CFAES

Drones and Data in Agriculture

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THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

Nationwide AgTech Innovation Hub

Sep 20, 2022

Nationwide, Ohio State University "green" light AgTech Innovation Hub

Nationwide to provide $2 million in funding to new collaboration designed to tackle climate change challenges

Drones and Data in Agriculture

https://youtu.be/fffvGPNOyyo?si=AiXPjF6-5YQ8YY4J

slido

What technology are you most optimistic about for improving your farming operation?

ⓘ Start presenting to display the poll results on this slide.

Drones and Data in Agriculture

Horticulture and Crop Science (HCS)

Battle for the Belt

Plot Design / Field Layout

Weekly agronomy field visits

Harvest measurements

Food, Ag, and Biological Engineering (FABE)
Computer Science and Engineering (CSE)

Drones and Data in Agriculture

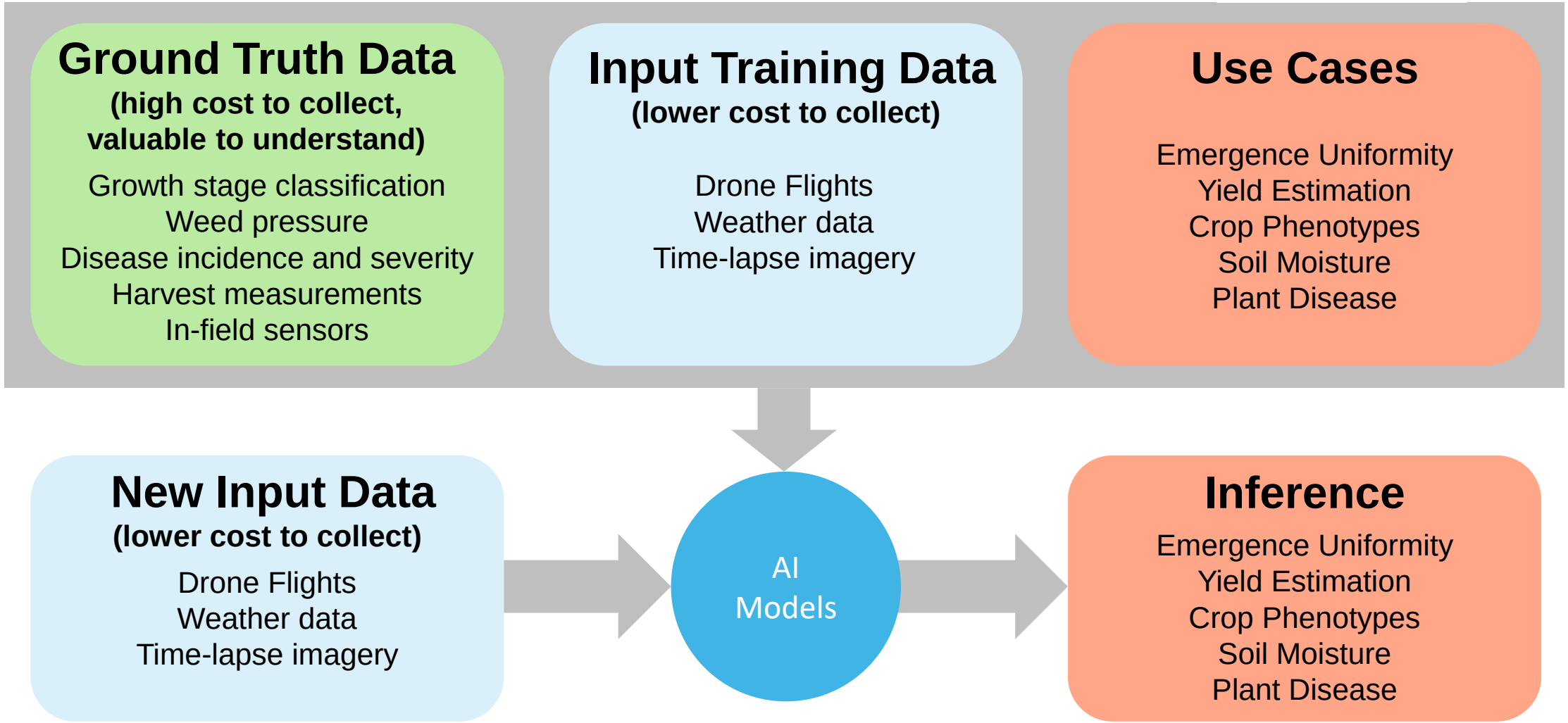
Drone Flights (85 total)

In-field sensing

Data processing

AI models

AI Applications in Agriculture

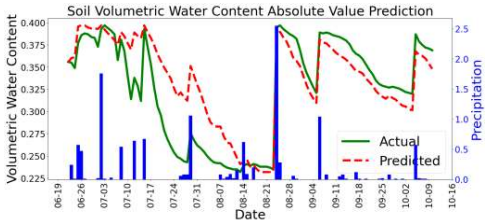


Drones and Data in Agriculture

Research question

How can we use data from drones and in-field sensors combined with artificial intelligence that would benefit farmers?

Emergence	Phenotyping	Soil Moisture	Kernel Weight



Emergence

Emergence | Phenotyping | Soil Moisture | Kernel Weight

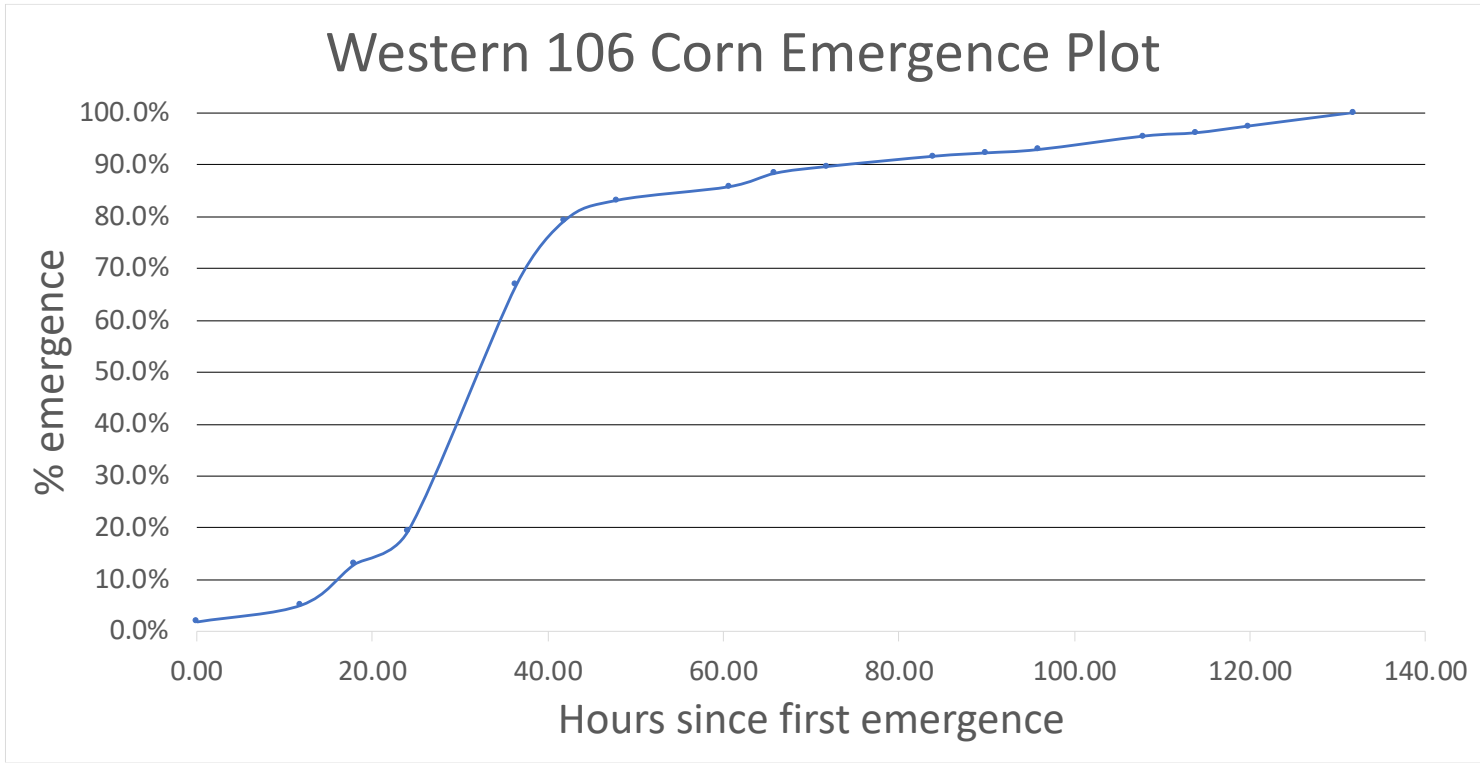
The ”Flag” Test (field visits every 12 hours)

An early predictor of yield potential!

What if we could measure emergence with time-lapse cameras?

Emergence

Emergence | Phenotyping | Soil Moisture | Kernel Weight



Phenotyping

Emergence | Phenotyping | Soil Moisture | Kernel Weight

Phenotyping

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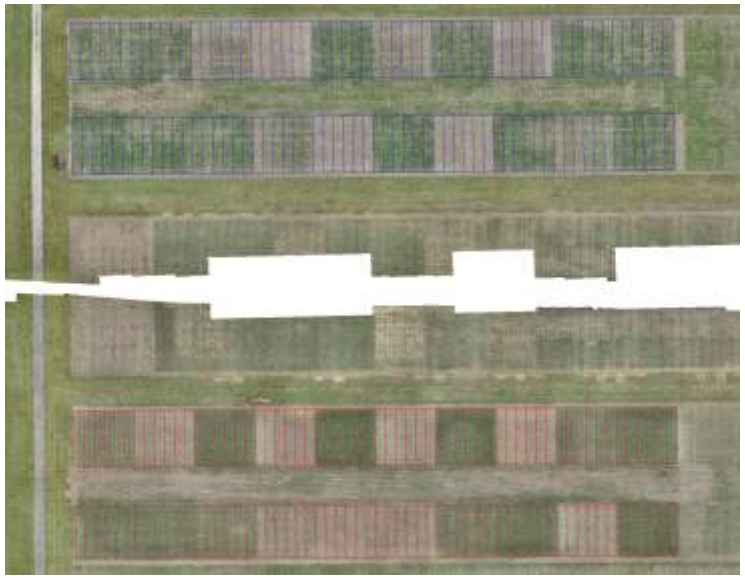
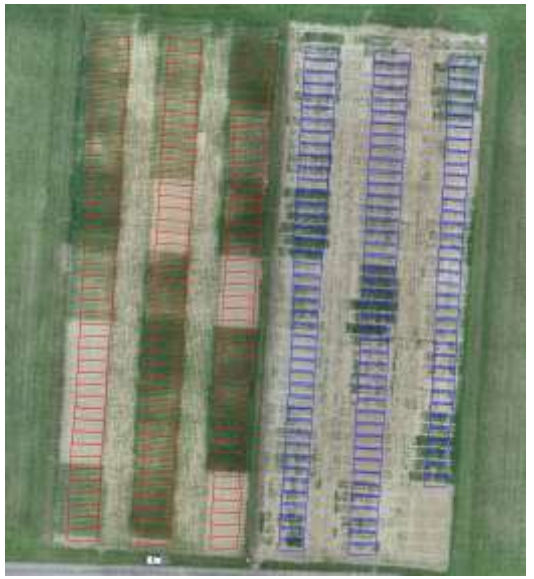


Northwest Agricultural Research Station

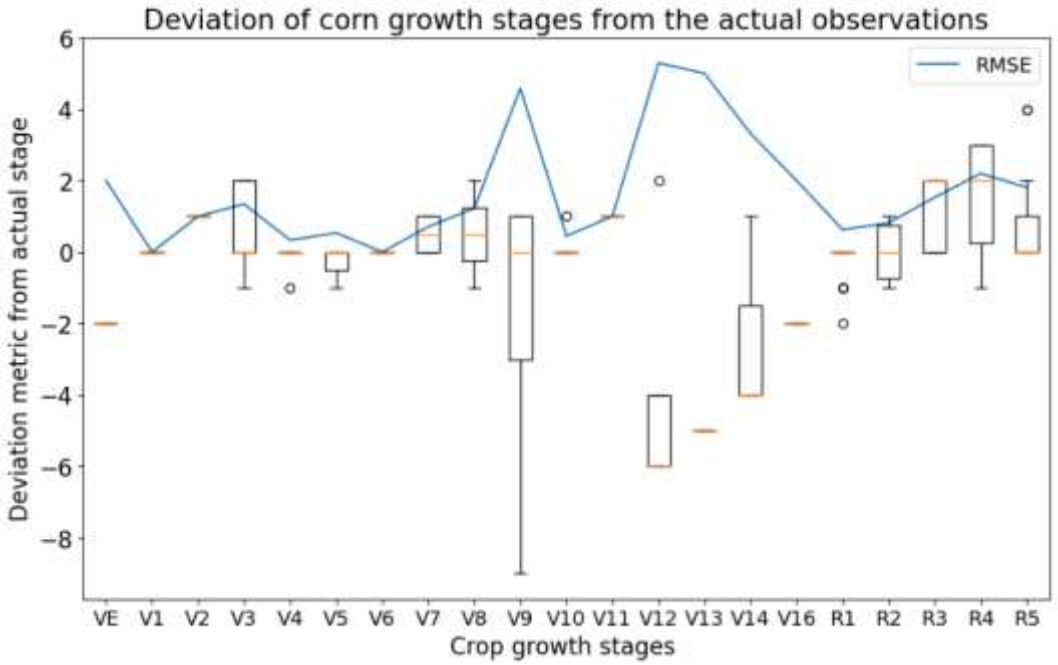
Western Agricultural Research Station



Wooster Snyder Farm

Phenotyping

Emergence | Phenotyping | Soil Moisture | Kernel Weight



Raccoon damage

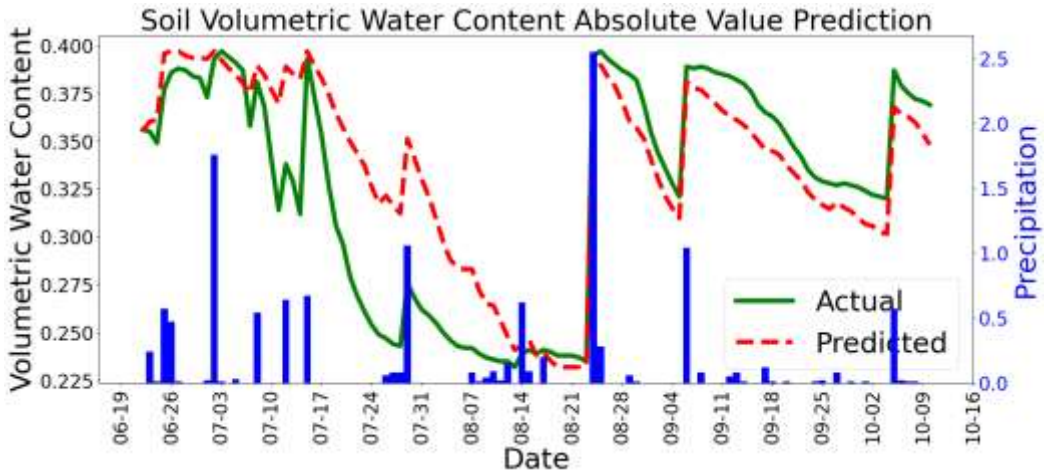
Soil Moisture

Emergence | Phenotyping | Soil Moisture | Kernel Weight

Our question

From rainfall and temperature data, could we predict soil moisture?
How might it vary across different soil textures and organic matters?
Could this be useful for understanding nitrogen mineralization?

Meter Teros 12 Soil Volumetric Water Sensor (Ground Truth)

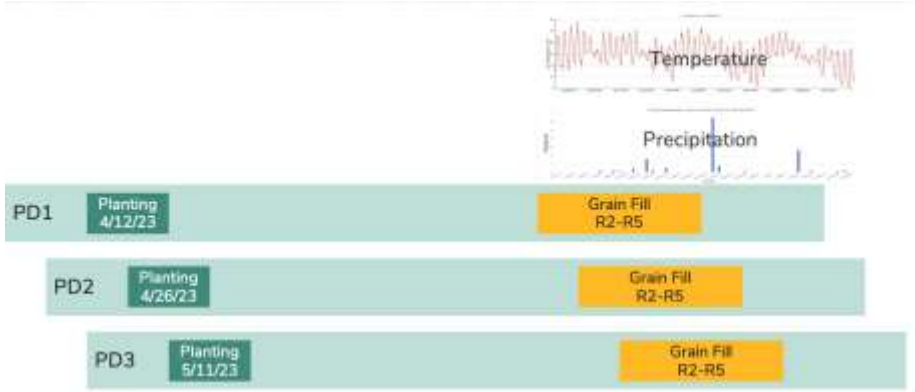


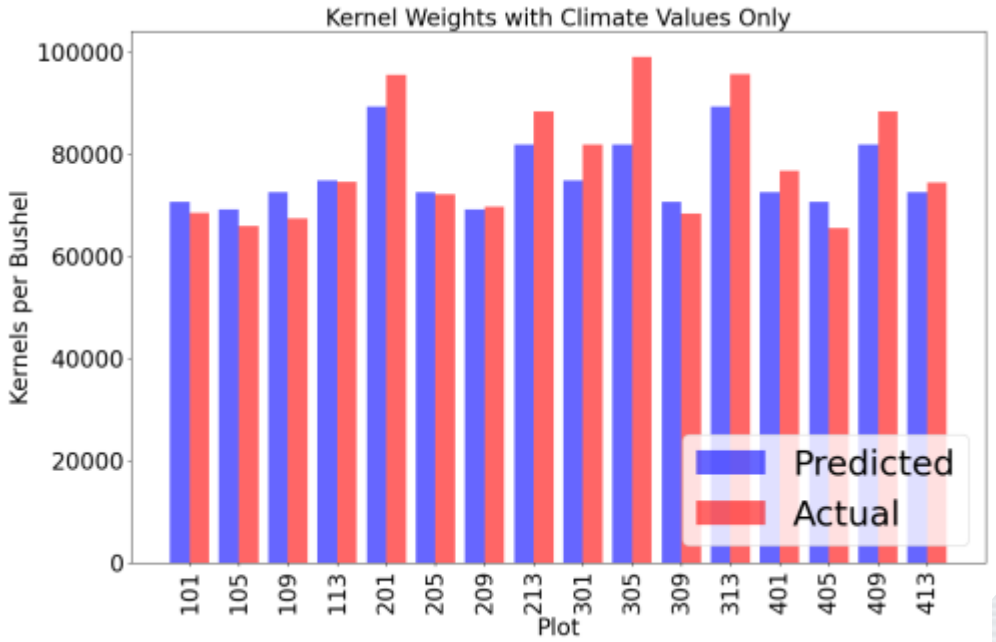
Kernel Weight

Research question

Could we use weather data to predict kernel weight of corn?

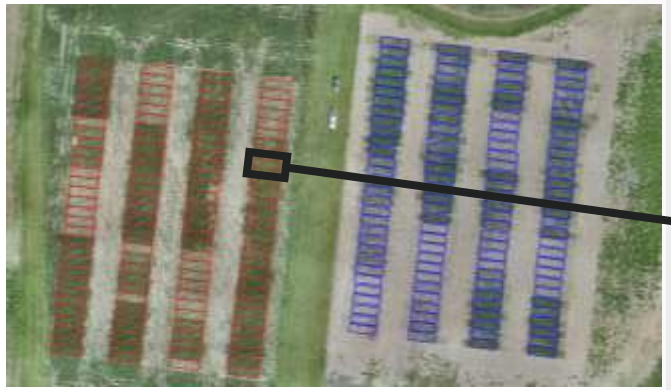
At Northwest the kernels per bushel ranged from 70,000 to 90,000 kernels per bushel, equivalent to about 50 bushels/acre difference!





Data visualization concepts

Crop Health Dashboard Concept



Plot 115

Plot Statistics

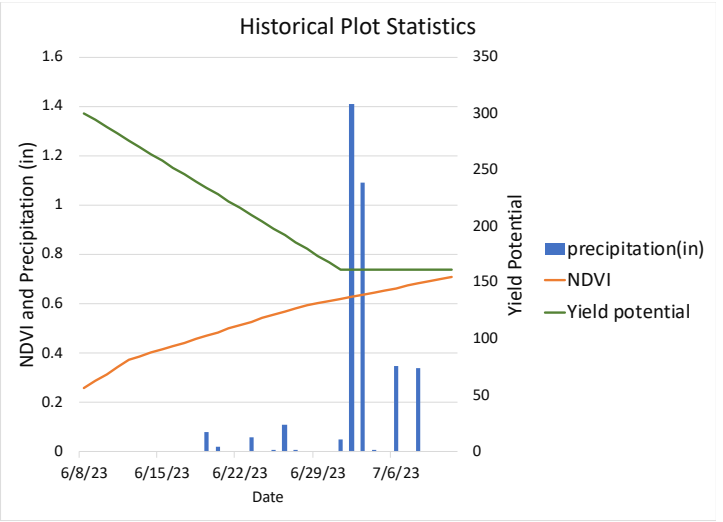
Soil vol water content: .37

Growth Stage: V10

Normalized Diff Veg Index: .87

Weed Pressure: Low

Disease: None detected



We are exploring ways to visualize the various types of data from the project.

Conclusion

1. We think our work from 2023 in growth stage, soil moisture, and yield estimation could be applied towards improved nitrogen recommendations.
2. Your feedback would be extremely valuable to us:
    - We will be putting out a survey in the next few months regarding innovation and technology in agriculture. Consider responding to it.
    - I would welcome your comments on anything you saw in this presentation.
    - If you are interested in improving your nitrogen use efficiency, I'd be very interested in discussing with you.

Contact Info

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