

Soil Moisture Monitoring: What Goes on Belowground?

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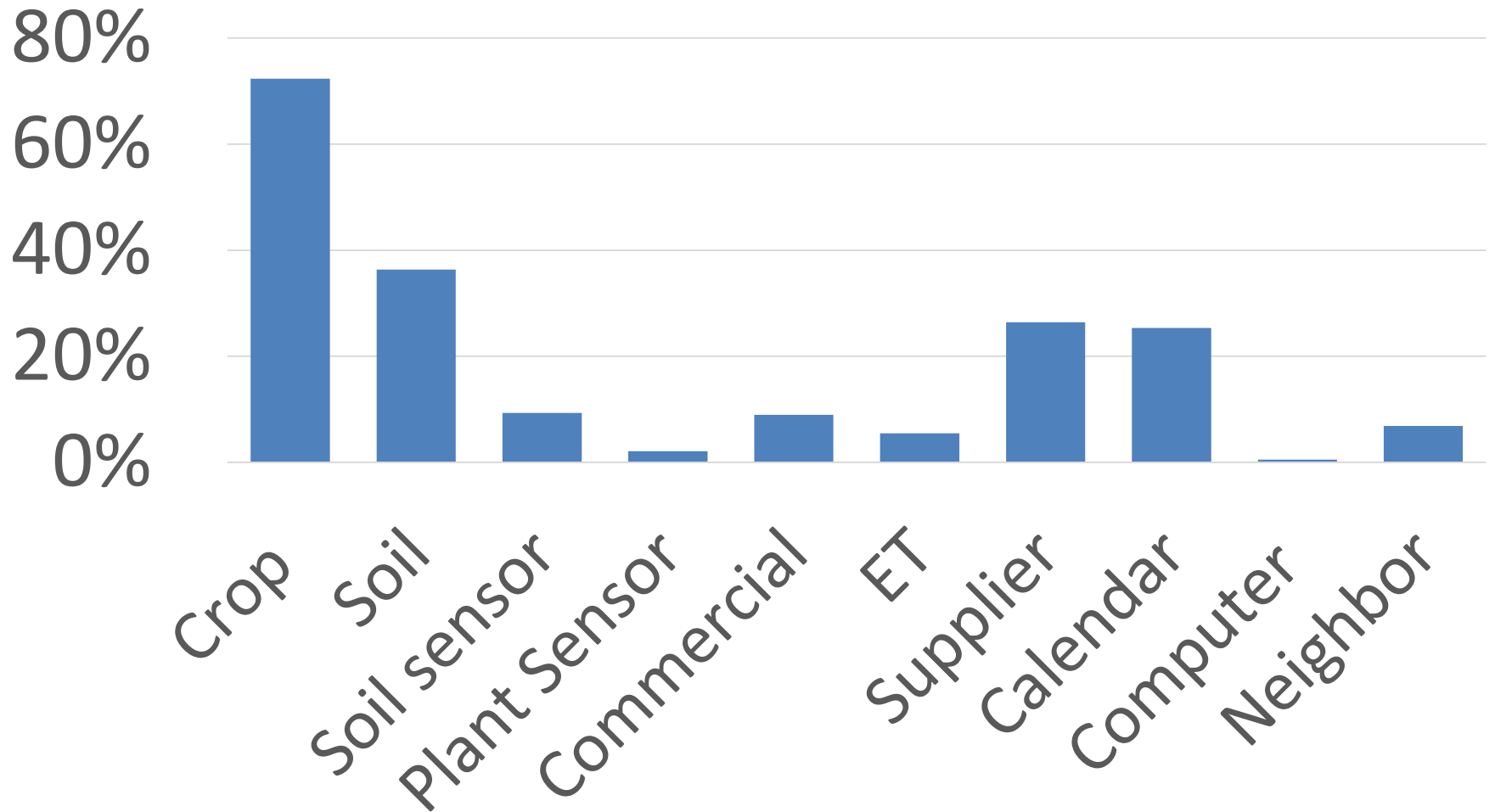
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EXTENSION 
UtahStateUniversity.

**How do most
farmers schedule
irrigation?**

How do most farmers schedule irrigation?



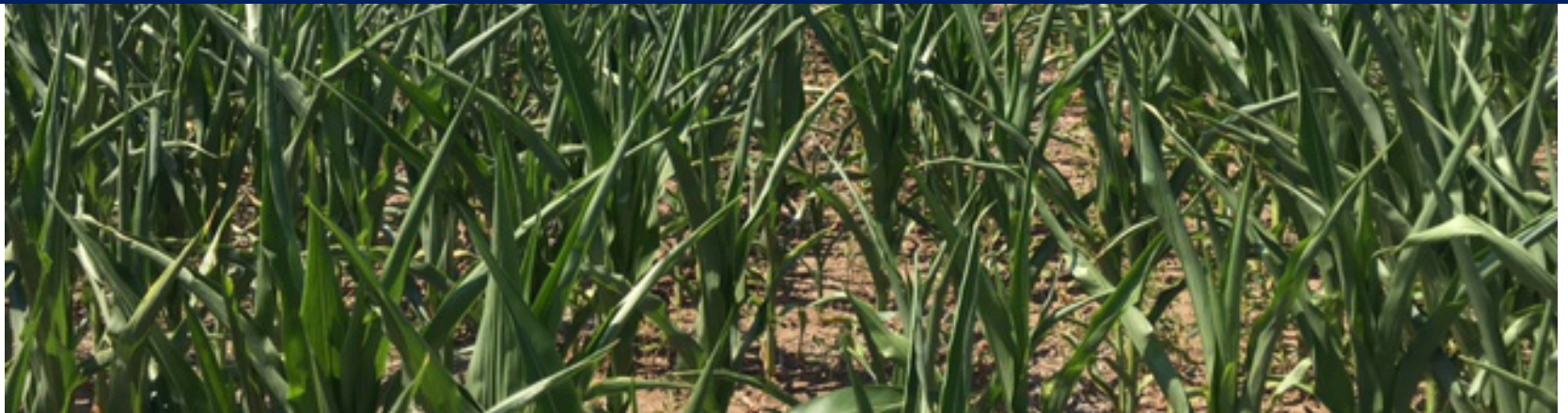
Crop Condition is #1



Crop Condition is #1



Why Monitor Soil Moisture?



Why Monitor Soil Moisture?

**EARLY
WARNING
SYSTEM**



Why Monitor Soil Moisture?



How to Monitor - Sensors?

Tensiometer



True-Domain Reflectometry



Granular Matrix



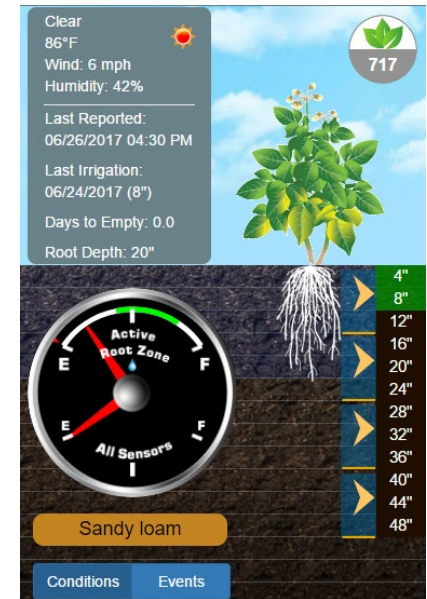
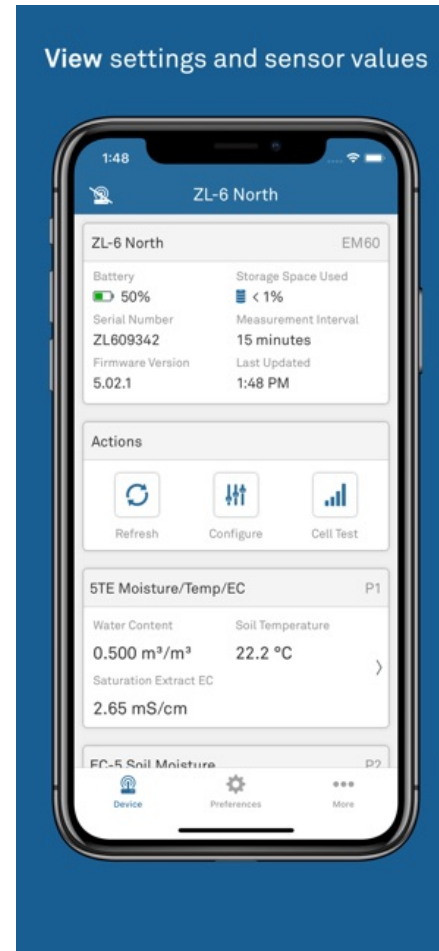
Capacitance



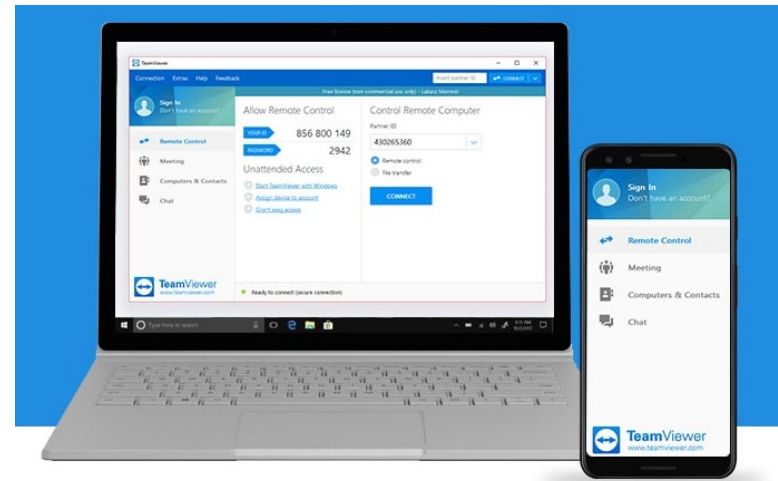
How to Monitor - Loggers?



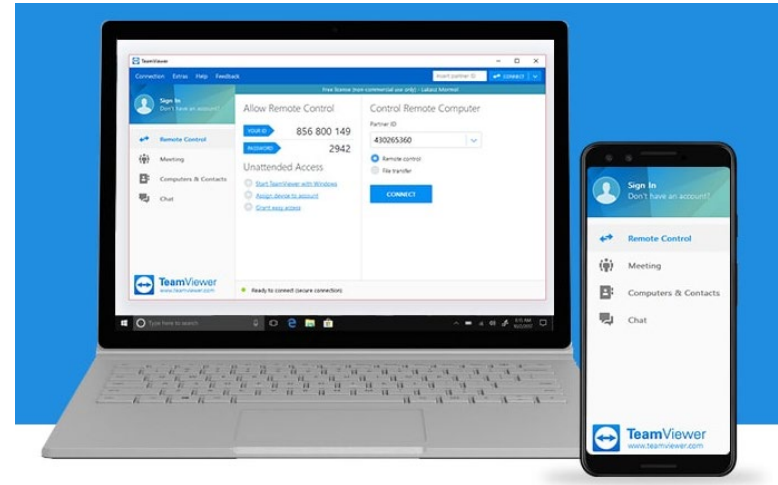
How to Monitor – Data access?



Which one to use?



Which one to use?



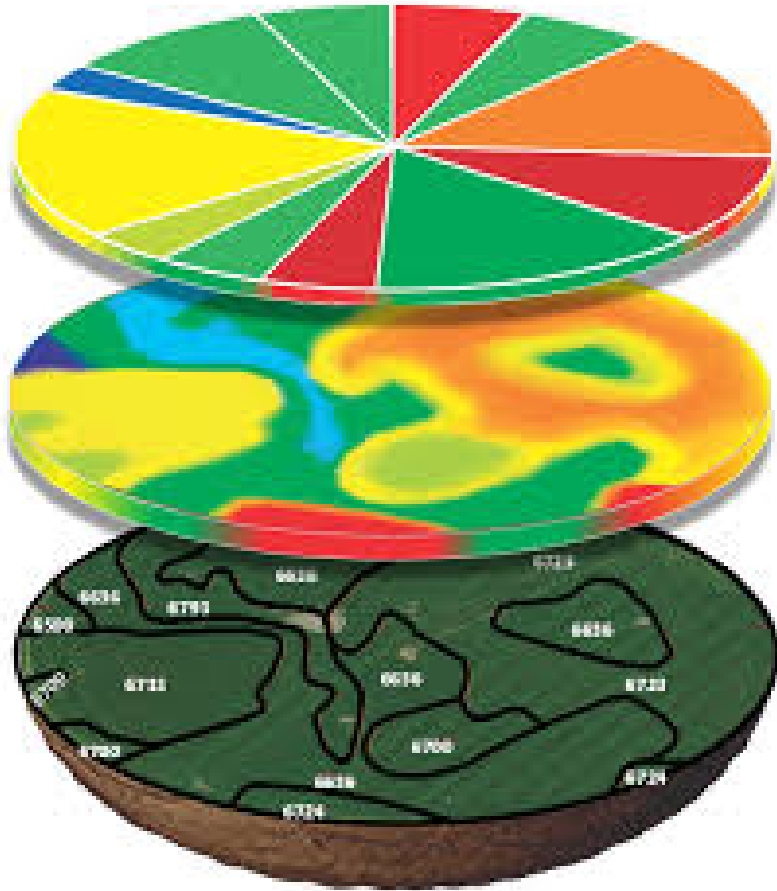
Total Cost of Ownership

- purchase
- repairs
- maintenance
- upgrades
- service
- support
- security
- training



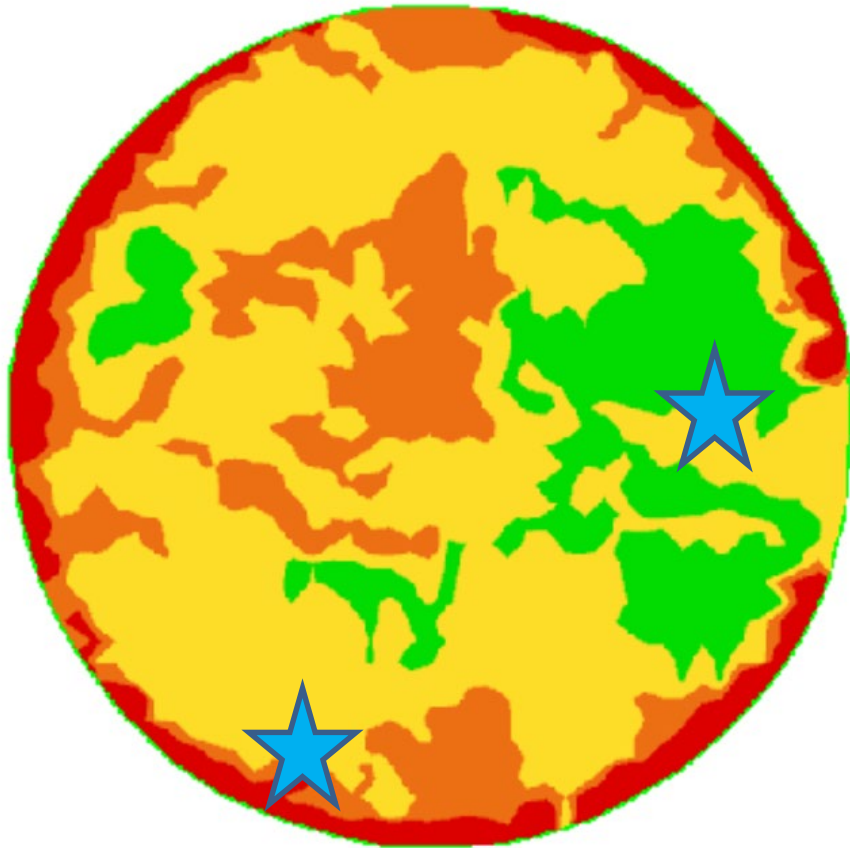
RETURN ON INVESTMENT

How Many Do I Need?



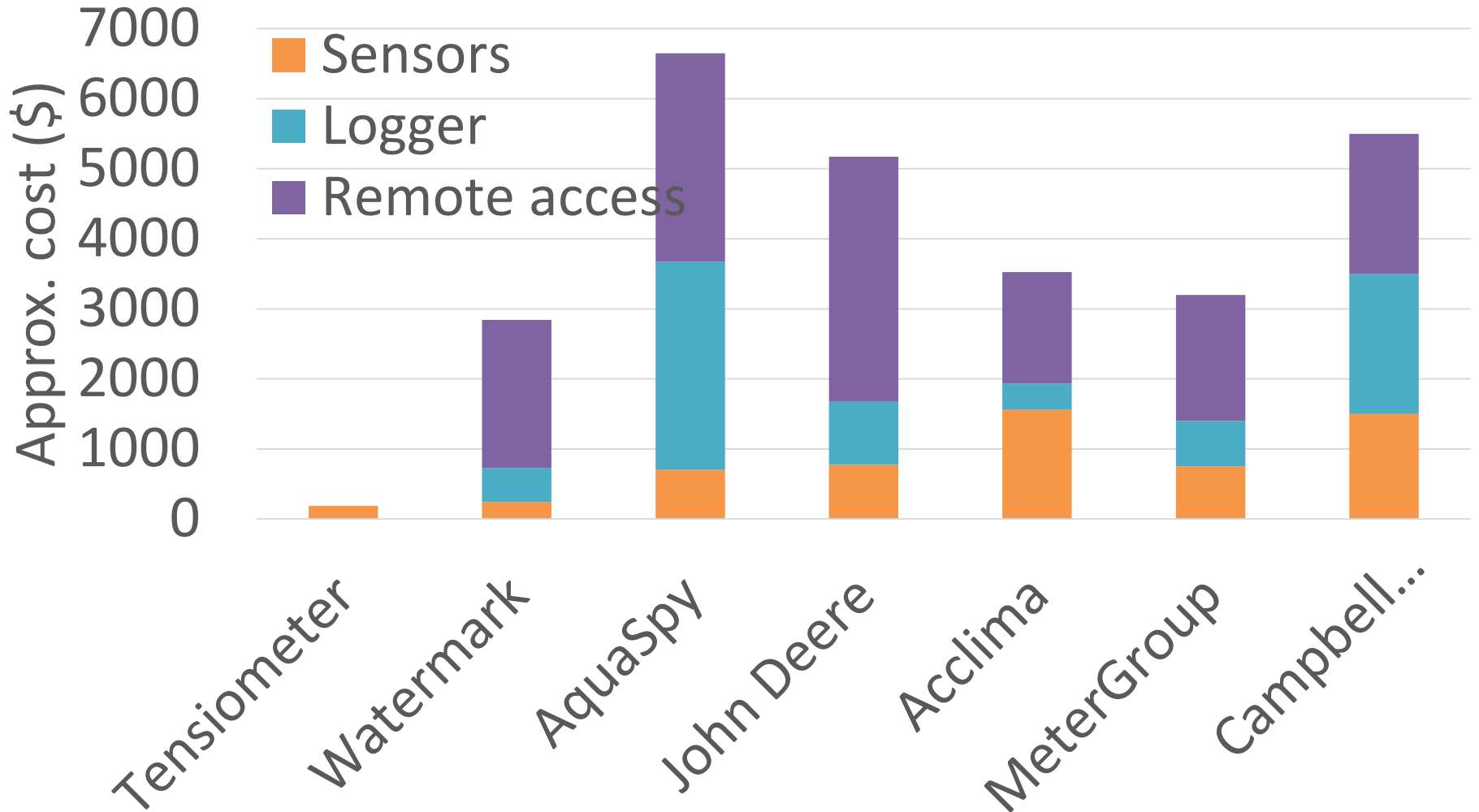
Key:
variation in
time and
space

Comparing Apples to Apples

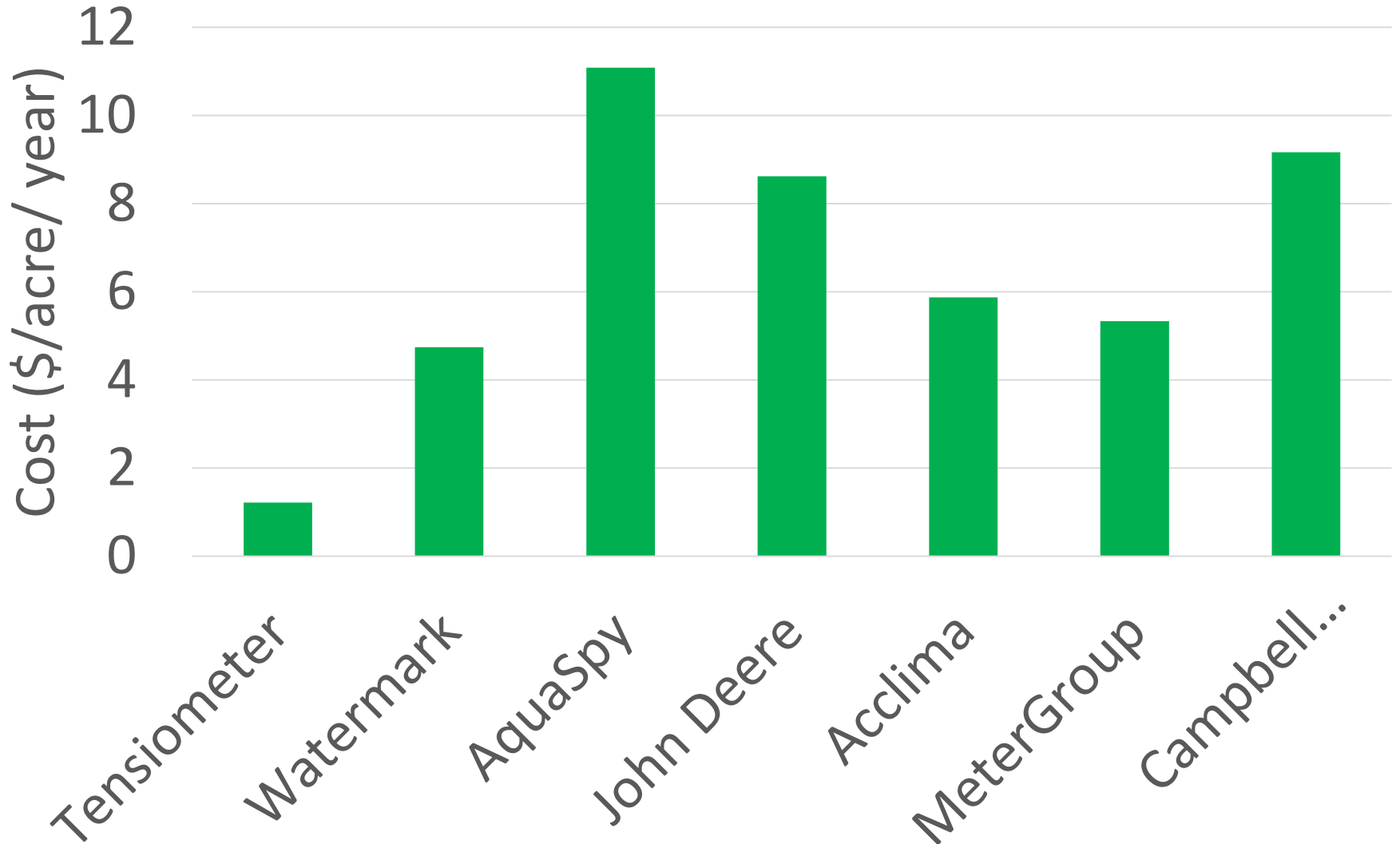


- 120 acres
- 2-4 field locations
- 10 years
- Remote access
- Top 3 ft of soil

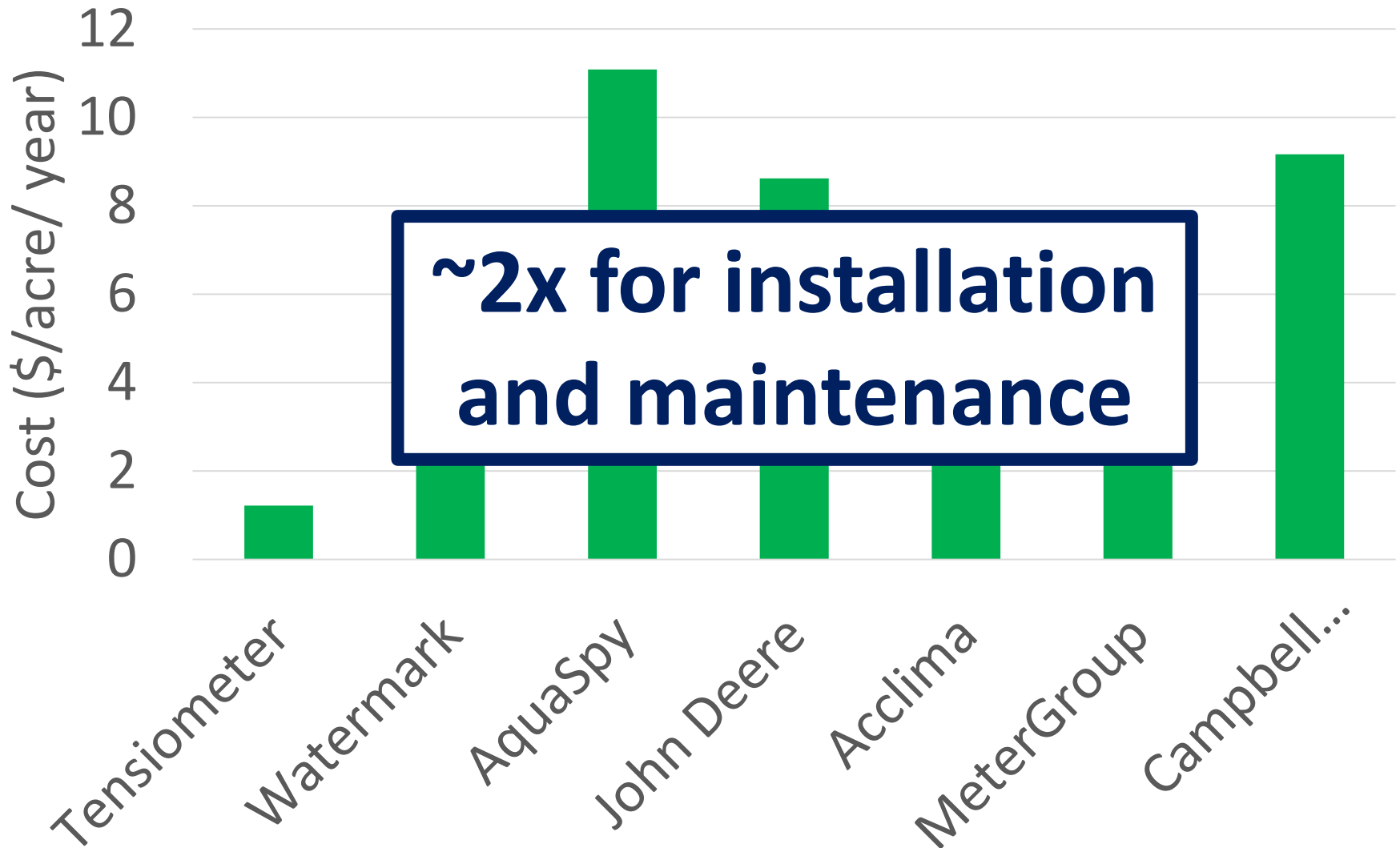
How much will it cost?



How much will it cost?



How much will it cost?



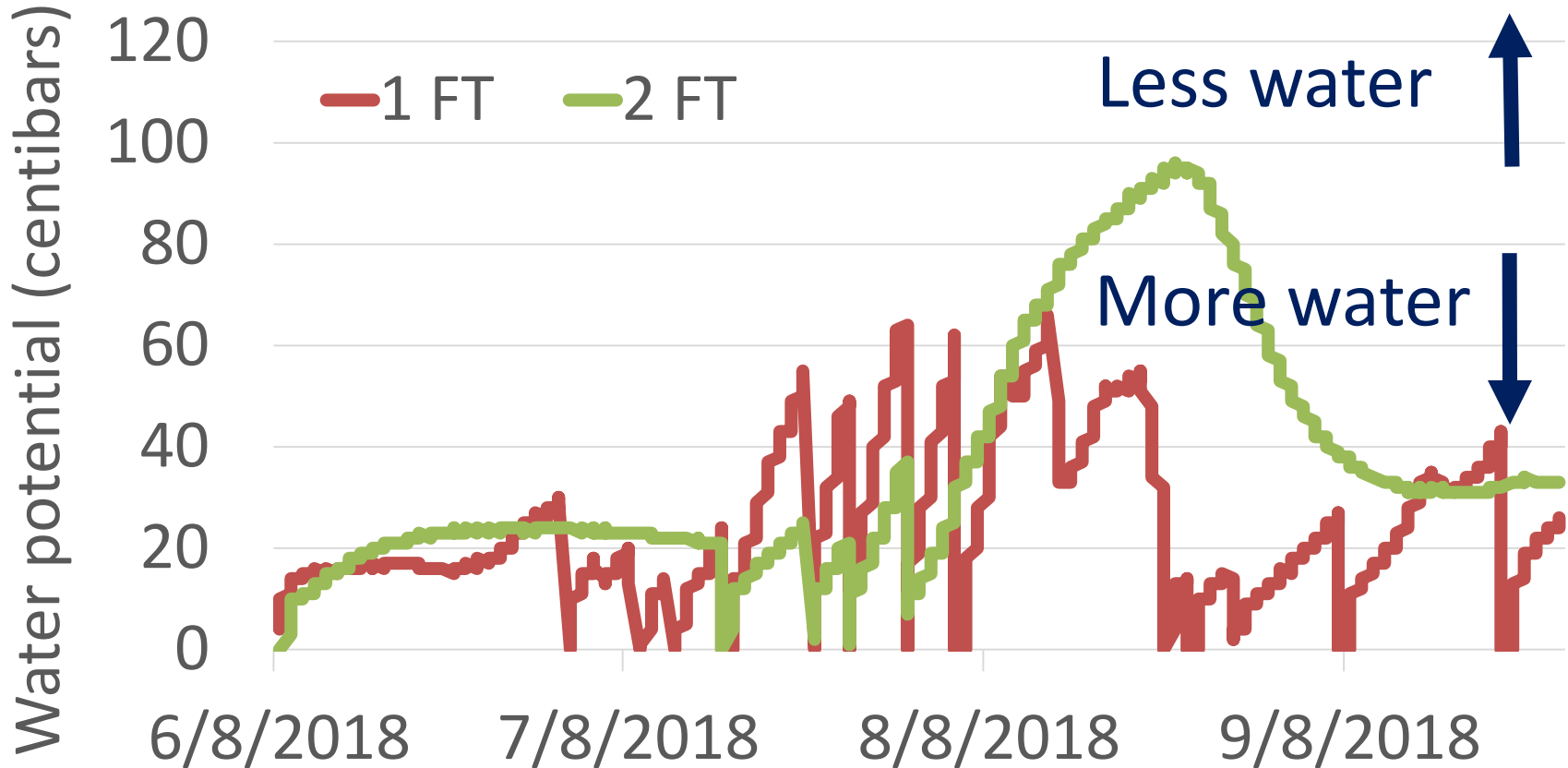
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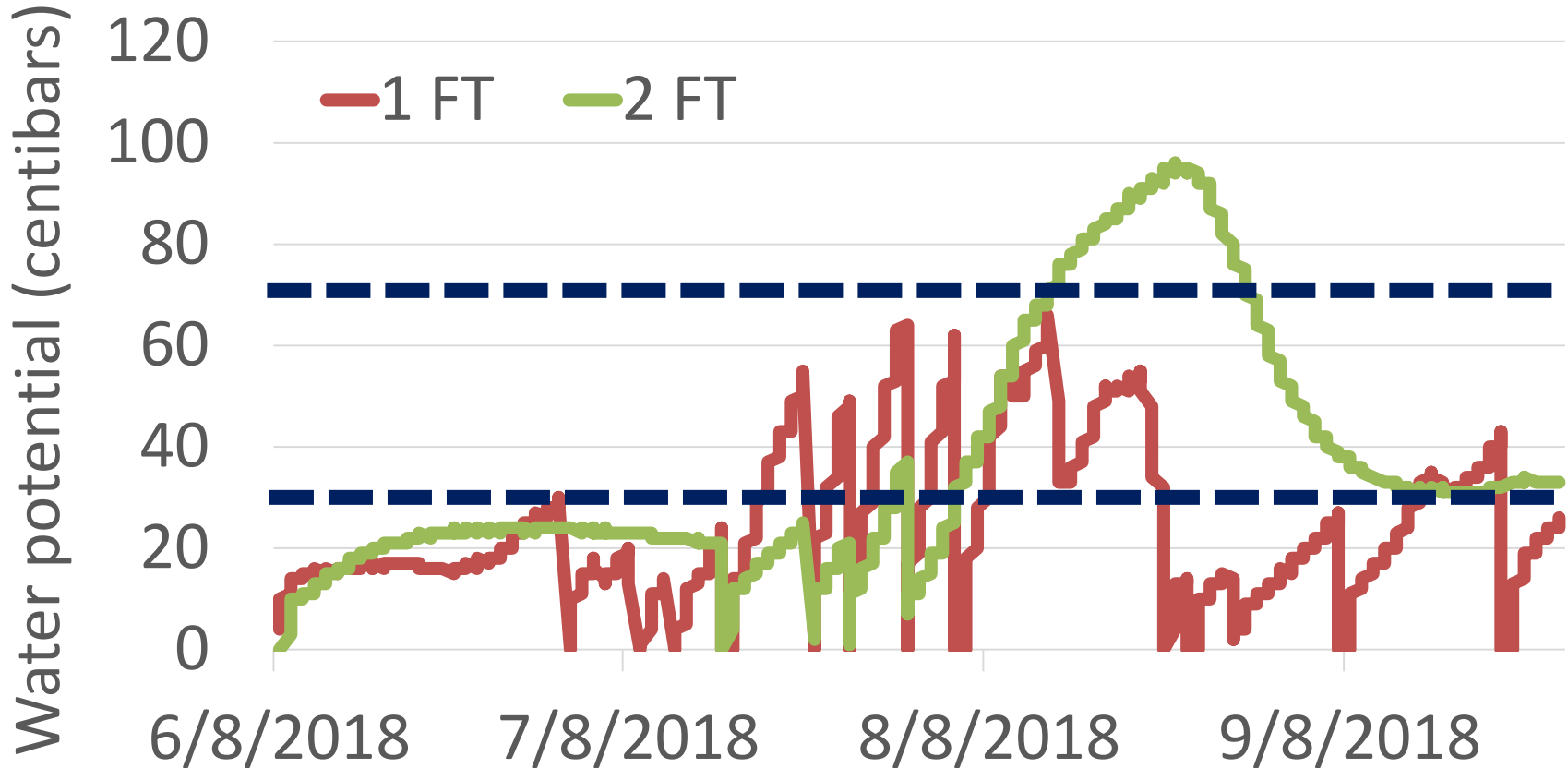
How to Use the Data?



How to use the data – water potential?

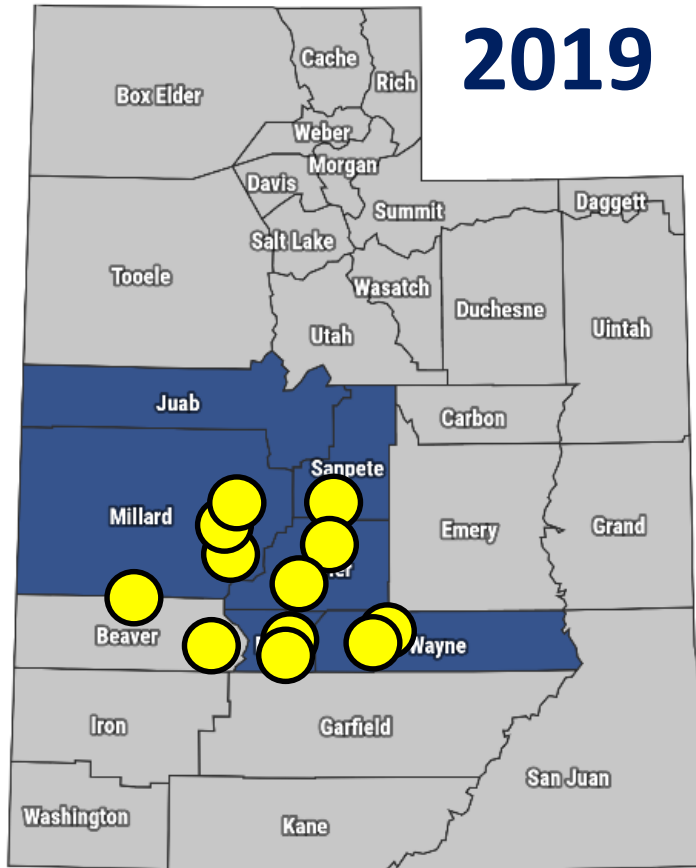


How to use the data – water potential?

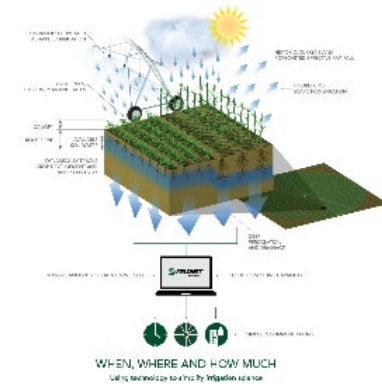


**Does advanced
scheduling
work?**

Does advanced scheduling work?



Soil sensor



Commercial model

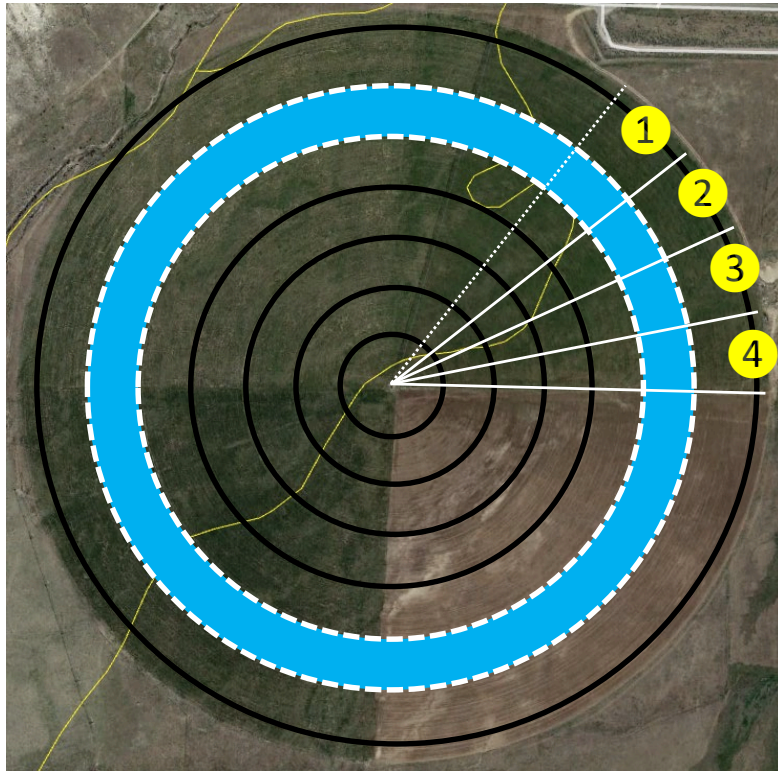


Weather stations



Farmer experience

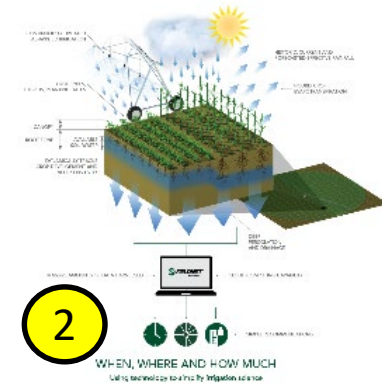
Does advanced scheduling work?



**15 Alfalfa Cuts
@10 Farms**



Soil sensor



Commercial model

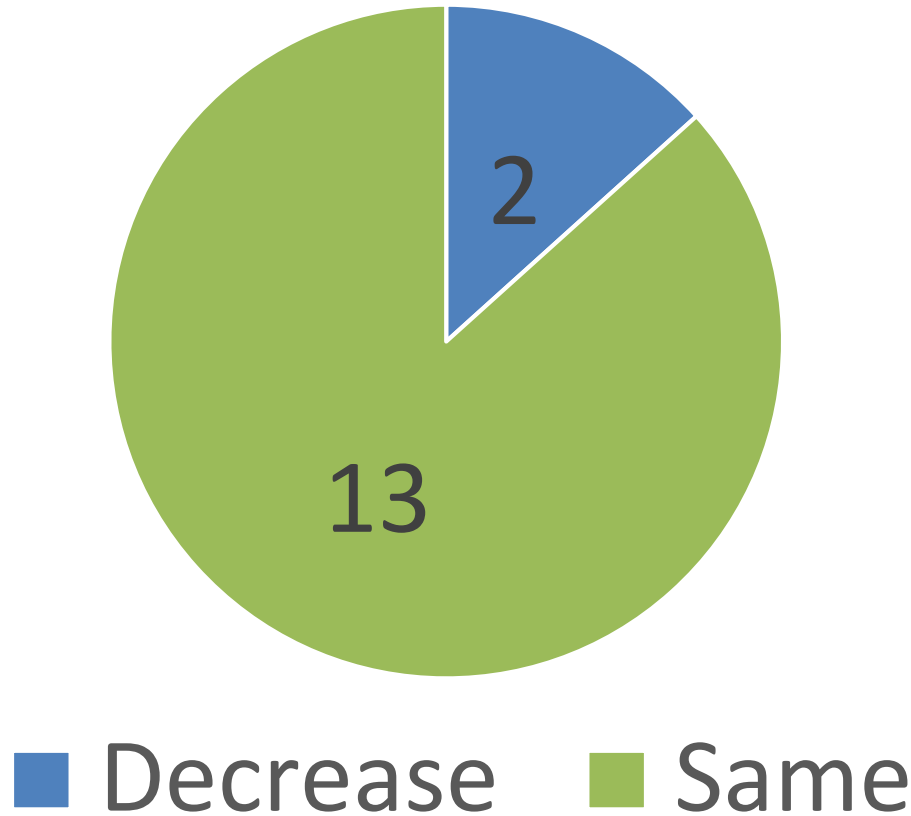


Weather stations



Farmer experience

Does advanced scheduling work?

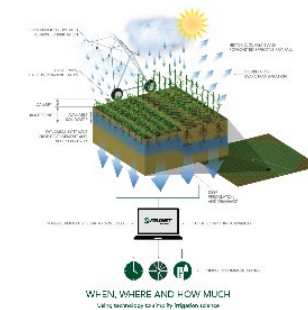
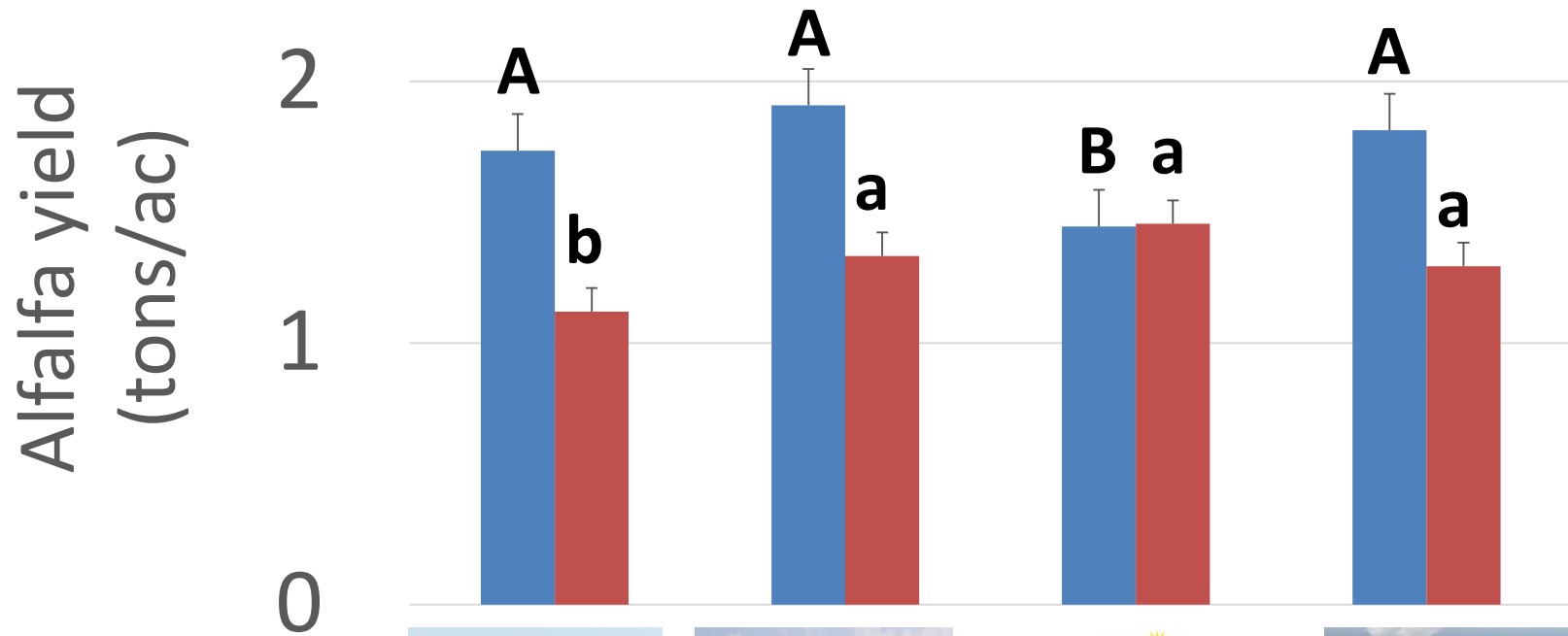


Soil
Moisture
vs.
Grower
approach

Decreased yield by 0.25 tons/acre

Results varying by time and space

■ Cut 2 ■ Cut 3



Take Home Points

- Soil moisture sensor benefits may be vary in time and space.
- Study will be repeated in 2020 in all cuts at all farms.
- Start small and inexpensive and scale up if you see an economic benefit.
- May considering rotating fields.
- Weigh all factors (need, time, \$) when considering soil moisture sensors.

Thank you

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Utah Division of Water Rights



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