

UAV: WHIN Region Select Case Studies

John Scott, Jon Charlesworth, Andrew Westfall
Cooperative Extension Service, Purdue University, 915 W. State Street, West Lafayette, IN
scott42@purdue.edu

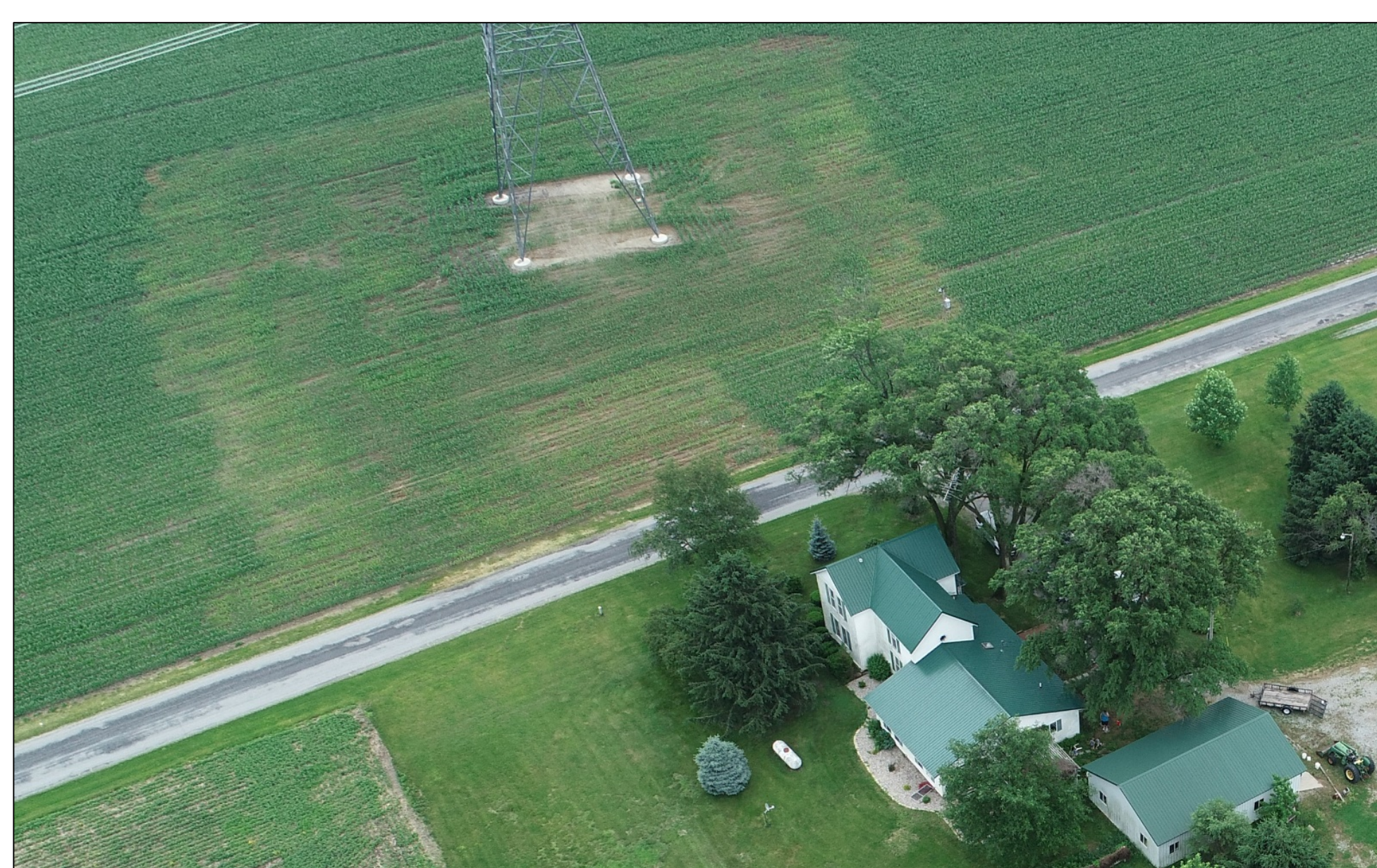


Introduction

Precision Agriculture has been developing for the past 20-30 years with continuous evolution. Today due to advances in technology agriculture has the opportunity to undergo a new revolution where data drives decision making and management actions. In this new era of Digital Agriculture, the combining precision technology with computer assisted data analysis and management, one rapidly expanding area is UAV (casually referred to as drones) utilization and its ability to provide prospective not otherwise easily attainable. Perhaps the most important question is how can a UAV be used to create value for any given operation? With this in mind Purdue University researchers and extension educators set out to learn about UAV uses.

Objective: Develop case studies on UAV uses in decision making and where it fits operationally.

Transmission Tower Installation Damage & Compaction



Manually captured drone image of the area around a newly installed power transmission tower showing that the effected area is much greater than the immediate tower footprint.
Drone operator: Andrew Westfall

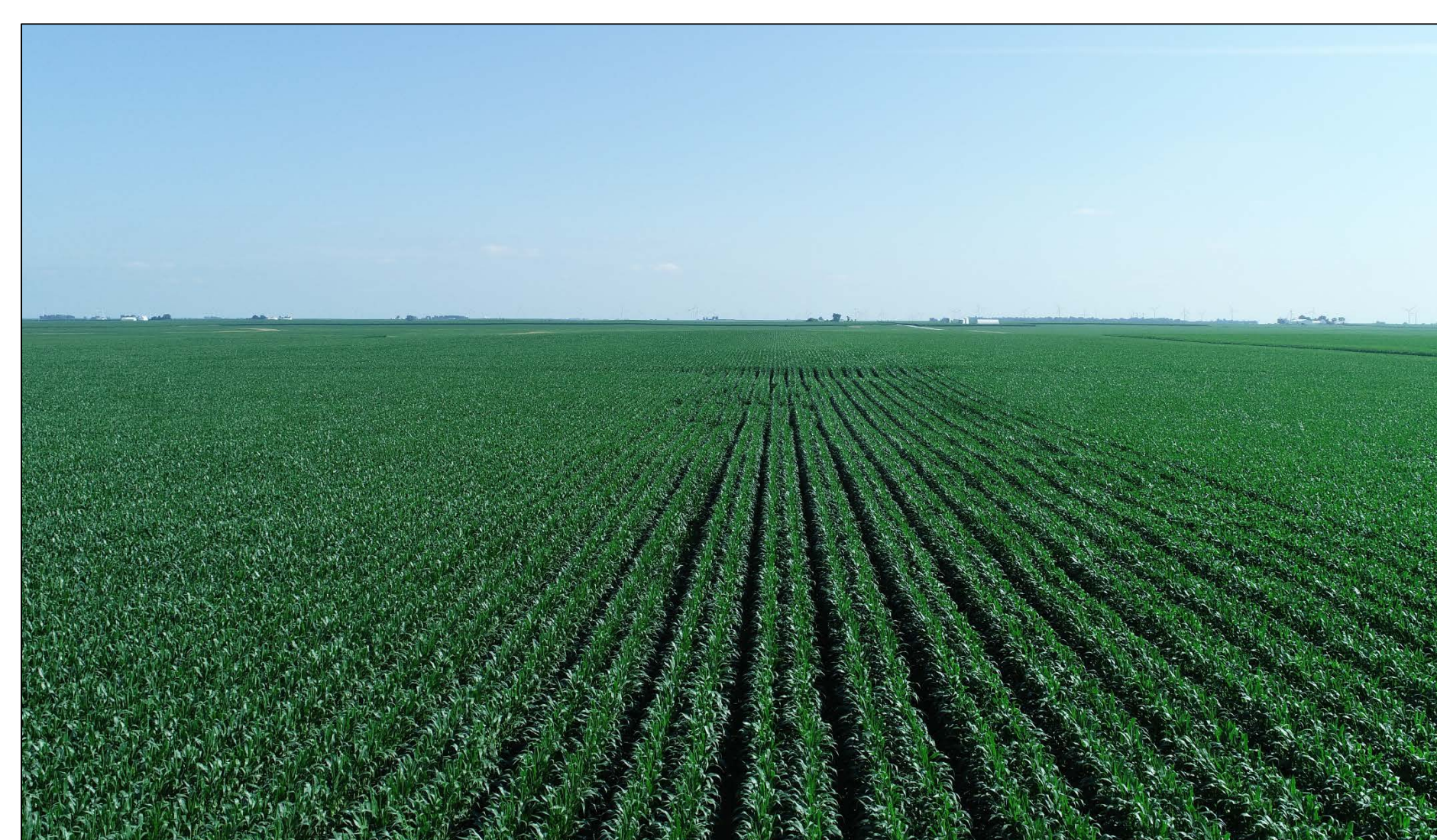
An orthomosaic map from Drone Deploy showing an area with water damage due to tower installation. The water damage occurred due to damaged field drainage tile during the tower installation.

Using drone deploy Westfall conducted geospatial analysis to quantify the damaged area for the farmer.

- Orange area = 3.27 ac (too wet, not planted)
- Purple area = 1.52 ac (plant roots too wet)
- Total = 4.79 ac



Cover Crop Interseeding



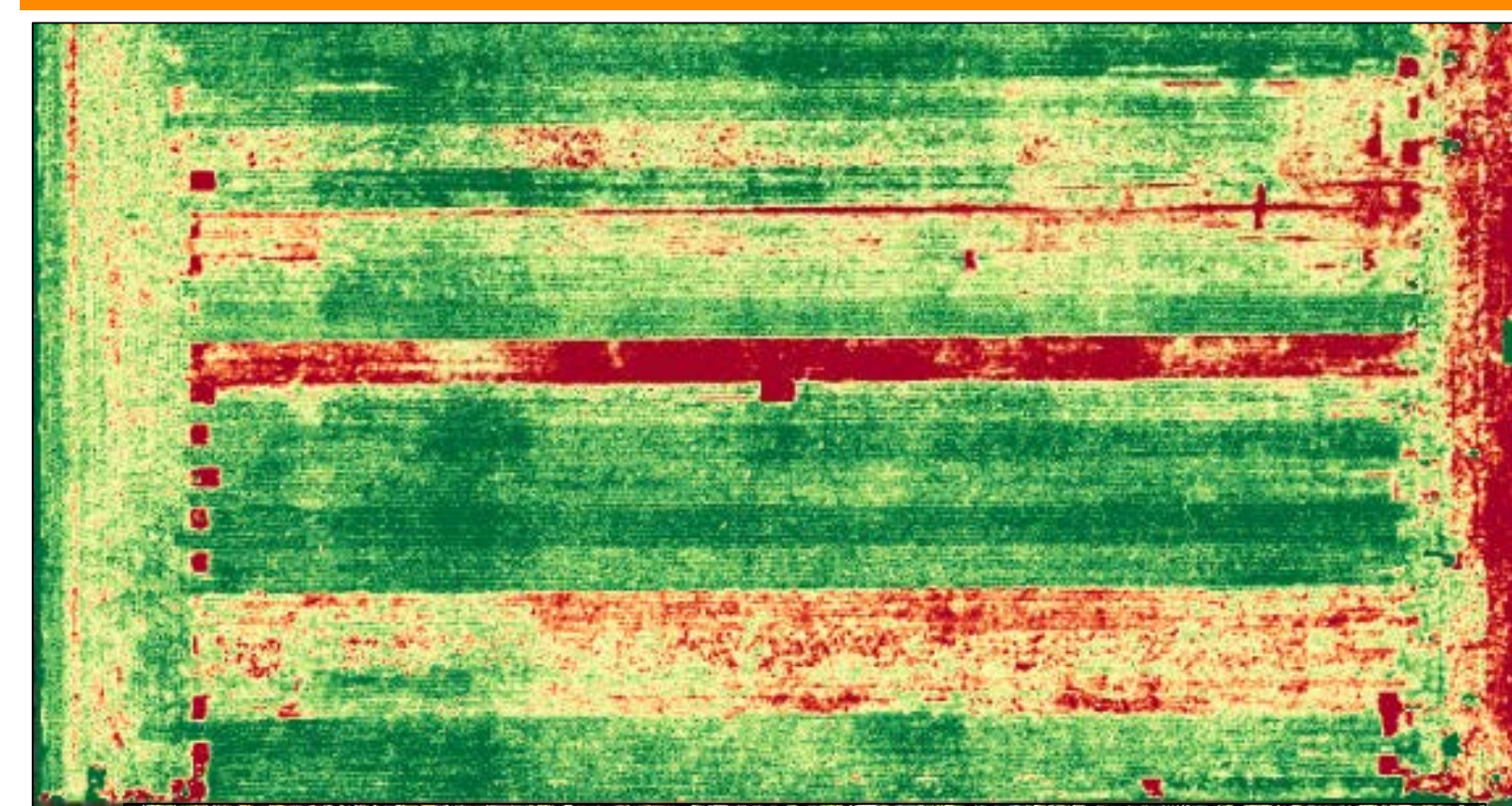
Interesting strip trial of interseeding cover crops into standing corn. Corn was planted in 30" rows with every 3rd row not planted to corn where the cover crop was planted at sidedress (early June).
Drone operator: Jon Charlesworth,
Date: June 29.



Mid-September flight to see how the cover crop is developing in still standing corn. Possible to see good stand of growing cover crop (appears to be clover and rye) and maturing corn.

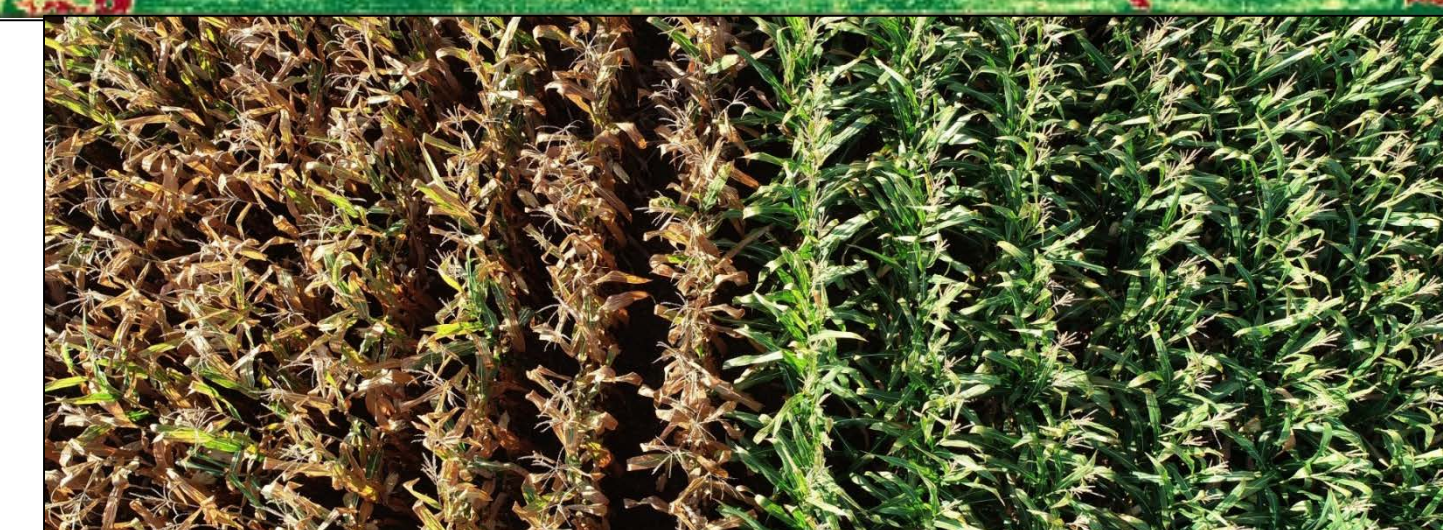
Future work may include different sensors/camera settings to observe cover crop establishment earlier in the growing season.

Field Scouting

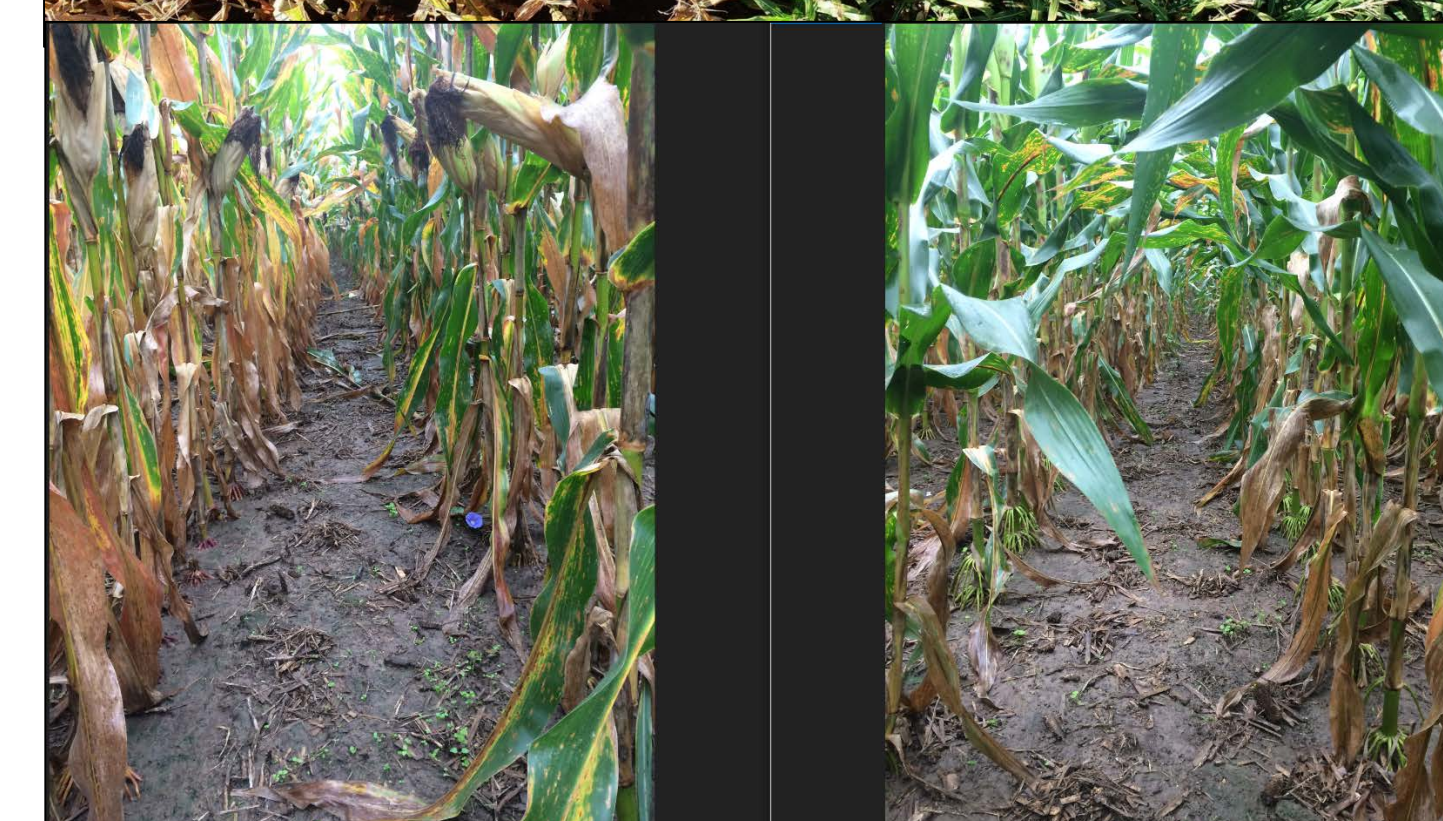


A plant health map from Drone Deploy showing a red streak in the middle of the field at Ivy Tech Lafayette. Initial indication of a problem with a certain hybrid. This issue was not observed on prior flights.

Drone operator: John Scott. Images captured 8-21.



Photograph collected manually showing the visual difference in plant health between the problem hybrid (left) and a healthier hybrid (right).



In field observation of the problem hybrid (left) and healthy hybrid (right). Identified grey leaf spot (GLS) on the problem hybrid which is a fungal disease in corn. Observed canopy degradation in the diseased hybrid.



Observation of ears from diseased and healthy hybrids. Ear size was similar between the hybrids but ears with severe GLS were much closer to physiological maturity, meaning that the seed fill window was reduced which may result in lower seed weight and less yield.

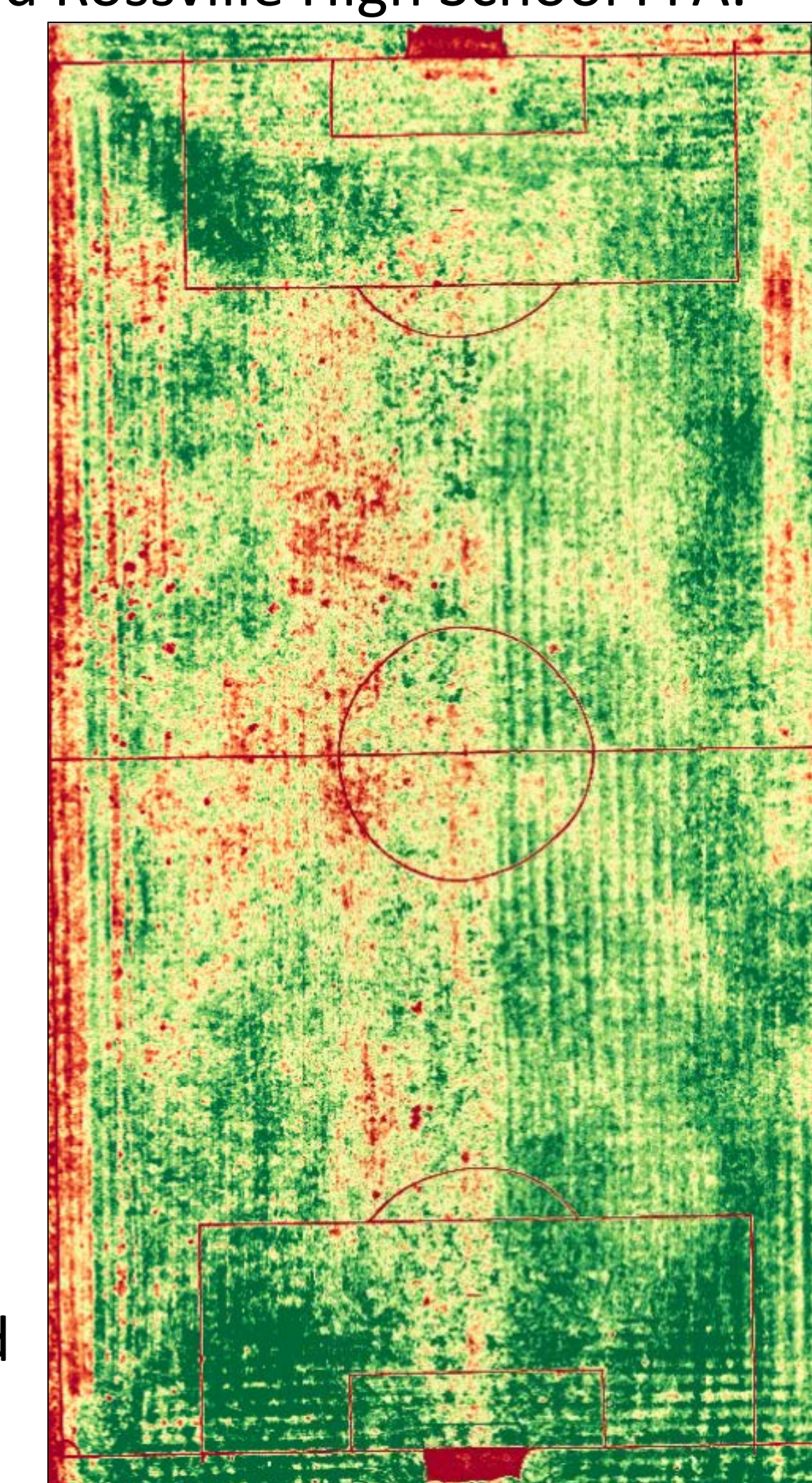
Turf Trends



Orthomosaic and plant health maps from Drone Deploy showing machine and human wear patterns on the soccer field at Rossville High School.

Wear pattern identification may help indicate areas for more intensive management.

Data collected during, and used for, programming between Extension and Rossville High School FFA.



Apparent favoritism toward the left edge of the field. Seemed odd and was assumed to be a camera error. Was flown multiple times with different settings and the same patterns emerged. Presented to FFA and some students who were soccer players corroborated this trend as accurate given practice tendencies.

2019 Projections

- Continue and expand upon current UAV work in the WHIN region.
- Three additional educators to be certified and flying by next growing season.
- Identify local producers in the counties that may be willing to experiment with new technology and sensors focusing on the group that was part of the UAV program in 2018.

Acknowledgements:

Thank you to the Wabash Heartland Innovation Network and Purdue Cooperative Extension Service for providing the necessary funding. Also thank you to Rossville High School FFA Chapter, Ivy Tech Lafayette, and area farmers for partnering with Extension to create and provide these case studies.