

# Quantifying Soil and Tree Canopy Density Variation in Tart Cherries for Precision Irrigation Applications

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## Objectives

- Precision approaches to irrigation do not currently exist for tart cherry production
- Evaluate if variable rate irrigation worth the effort in tart cherries
- Develop management practices to help conserve water
- Improve profits for growers
- Find if there a correlation between soil texture, canopy density and yield



## Methods

- Develop a soil electrical conductivity (EC) map
- Collect canopy density data
- Capture aerial footage of each orchard
- Yield monitor prototype
- Install variable rate treatments

## Soil Electrical Conductivity

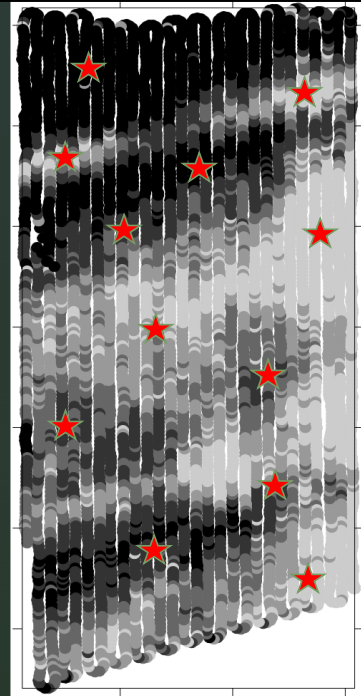
- Soil electrical conductivity (EC) was taken across all of the orchards with an EM-38DD EC probe
- Twelve soil samples were taken from each orchard and analyzed for texture, organic matter, and electrical conductivity
- Soil samples were then correlated to the soil electrical conductivity





## Correlating Soil Samples to EC

- Soil EC readings detect subsurface conductivity of particles in the soil
- Particle Size Analysis: Hydrometer Method
- Salinity: Saturation Paste – Soluble Salts
- Soil Organic Matter: Loss on Ignition



Plant, Soil and Water Reference Methods for the Western Region. 1994. R. G. Gavlak, D. A. Horneck, and R. O. Miller. WREP 125.

## Canopy Density

- Canopy density was measured multiple times during the season using eight Apogee SQ-311 quantum sensors
- Quantum sensors were connected to a Campbell CR-1000 and driven through each field
- Scan rate of 0.1 seconds. Driving at 3 mph the sensors took readings every 15 cm

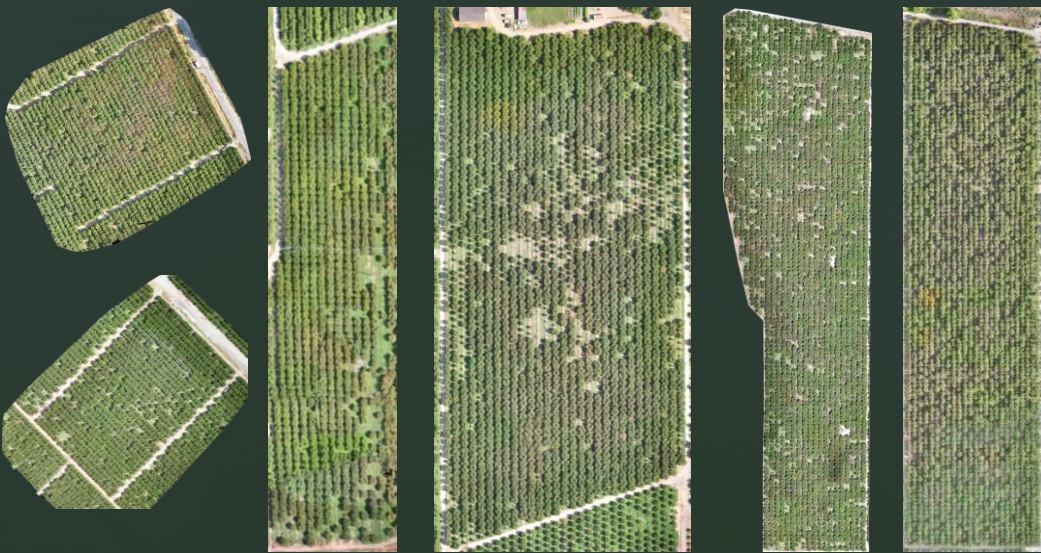


## Aerial Imagery

- Dji Matrice 600
- Drone images were taken pre/post cherry harvest



## Aerial Imagery



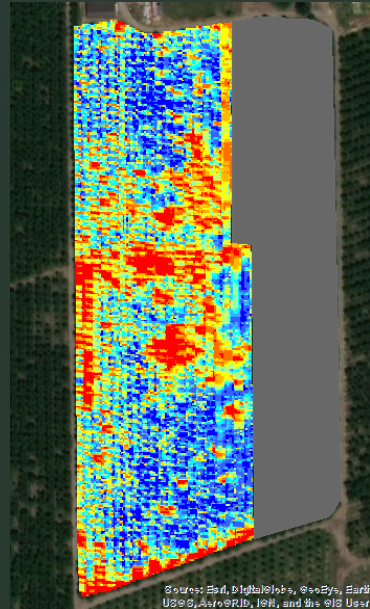
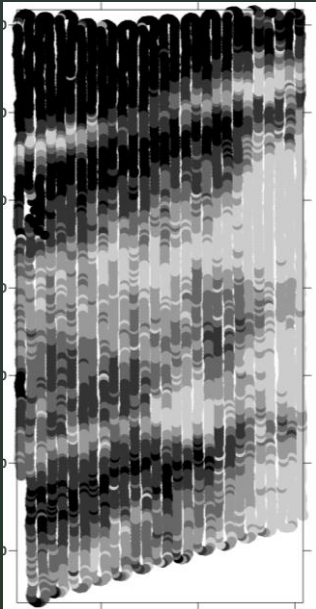


# Aerial Imagery

- Collect point cloud data to produce 3D visuals of orchards
- Able to calculate orchard volume
- Exploring new range of possibilities



# Visual Correlation



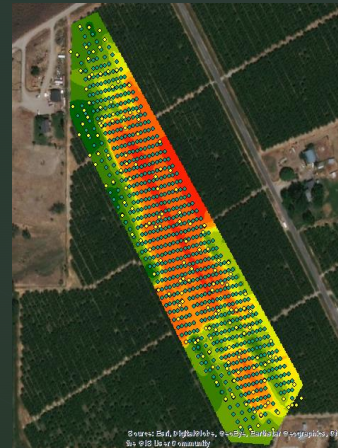
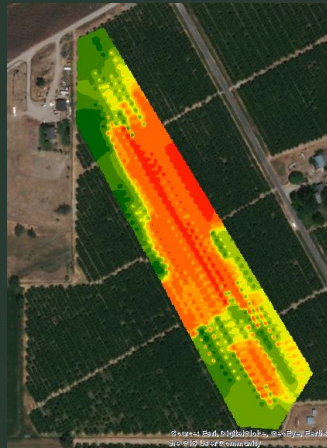
Source: Ben, Digna/Elabs, GeoByz, Earth  
USGS, AeroGRID, ION, and the GIS User

## Yield Monitor

- No yield monitors currently exist
- Prototype created by Bailey Shaffer
- A GPS antenna and logger keep track of where each bin is unloaded
- Could be a huge benefit for growers

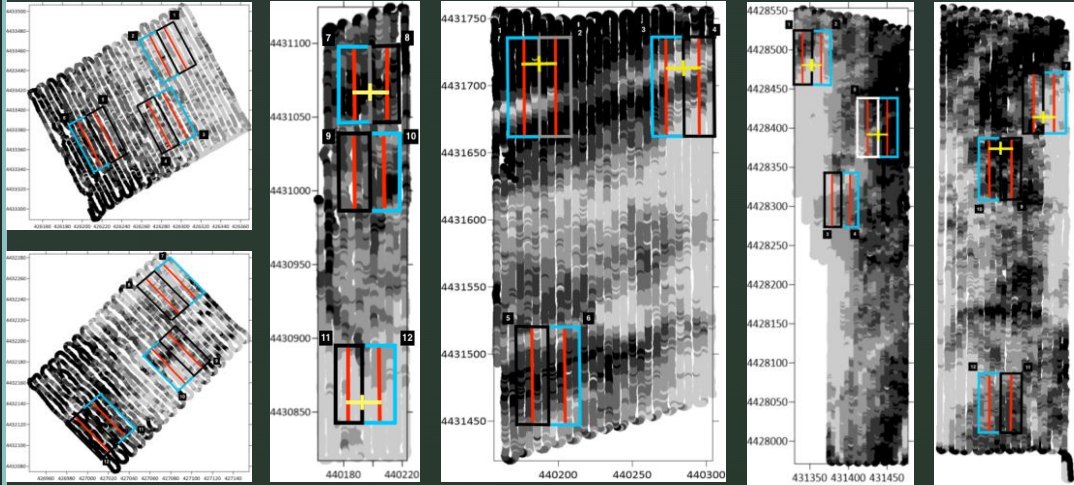


## Yield Map



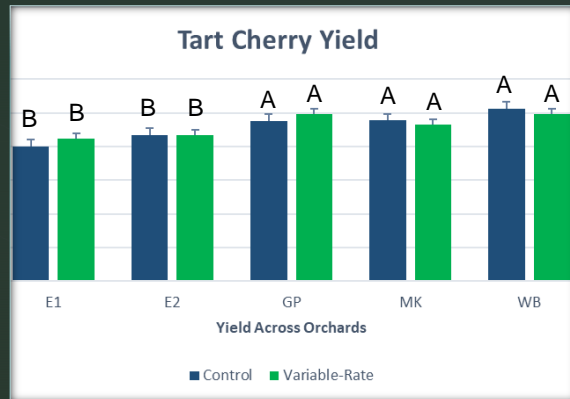
LEGEND	
	Treatment Parameter
	Variable Rate Treatment
	Harvest Row
	Watermark Installment

## Treatment Maps



## Comparing Bin Weights

- No statistical difference
- Yield of fruit was unaffected by variable-rate treatments





## Looking Forward

- Collect yield monitor data
- Continue treatments to see effects after one growing season
- Explore new technology and data