

No/low-till practices as a water conservation tool on small-scale vegetable farms East of the Cascades

Fall '22 Meeting



Nella Mae's Farm
Cove, OR



Sweet Union Farm
Klamath Falls, OR



Sungrounded Farm
Terrebonne, OR



Sakari Farms
Tumalo, OR



Fibonacci Farm
Bend, OR

Research Objectives:

Objective 1: Measure differences over one growing season in plant-available water between beds with no or low-till preparation and beds prepared with tillage.

Objective 2: Monitor rainfall, temperature, humidity, and wind over one season and analyze correlations to changes in water tension in the soil.

Education Objectives:

Objective 1: Establish an educational network of five small-scale vegetable producers.

Objective 2: Develop case studies and a demonstration video from the network farms.

Objective 3: Present findings and final video as a panel at the OSU Small Farms Conference in February 2023.

Objective 4: Disseminate presentation and final video via five agricultural networks, including the Oregon Climate (OrCAN) and Agriculture Network and OSU Extension.

Objective 5: Host an online workshop to present research findings and case studies in partnership with OSU Extension.

Sweet Union Farm

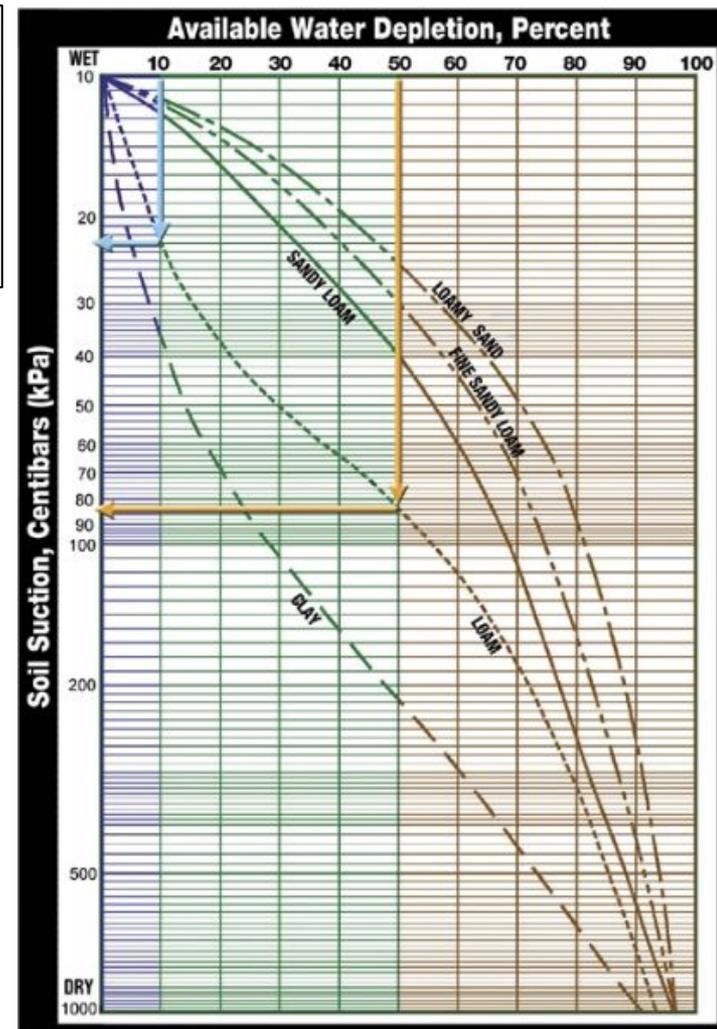
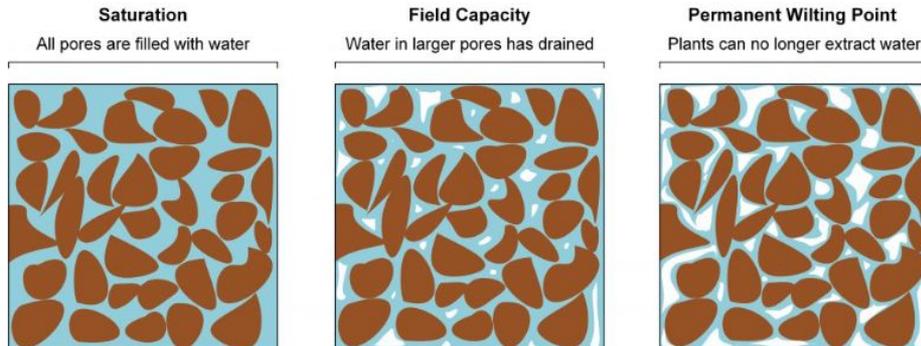
Klamath Falls, OR



Soil Moisture

Soil Texture Classes	AWHC (inch/inch)
Sandy loams	0.11-0.15
Silt loams	0.20-0.24
Silty clay loams	0.18-0.23
Clay loams	0.14-0.19
Silty clays	0.10-0.14

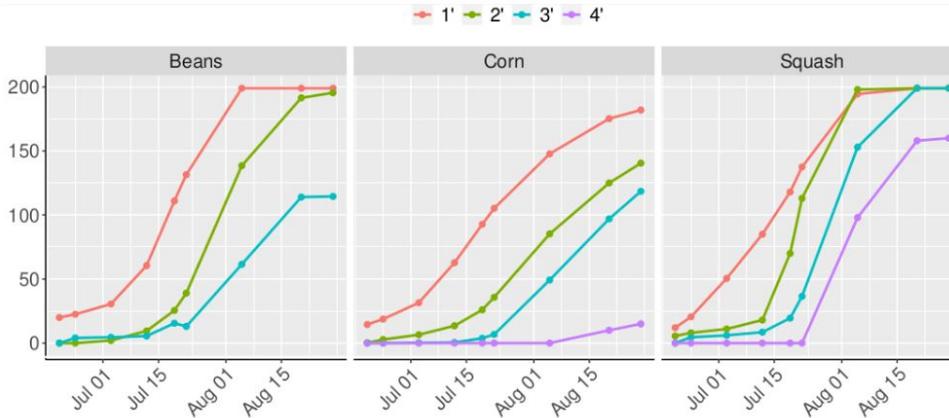
- **Soil series:** NRCS Web Soil Survey. (Sometimes inaccurate!)
- **Depth to restrictive feature:** Depth to bedrock or other root-limiting layer
- **Available water holding capacity to 60”:** Inches of water that the soil holds onto, down to restrictive layer, or else top 60”
- **Irrigation trigger point:** Range of soil matric potential (i.e., soil suction) in which it is recommended to irrigate (centibars, kPa). Values from [this U of Nebraska report on corn production](#)



Factors that affect soil moisture levels

- Soil physical properties (texture and organic matter)
- Precipitation and irrigation
- Evaporation from surface
 - Temperature, humidity, and wind
 - Tillage, mulching
- Evapotranspiration from plants
 - Temperature, humidity, and wind
 - Plant type and maturity

Soil moisture loss in different crops, dry farmed in silty clay loam



Horizon (depth)	Texture	AWHC (in)	Consistency
Ap (0-9")	Silt Loam	1.8	Very Friable
A2 (9-12")	Silt Loam	0.6	Very Friable
E (12-18")	Silty clay loam	1.1	Very Friable
Bt1 (18-26")	Clay	1.0	Very Firm
Bt2 (26-38")	Clay	1.4	Firm
BCt (38-44")	Silty clay loam	1.1	Firm
C (44-60")	Silt loam	3.2	Friable

Sweet Union Farm

Location: Klamath Falls

Crop: Paste Tomatoes

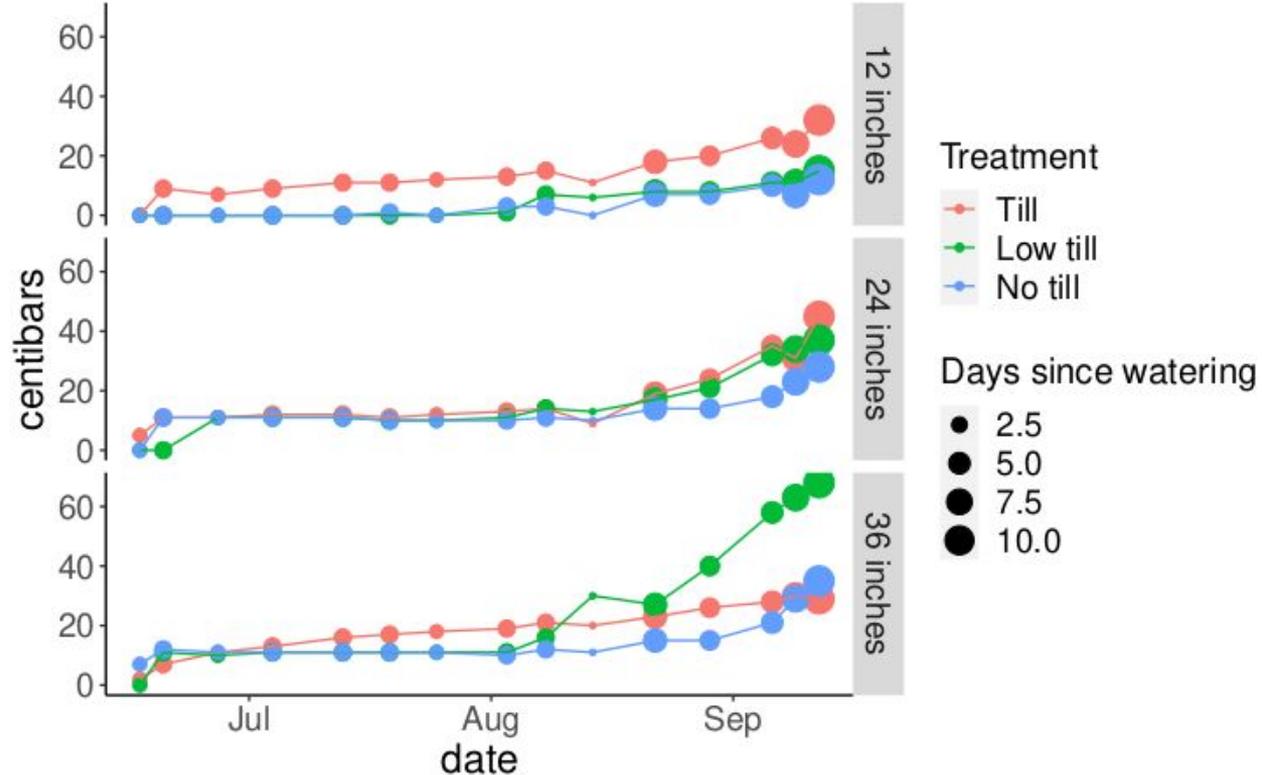
Treatments:

- Till (Rototiller)
- Low till (Power harrow)
- No till

Crop performance by treatment:

Till \approx Low till \approx No till

Soil Series: Calimus loam
Depth to restrictive feature: 80+ inches
Available water to 60”: High, 9.3 inches
Irrigation trigger point: ~80-90 centibars





Fibonacci Farm

Bend, OR

Fibonacci Farm

Location: Redmond

Crop: Zinnias

Treatments:

- Till (Simulated w/ hand hoe)
- Low till (Broadfork + Tilter)
- No till

Crop performance by treatment:

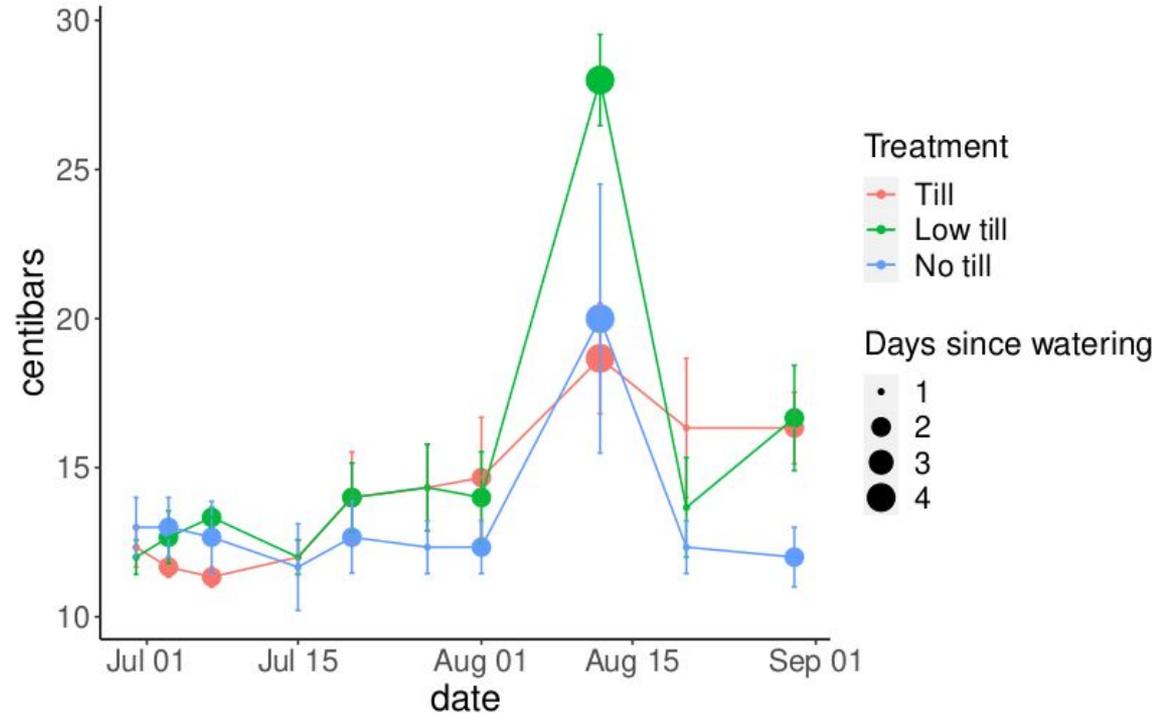
Low till > No till > Till

Soil Series: Stukel sandy loam

Depth to restrictive feature: 10-20 inches

Available water to 60": Very low, 2.2 inches

Irrigation trigger point: ~30-33 centibars



Depth of sensors: 3-6"



Sungrounded Farm

Terrebonne, OR

Sungrounded Farm

Soil Series: Deschutes sandy loam (or loamy sand?)
Depth to restrictive feature: 20-40 inches
Available water to 60”: Low, 3.7 inches
Irrigation trigger point: ~30-33 centibars

Location: Terrebonne

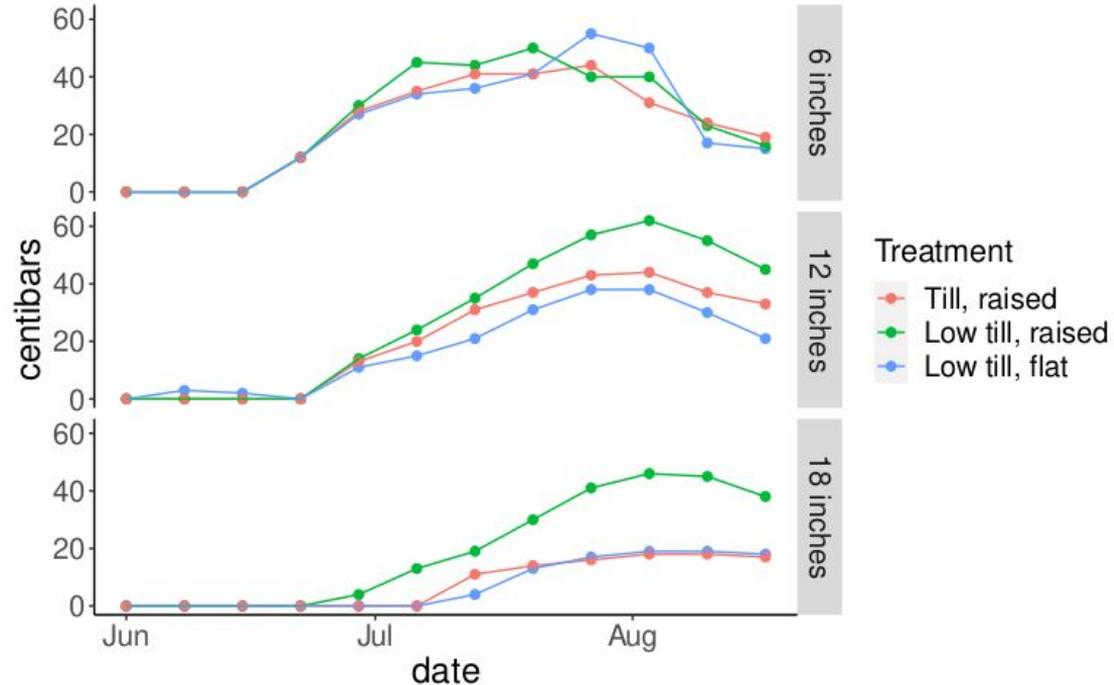
Crop: Onions

Treatments:

- Till, raised (Rotary plow + Rototiller)
- Low till, raised (Rotary plow, Power harrow)
- Low till, flat (Power harrow)

Crop performance by treatment:

Till, raised \approx Low till, raised > Low till, flat





Sakari Farms

Tumalo, OR

Sakari Farm

Location: Bend

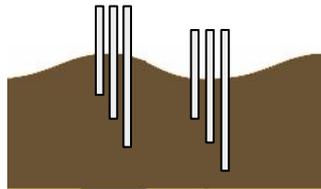
Crop: Golden Beets

Treatments:

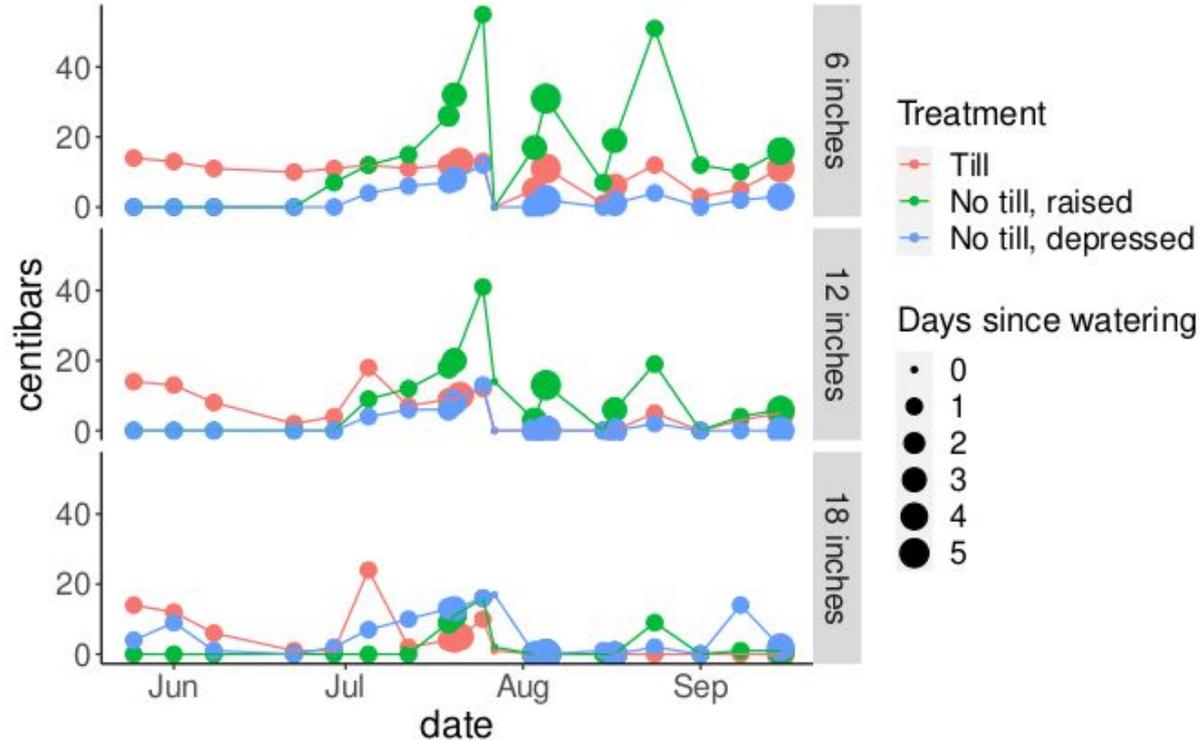
- Till (Rototiller)
- No till, raised (Shovel formed)
- No till, depressed (Shovel formed)

Crop performance by treatment:

No till, raised > No till, depressed > Till



Soil Series: Tumalo sandy loam
Depth to restrictive feature: 20-40 inches
Available water to 60": Low, 4.6 inches
Irrigation trigger point: ~30-33 centibars





Nella Mae's Farm

Cove, OR

Nella Mae's Farm

Location: Cove

Crop: Lettuce

Treatments:

- Till (Rototiller, outside)
- Low till (Tilther, hoophouse)
- No till (Broadfork, hoophouse)

Crop performance by treatment:

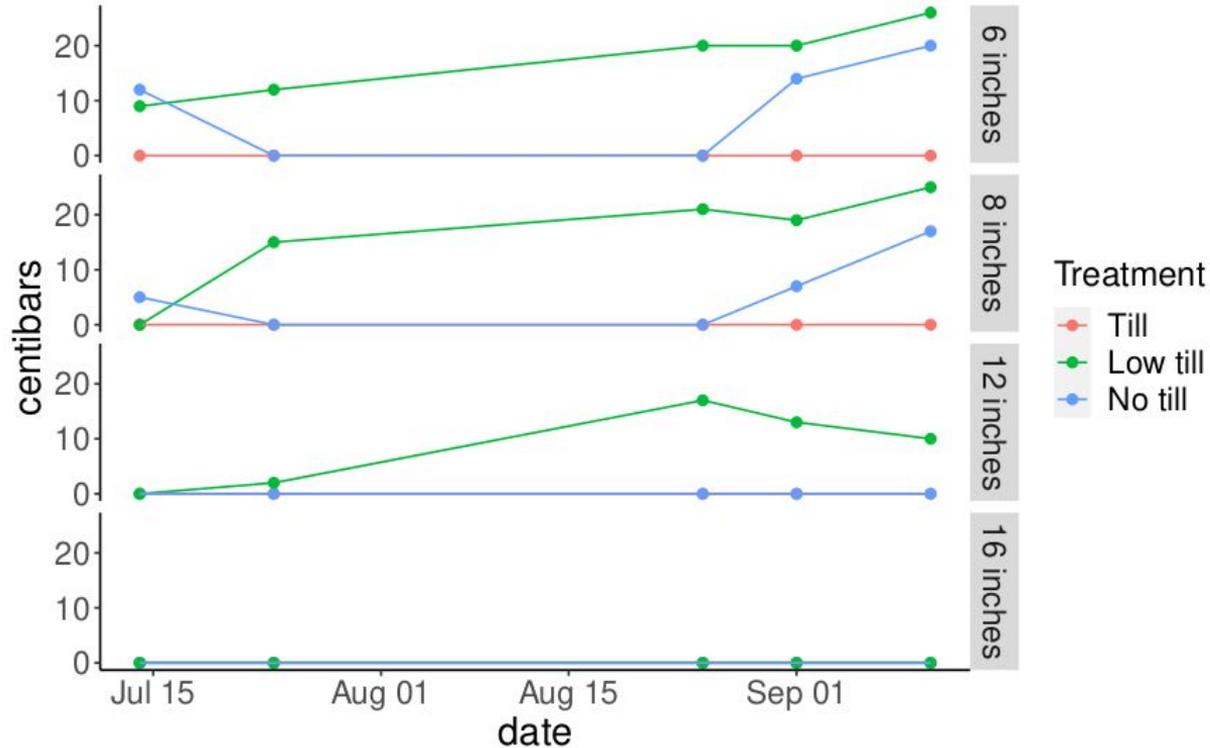
Germination

Till \approx Low till > No till

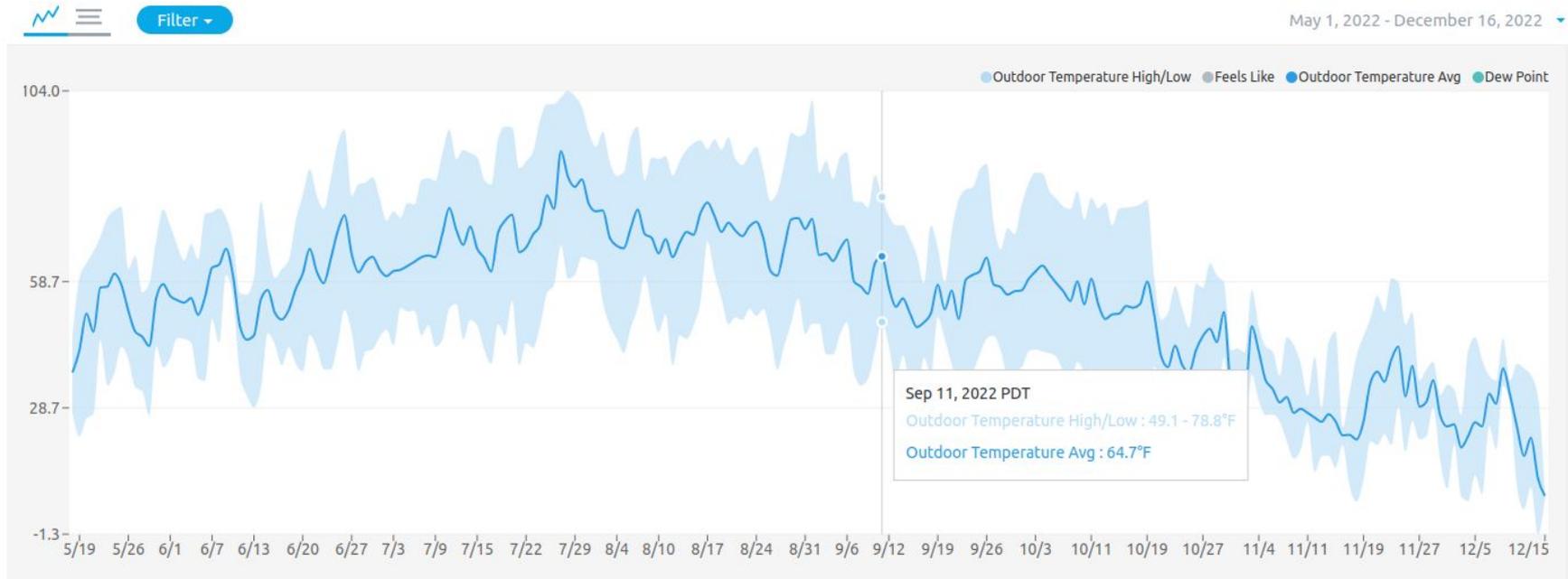
Yield

No till > Low Till \approx Till

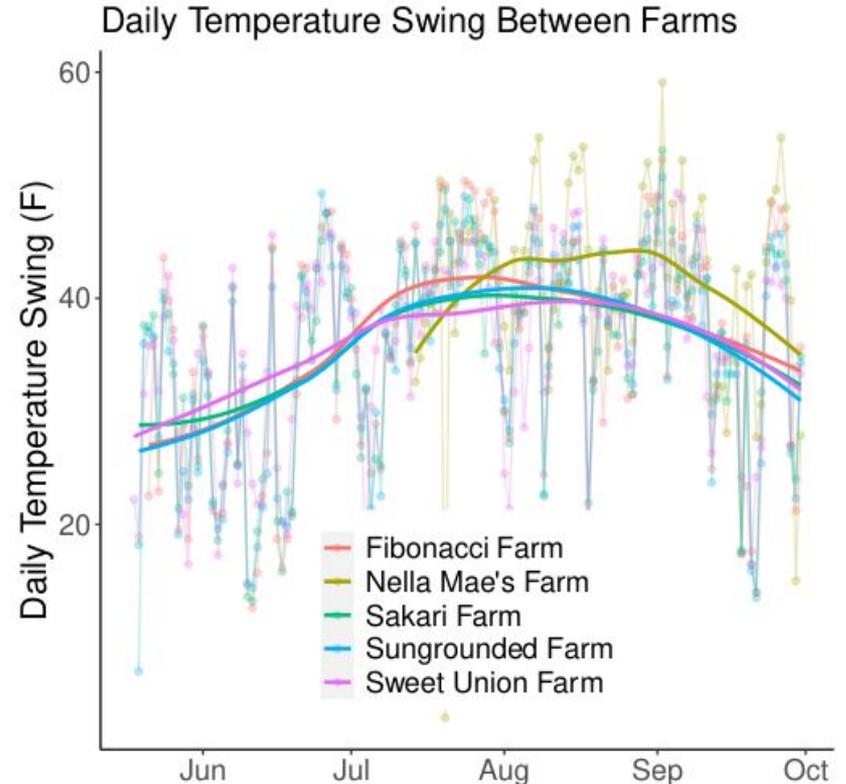
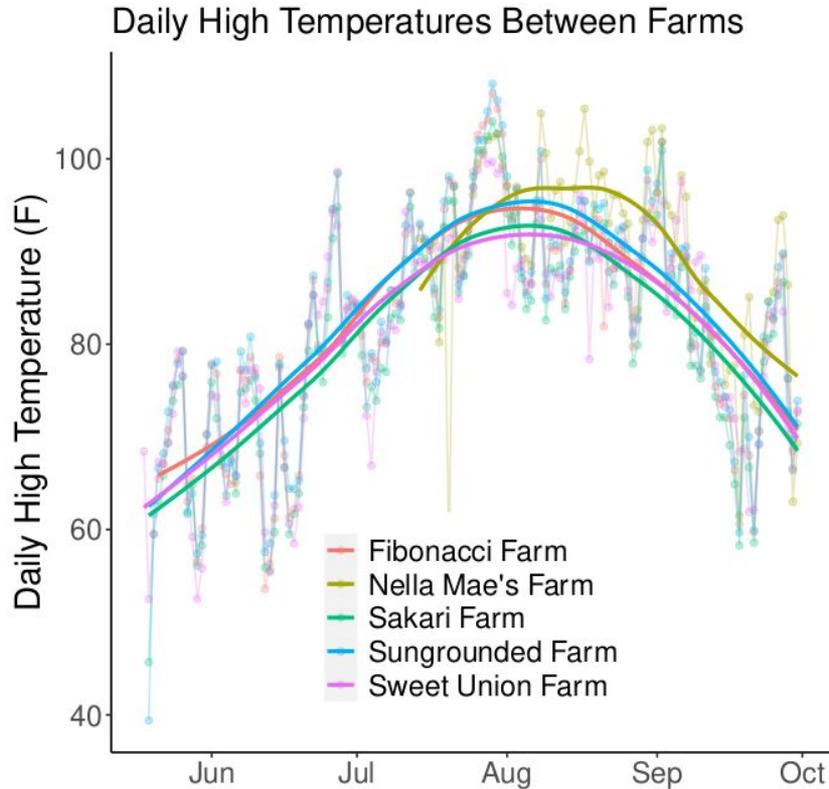
Soil Series: Ramo-Conley silty clay loam
Depth to restrictive feature: 80+ inches
Available water to 60": Moderate, 7.4 inches
Irrigation trigger point: ~75-80 centibars



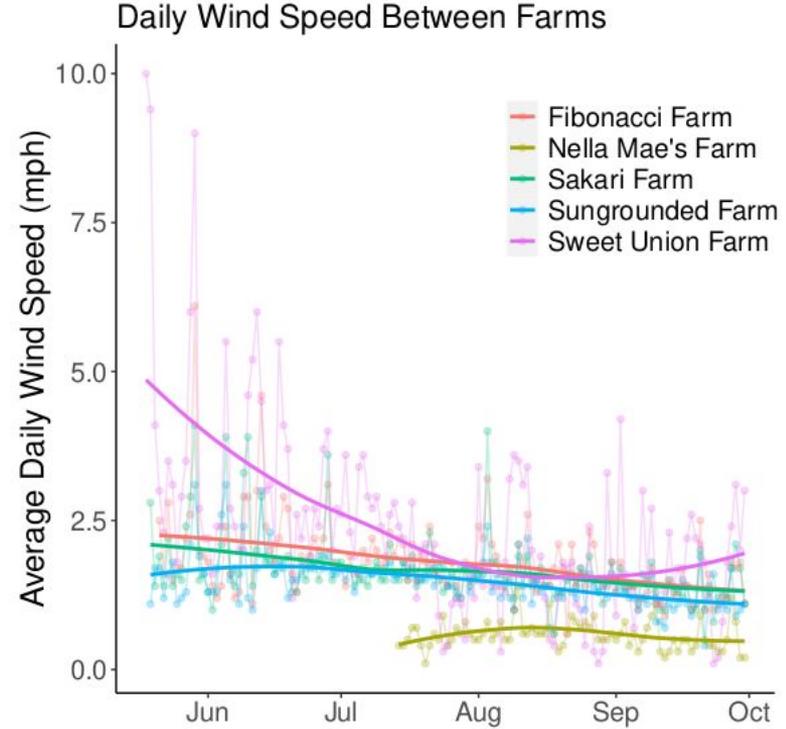
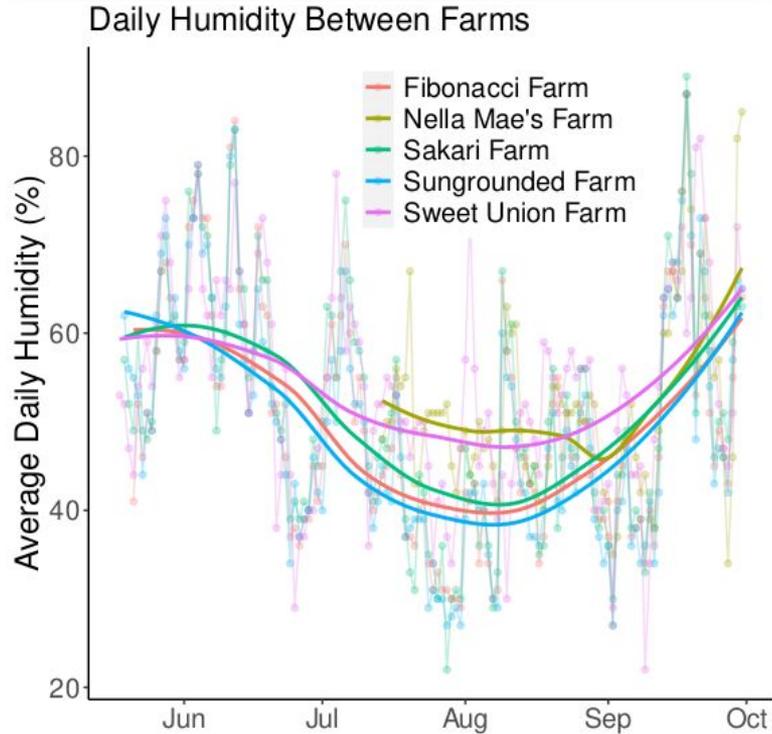
Weather Station Data, ambientweather.net



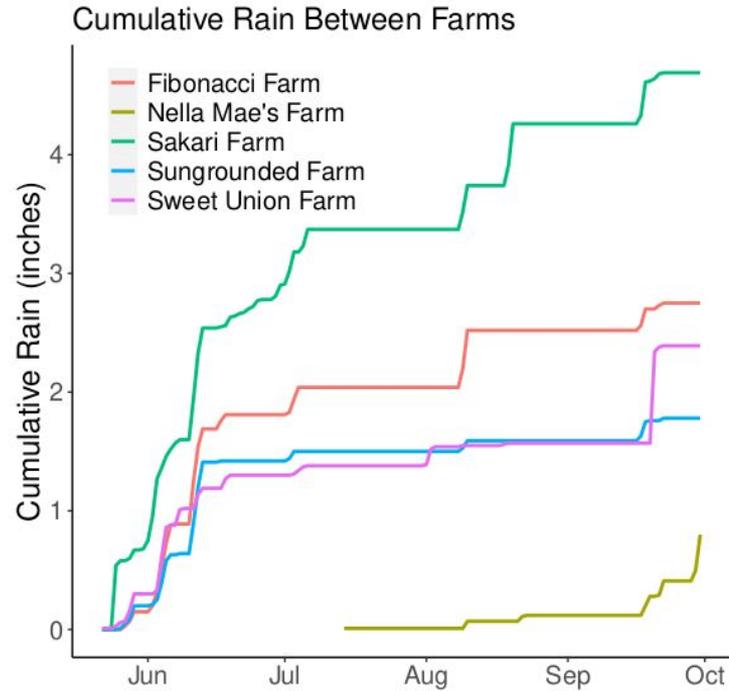
Temperature Extremes



Humidity and Wind Speed



Cumulative Rainfall, May 21st-Oct 1st



Discussion Questions

Tradeoffs between different tillage practices?

Other ways to reduce reliance on irrigation?

Benefits and limitations of using soil moisture meters?

Next steps for on-farm experimentation?

Future collaborations?