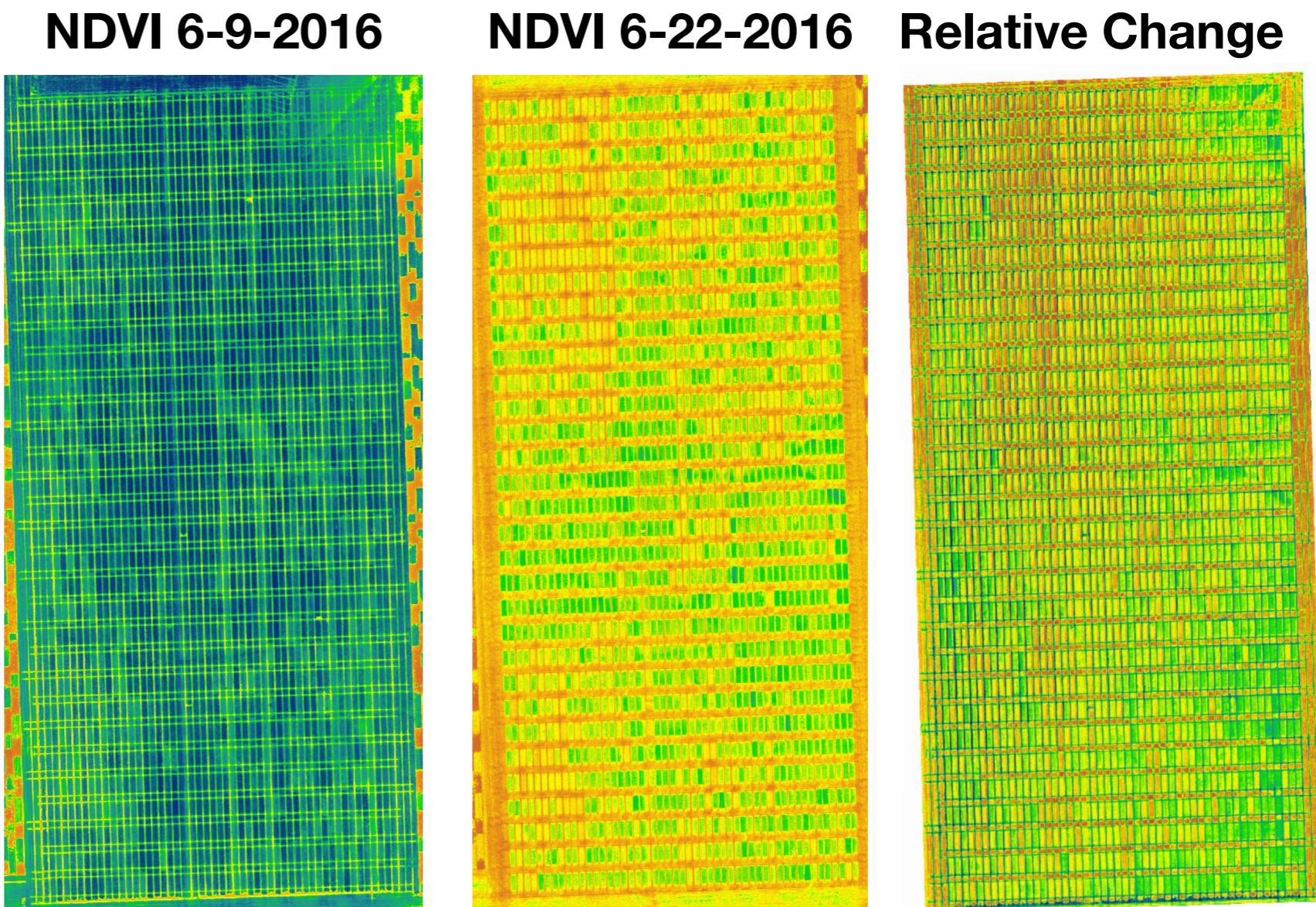


Figure 22, 23, 24. Wheat variety trials NDVI images.

Methodology

- Task 1. Integrate new sensors into research plots coupled with ground truth measurements
- Task 2. Analyze different vegetation indices and their ability to describe variability among different wheat populations over time



DJI Phantom with Quad Band Sensor



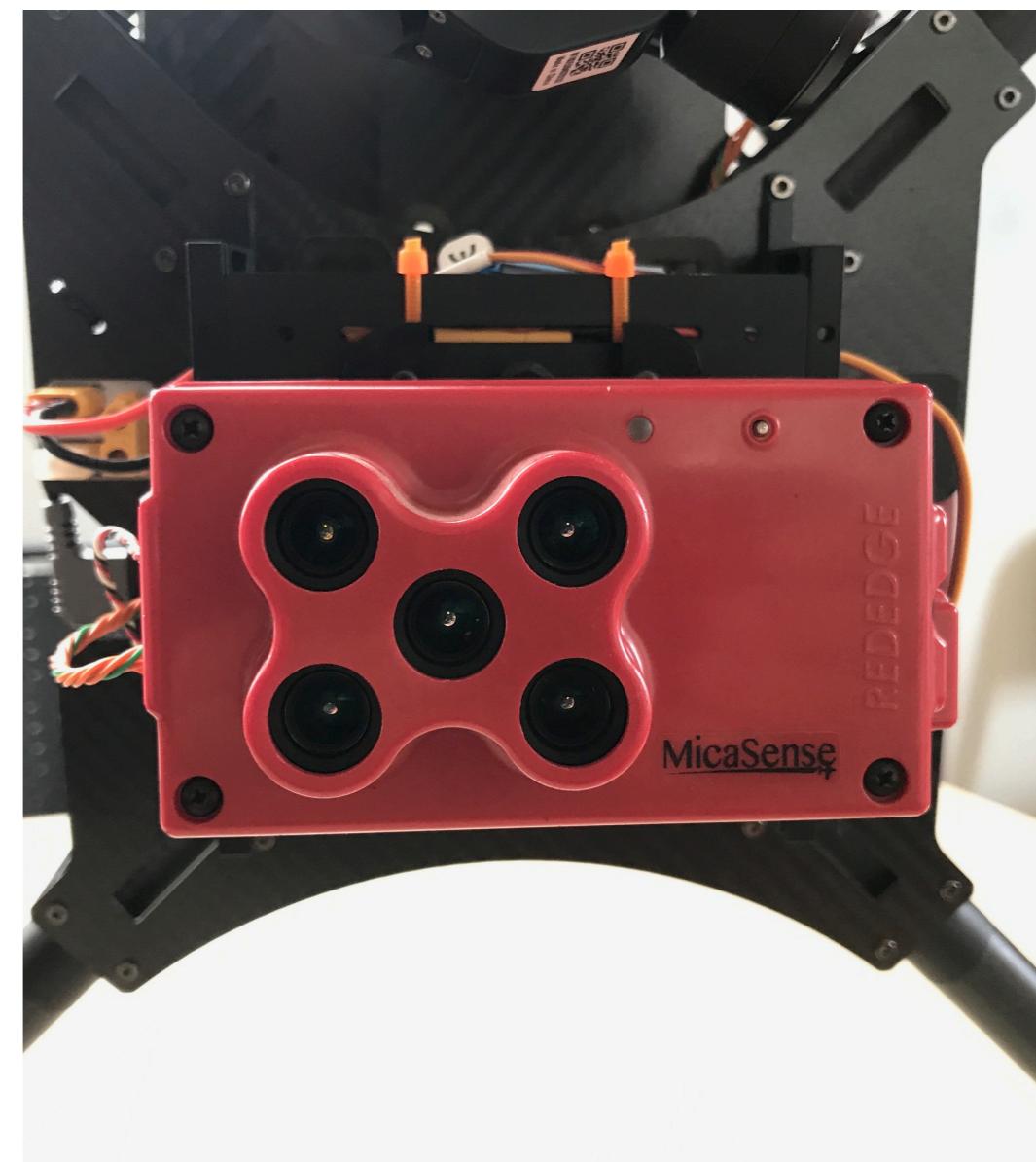
Zenmuse XT Thermal Camera

Methodology

- Task 1. Integrate new sensors into research plots coupled with ground truth measurements
- Task 2. Analyze host of vegetation indices and ability to describe variability among different wheat populations



Zenmuse X3 Visual Camera



MicaSense RedEdge Camera

Expected Outcomes

- Provide reflectance data in many different wavelengths and compare relative changes from one date to the next across the experiment
- Combine with ground truth, and modeling results to improve timing of most critical data collection.

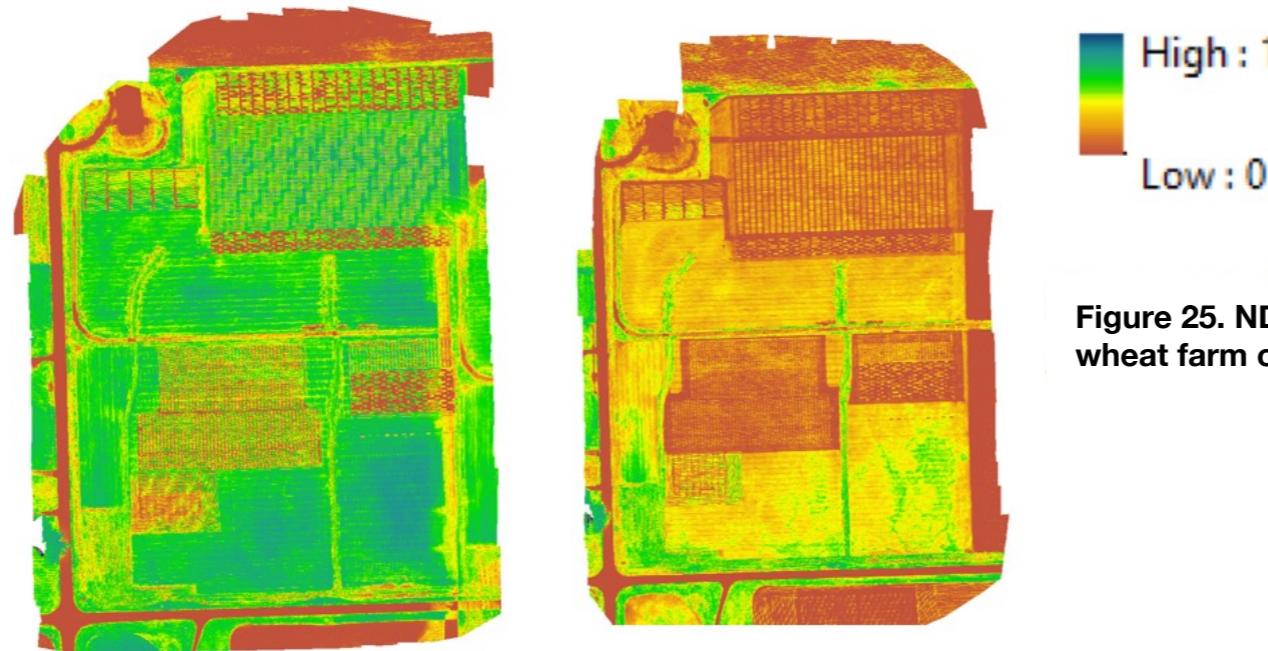


Figure 25. NDVI Images of entire wheat farm on 6-9-2016 & 6-22-2016

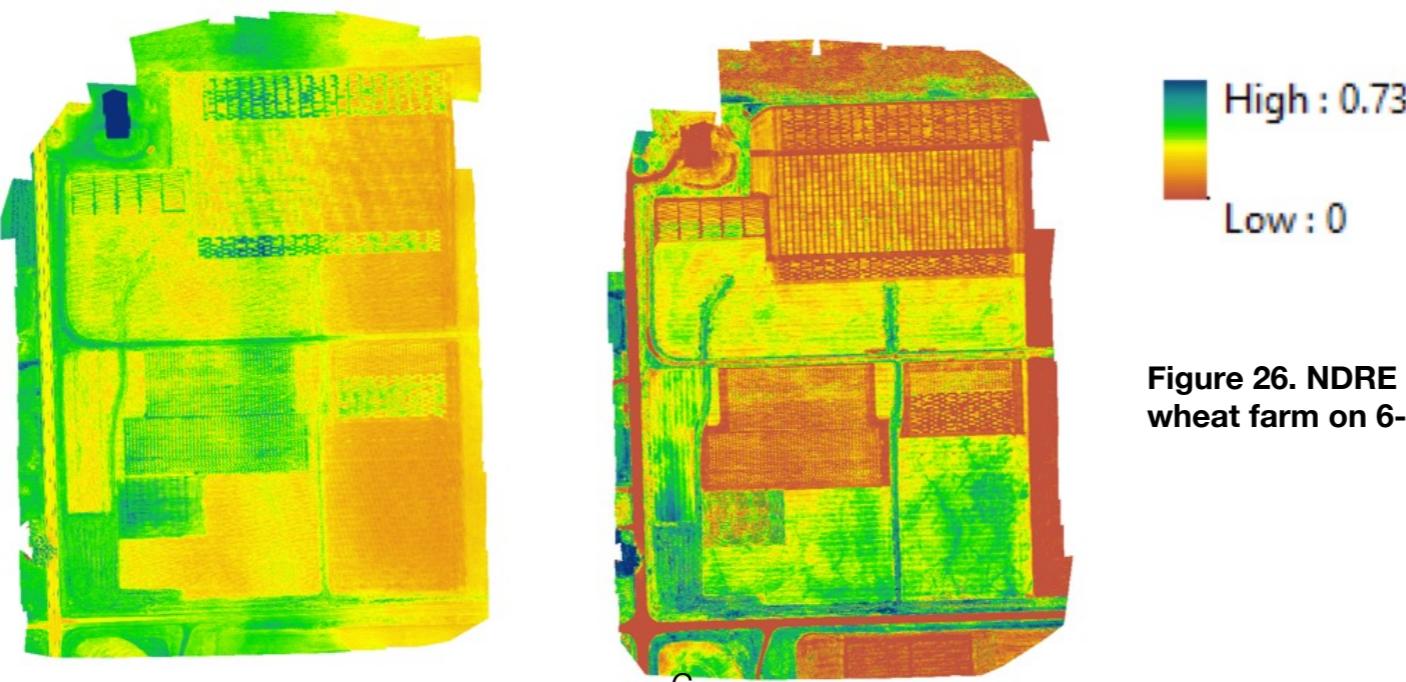


Figure 26. NDRE Images of entire wheat farm on 6-9-2016 & 6-22-2016

Expected Outcomes

- Provide reflectance data in many different wavelengths for enhanced index creation.
- Combine with ground truth, and modeling results to improve timing of most critical data collection.

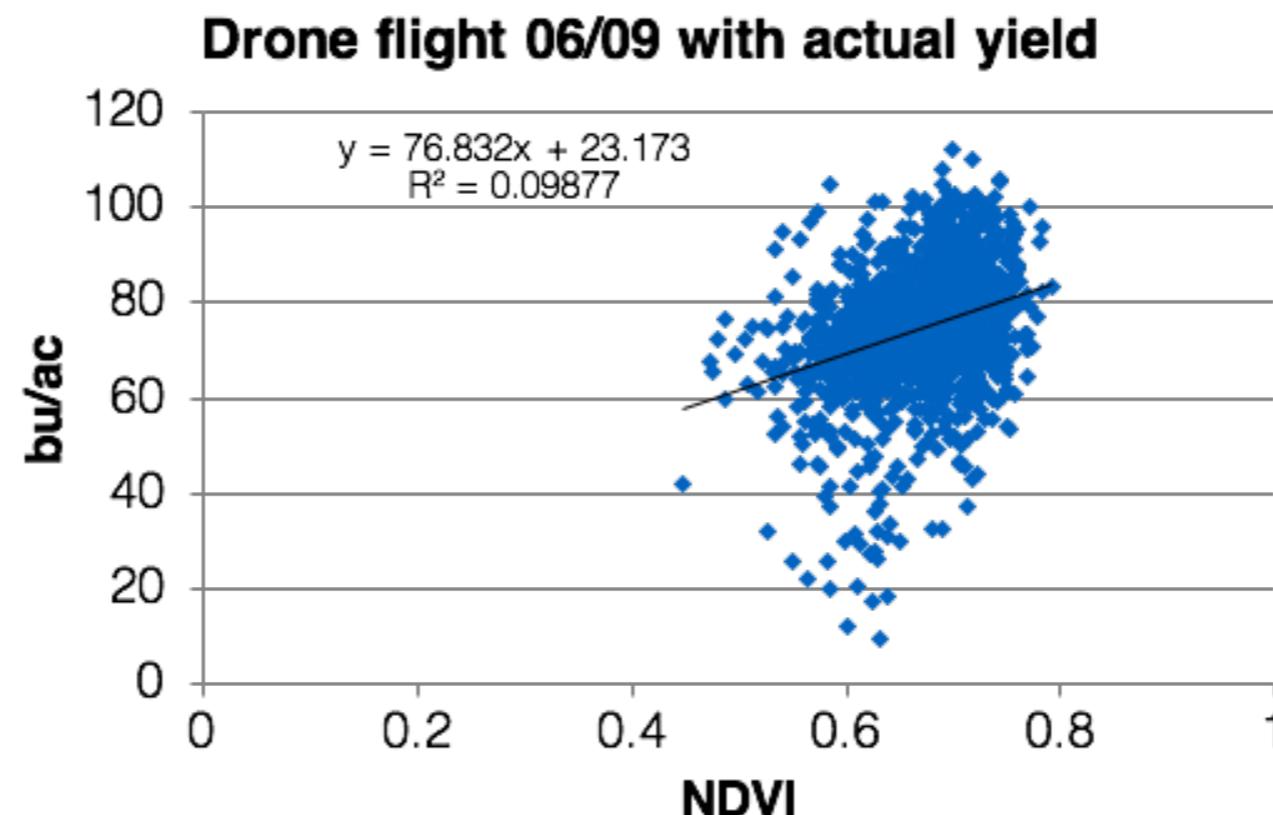


Figure 27. Correlation between yield and NDVI with all varieties from 6/9 image

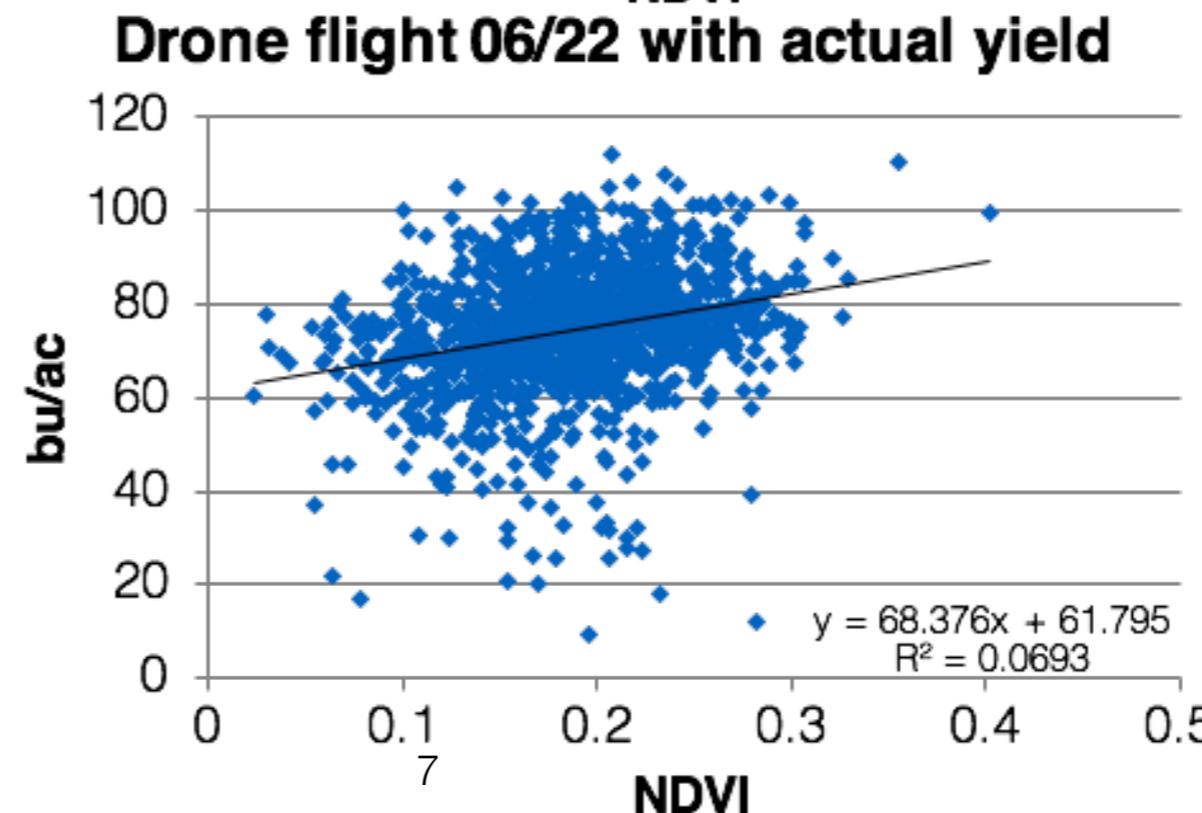


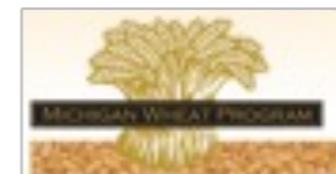
Figure 28. Correlation between yield and NDVI with all varieties from 6/22 image

Acknowledgements

- The Basso Lab



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