PURDUE UNIVERSITY
Institute for Plant Sciences

Purdue University's Controlled-Environment and Field-Based Phenotyping Facilities

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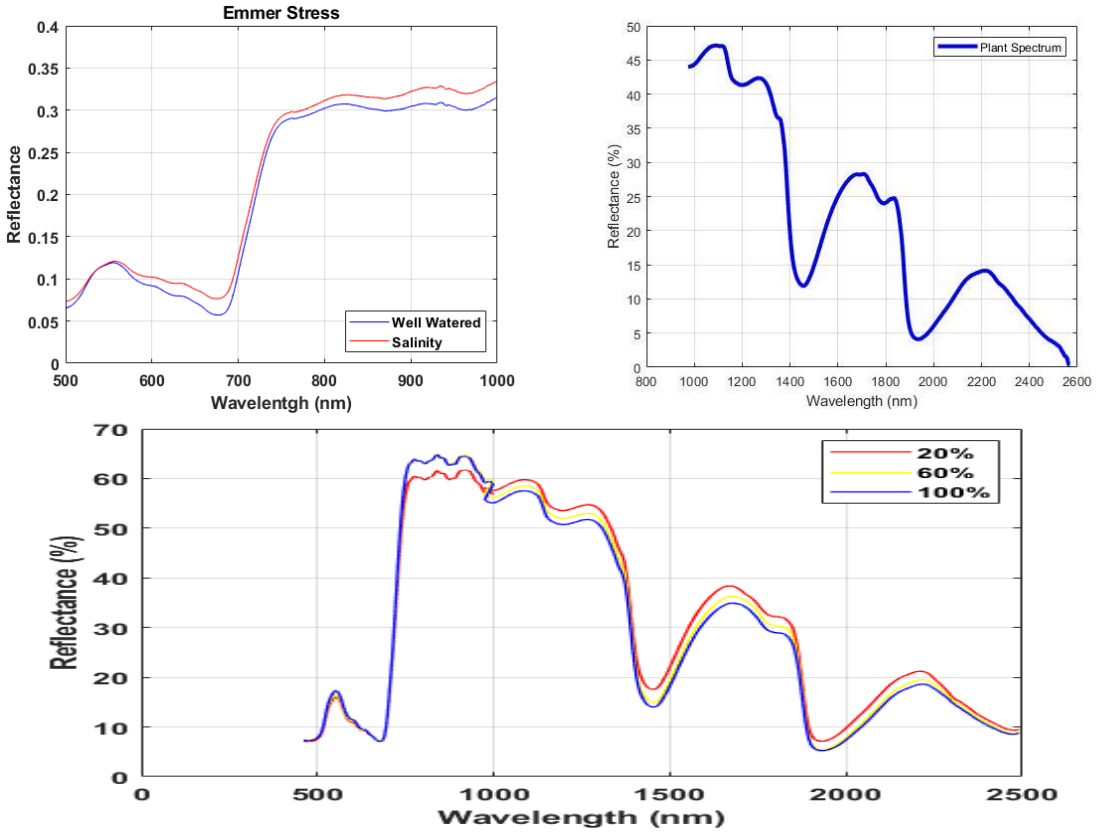
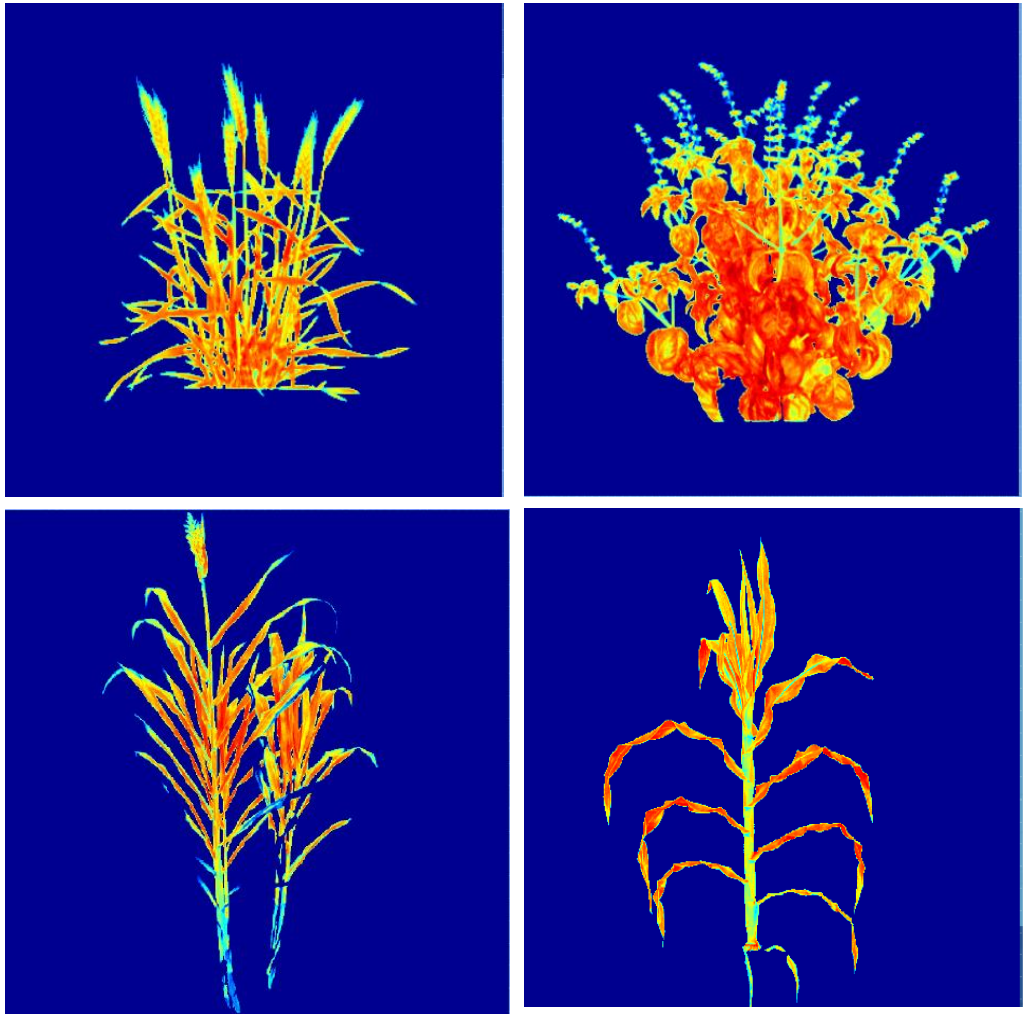
AgAlumni Seed Phenotyping Facility (AAPF)

- Two large growth chambers can hold >600 plants up to four (4) meters in height
  - Air temperature, RH, radiation well controlled
  - Capable of CO_2 enrichment
  - Fully automated fertigation management
- Machine-vision systems enable high-throughput, non-destructive phenotypical trait assessment
  - RGB – up to 120 plants per hour
  - Hyperspectral – up to 70 plants per hour
  - X-ray CT – up to 4 plants per hour

AAPF – Hyperspectral Imaging

- Side and top-scanners in VNIR + SWIR spectral range capable of imaging up to 70 plants per hour





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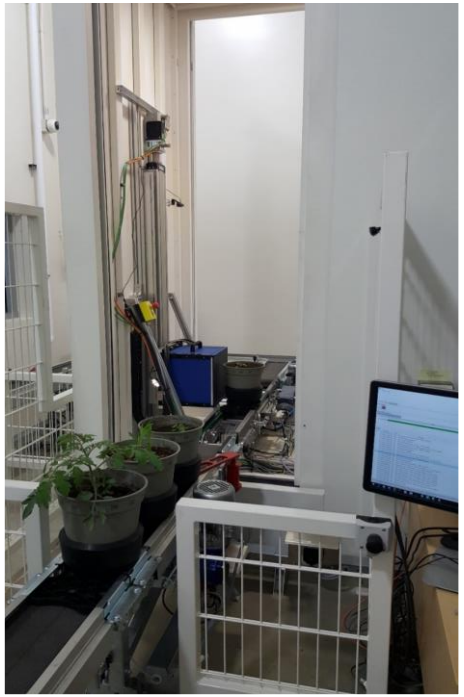
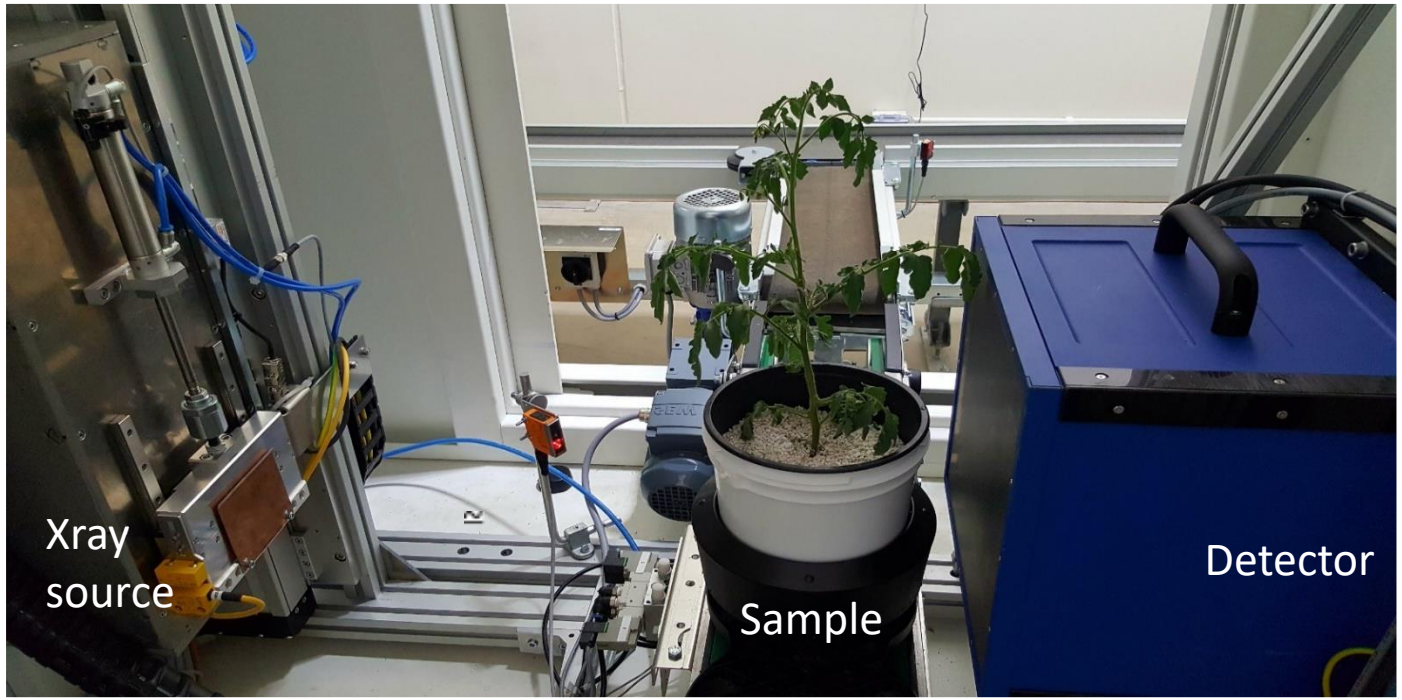
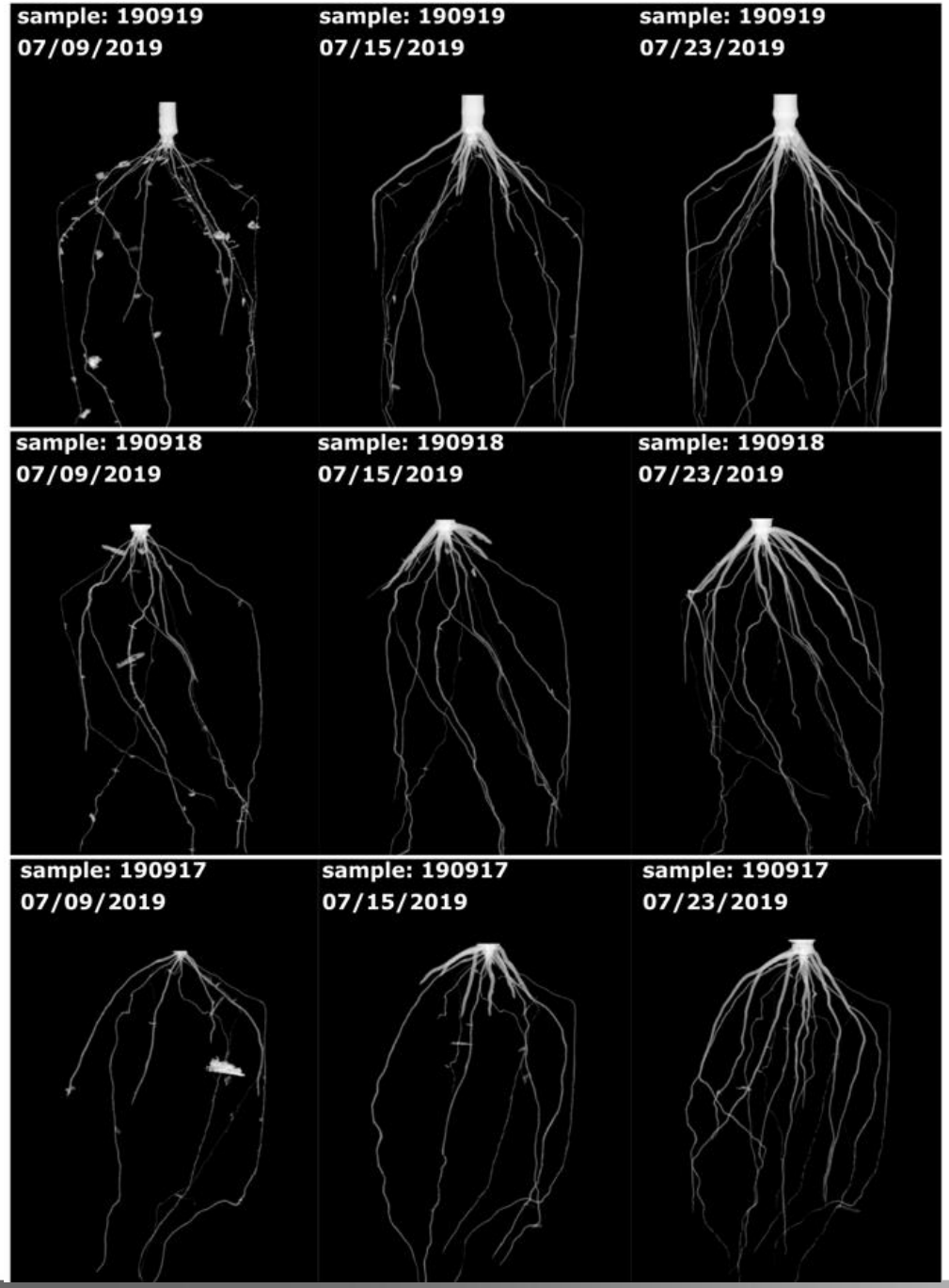
AAPF X-Ray CT Root Imaging

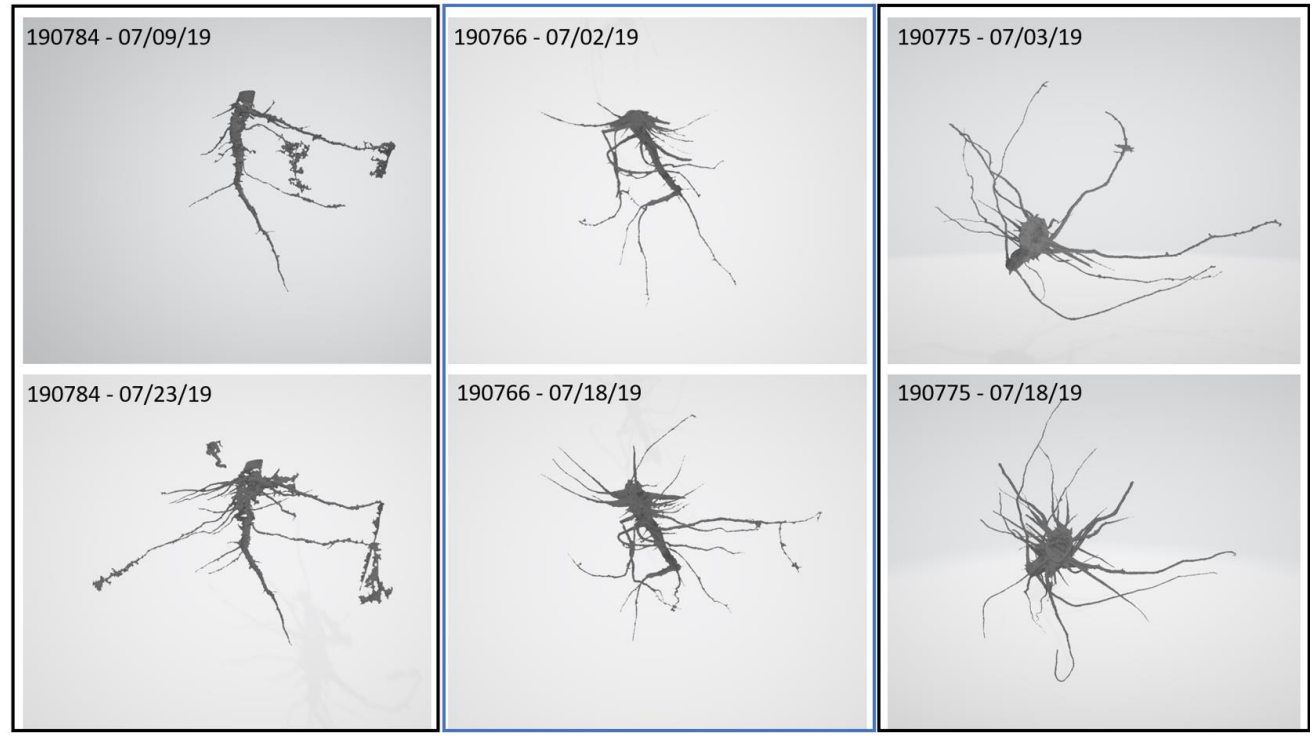
- X-Ray CT imaging is being used to create 3D images of plant root systems.
  - Non destructive imaging technique
  - Allows the visualization of the interior of an object in 3D without cuttings
  - Spatial resolution: 200 – 75 micrometer



Automation







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Indiana Corn and Soybean Innovation Center (ICSC)

- The Indiana Corn and Soybean Innovation Center is a fully integrated **field phenotyping facility** that accommodates plant and seed analyses with proximal and near-proximal sensing to support phenotyping research.

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UAS – Plant Phenotyping Service

- GRYFN multimode UAS remote sensing system

	Sensor	Traits
	RGB (Alpha a7R III)	Stand Count Plant Height Flowering Date Visual Inspection
	Hyperspectral (Headwall)	Crop Monitoring Vegetative Indices Predictive Modeling
	LiDAR (Velodyne VLP-16)	Plant Height Canopy Coverage

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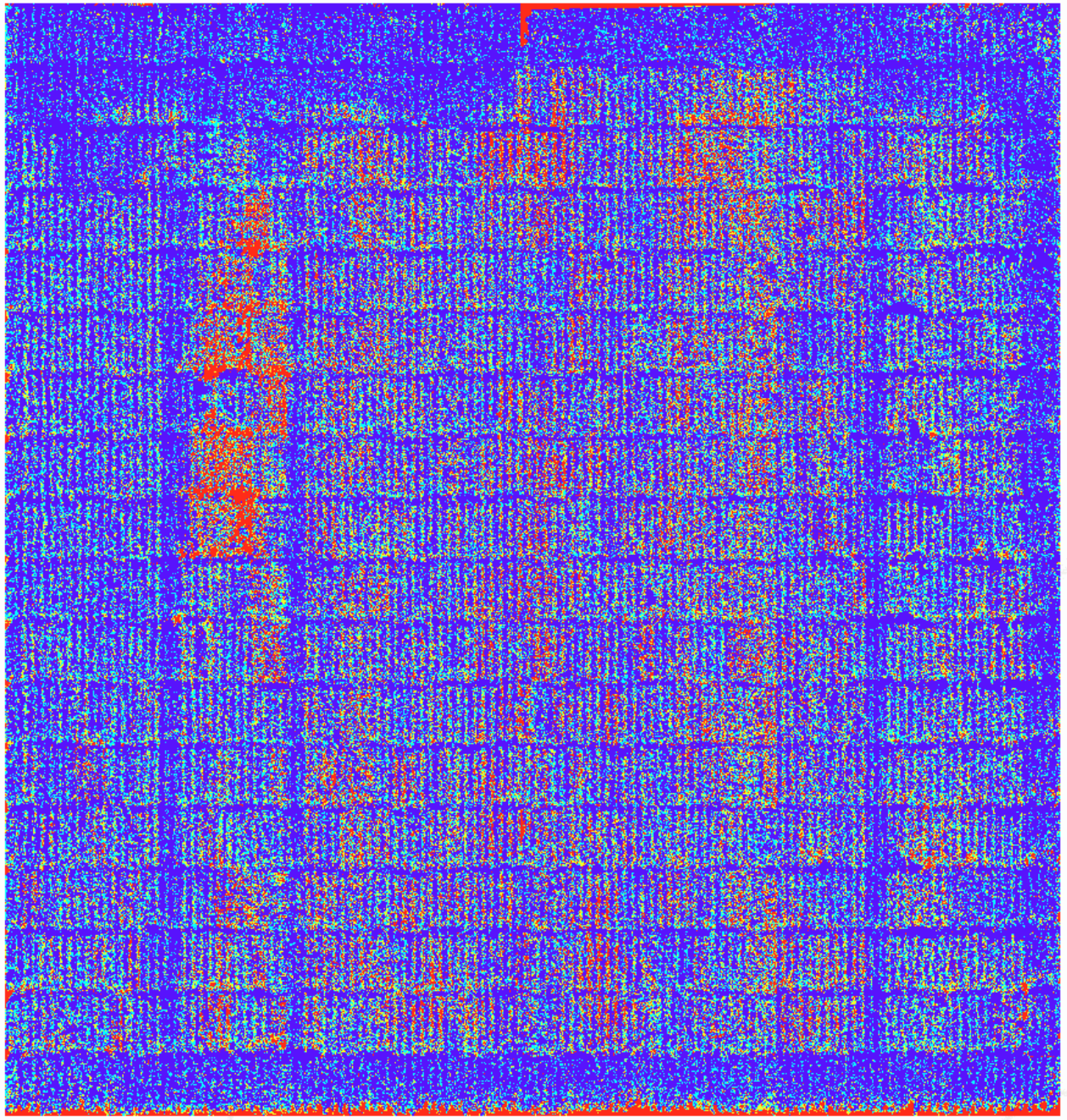
Corn trait

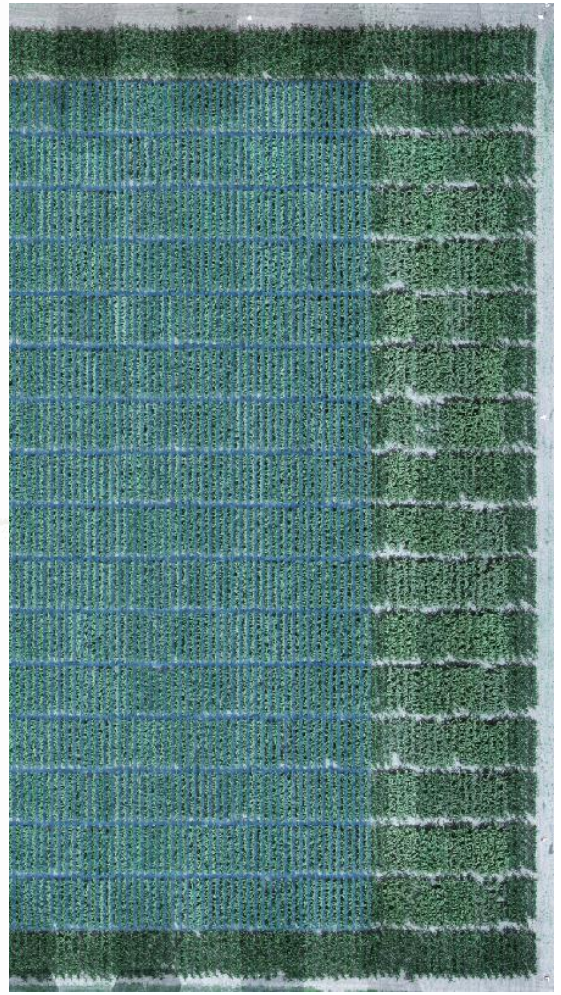
- UAV flights thr season
- Data were prc Pix4D, and GI

(a) RGB-based Point Cloud

(c) Vegetation-based semantic classification

(d) Indi





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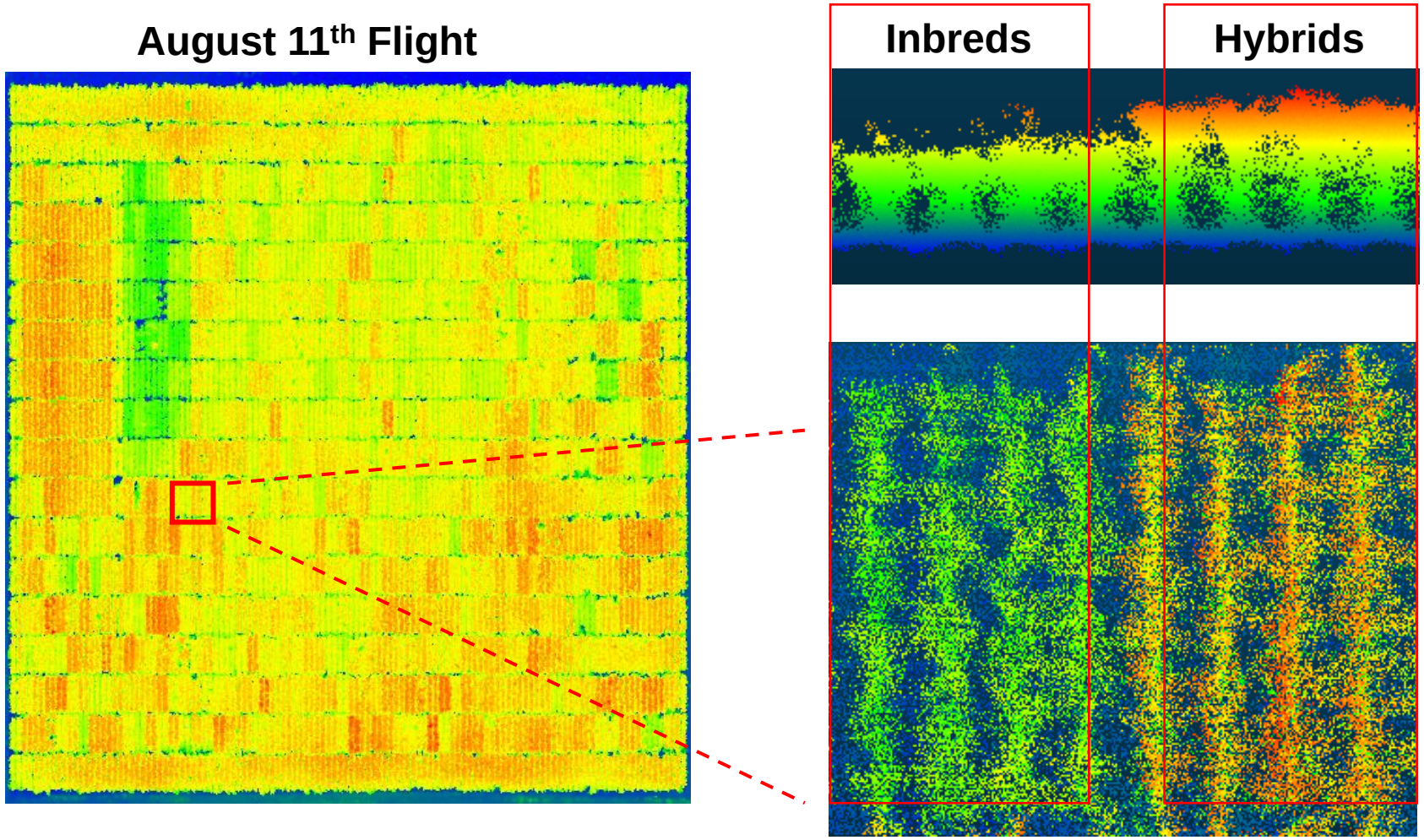
Esri, HERE, Garmin, INCREMENT P, USGS, EPA, USDA

Light Detection and Ranging (LiDAR)

- LiDAR was used to create 3D point clouds



PURDUE'S Next Moves: Plant Science 2.0

General Objective

- Leverage advances in phenotyping and digital agriculture from Plant Science 1 to add value to plants and forest products by optimizing plant productivity, nutrition and sustainability traits.

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82%

Enhance Plant Science Research Platform




Expansion of Field-based Phenotyping Capabilities

- The Rainout Shelter steering committee completed the design for a proposed rainout shelter.
- We are in discussion with potential donors to support installation of the rainout shelter and gantry.

THANK YOU

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