

Soil Structure & Moisture Considerations for Improving Crop Performance

Southern Cover Crop Conference

Soil Physical Properties & Soil Moisture Track

July 16, 2019

What limiting factors can cover crops address?

- Water Infiltration
- Holding Capacity
- Plant Available Water

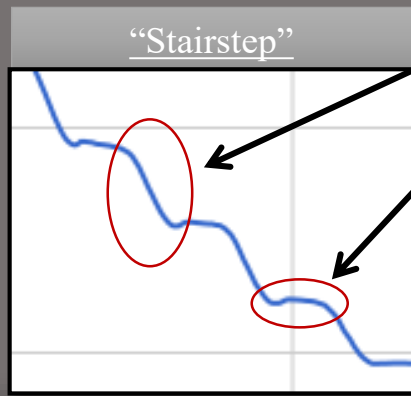
- Faster field re-entry time?
- Lower plant stress?
- Increased nutrient availability?







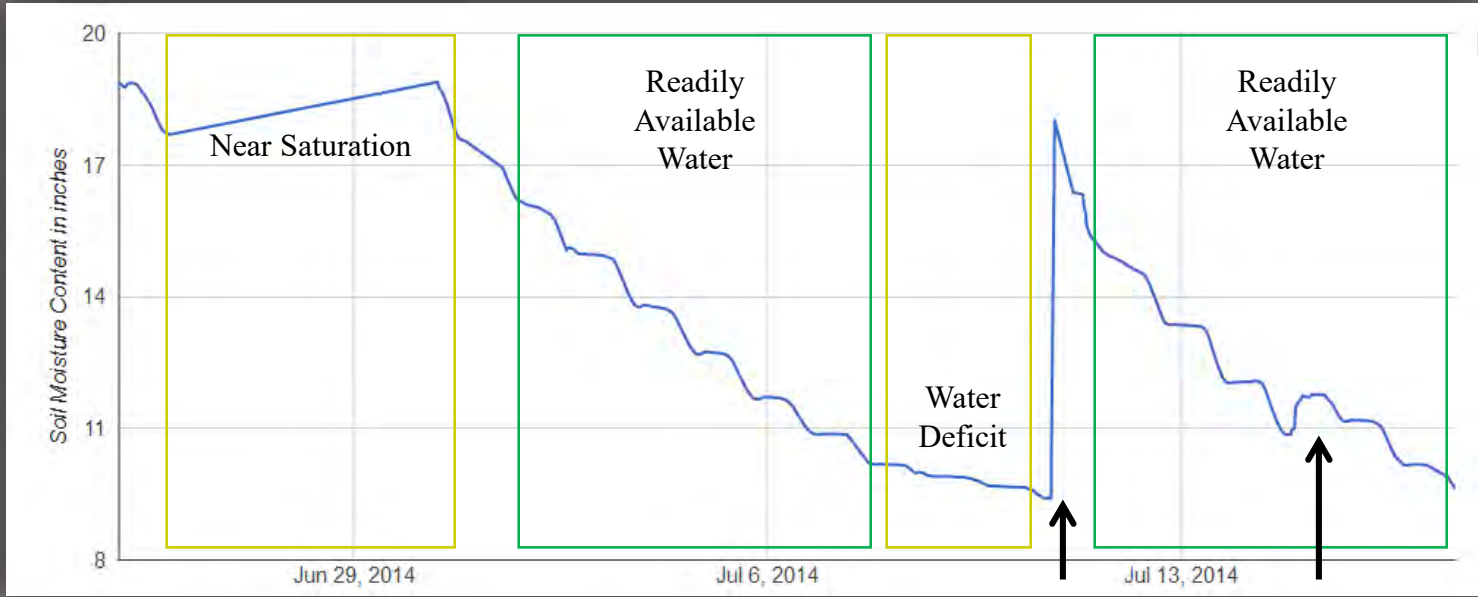
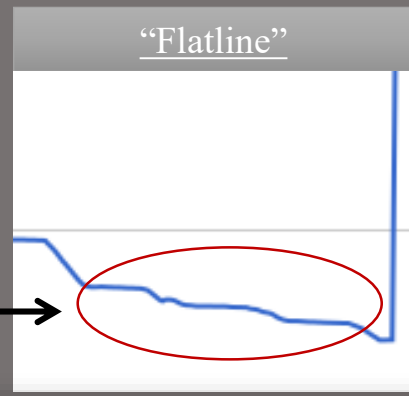




Daytime water use is reflected by a downward trending line

Plant water use declines at night resulting in a flatter line

As available water decreases the line flattens

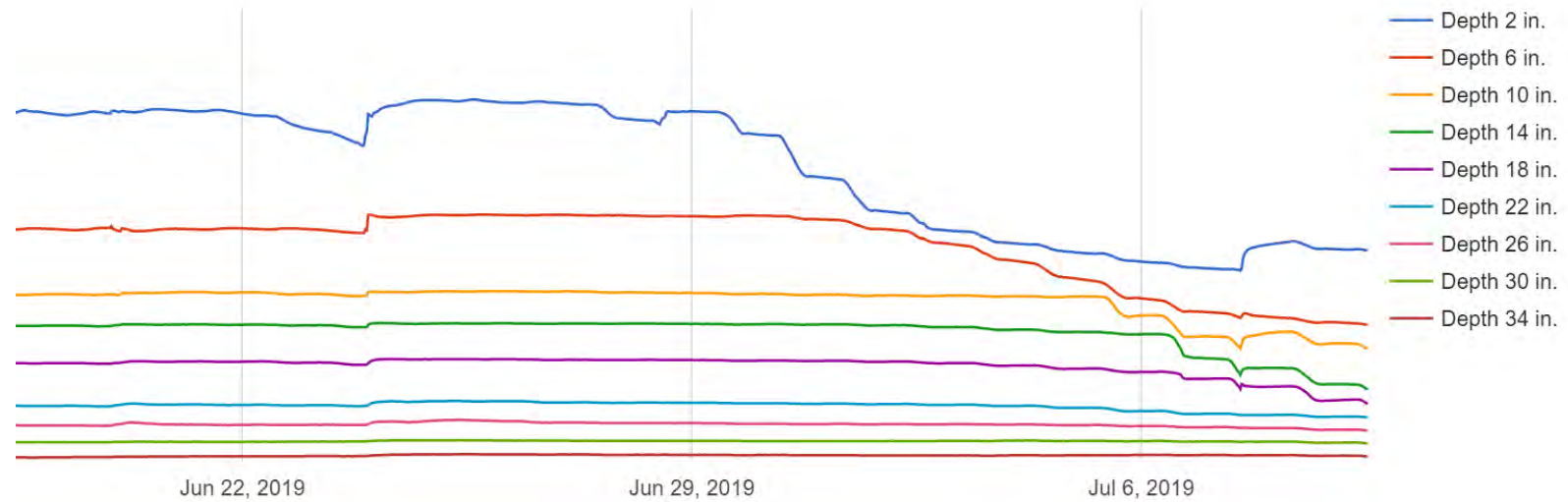


Bolivar County soybeans planted in Forestdale silty clay loam

Irrigation

1/2" Rain

36 inch probe with
Individual sensors
every 4 inches



Sum of the individual
sensors in the active
rooting zone



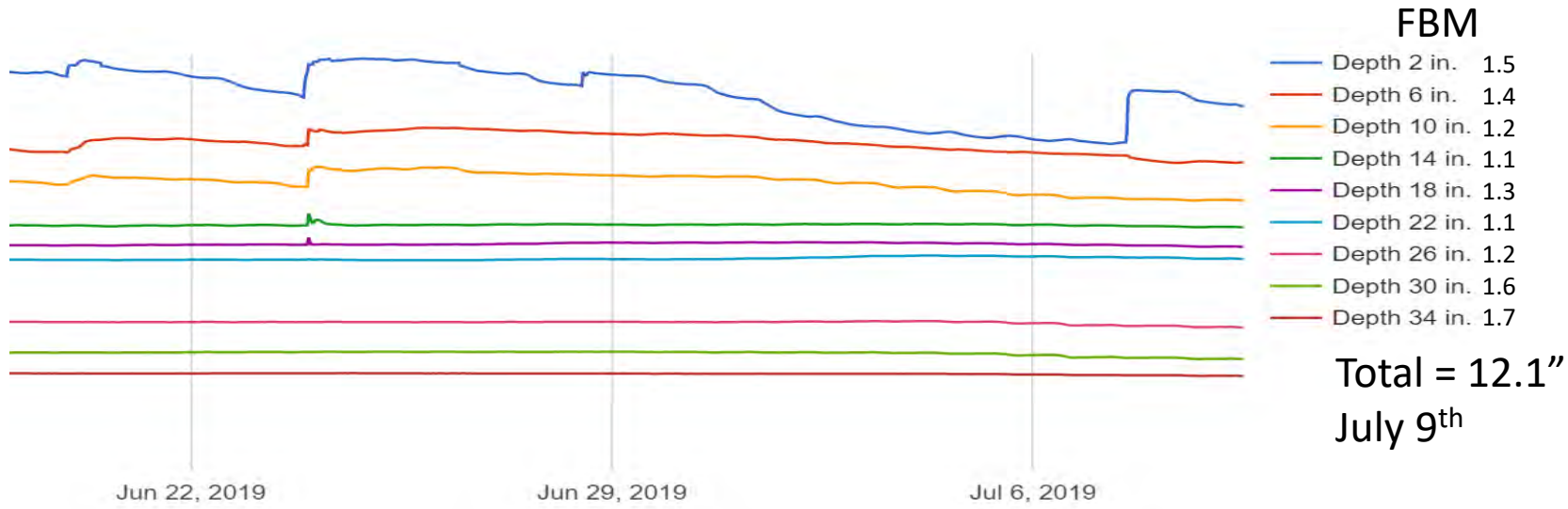
CCMT – Cover Crop/Minimal Till

FBM – Farmers Best Management

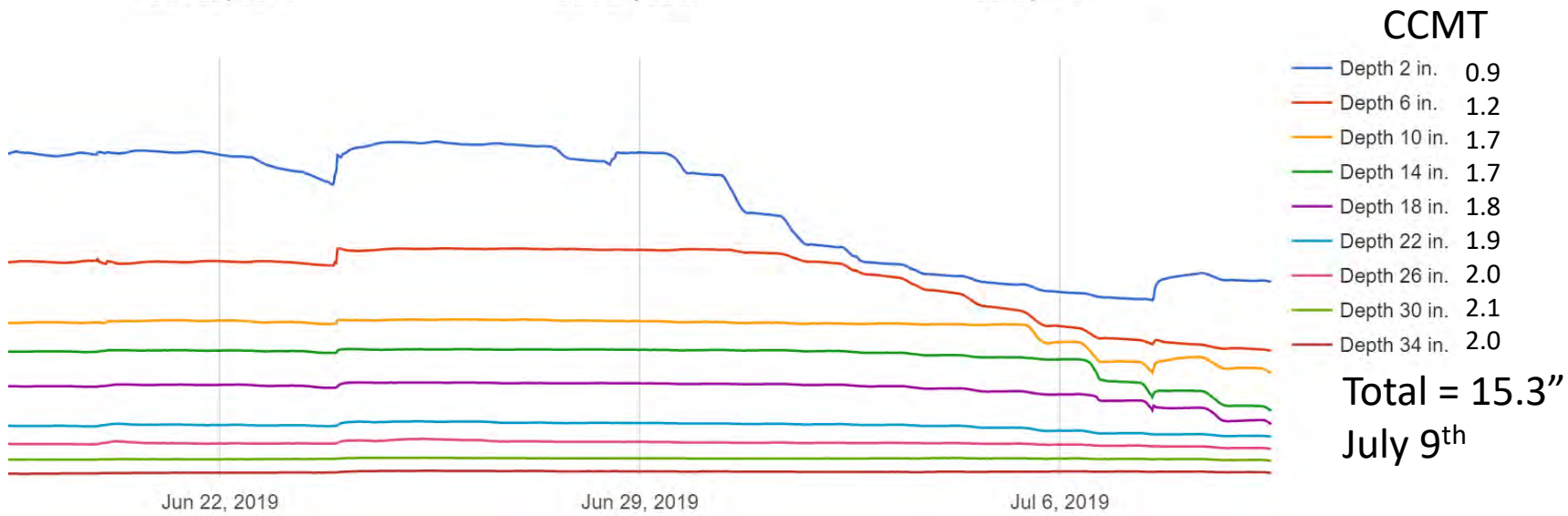




Commerce Silt Loam – Soybeans (R2)

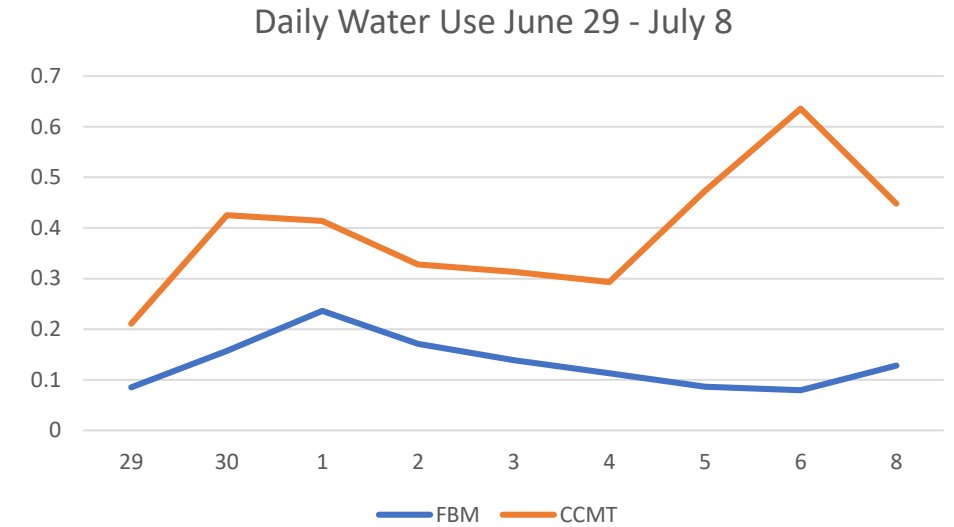


- Active Root Zone = 12"
- Infiltration = 18"



- Active Root Zone = 28"
- Infiltration = 26"

Commerce Silt Loam – Soybeans (R2)

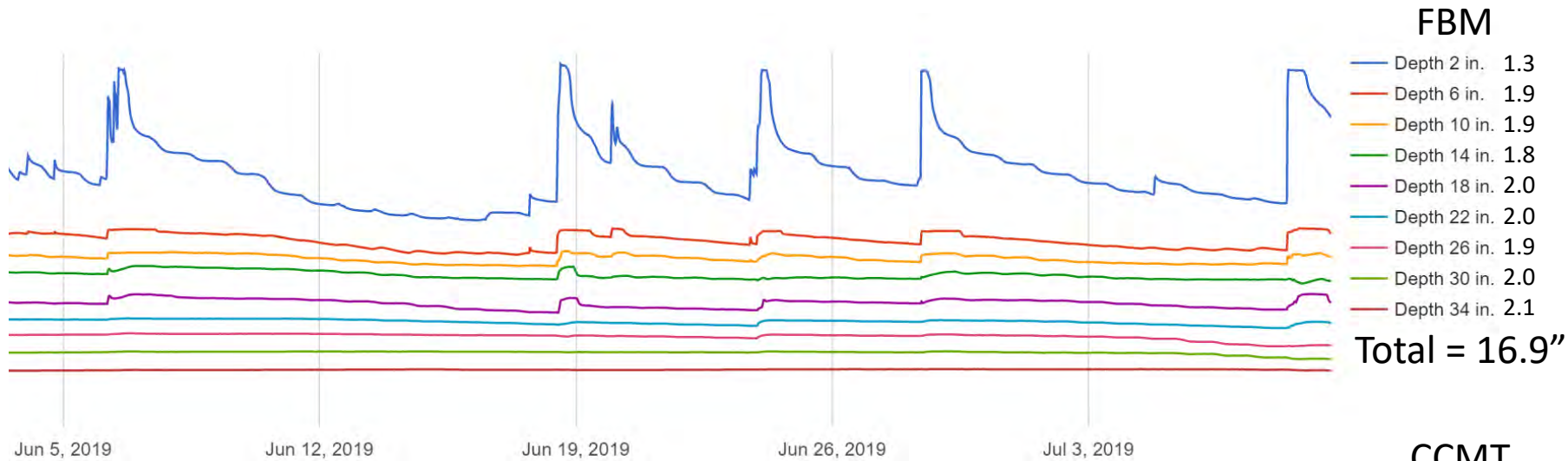


Estimated ET Demand – 0.20 inch/day

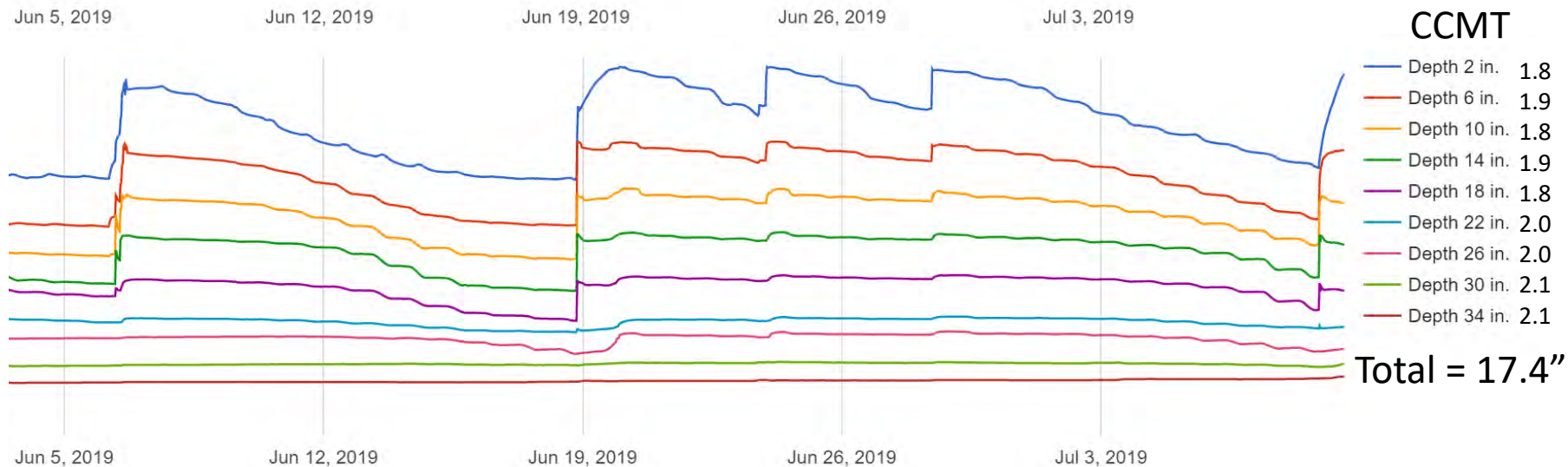
Avg FBM Daily Water Use = 0.13 inch/day

Avg CCMT Daily Water Use = 0.39 inch/day

Dundee Silt Loam – Corn (dough)

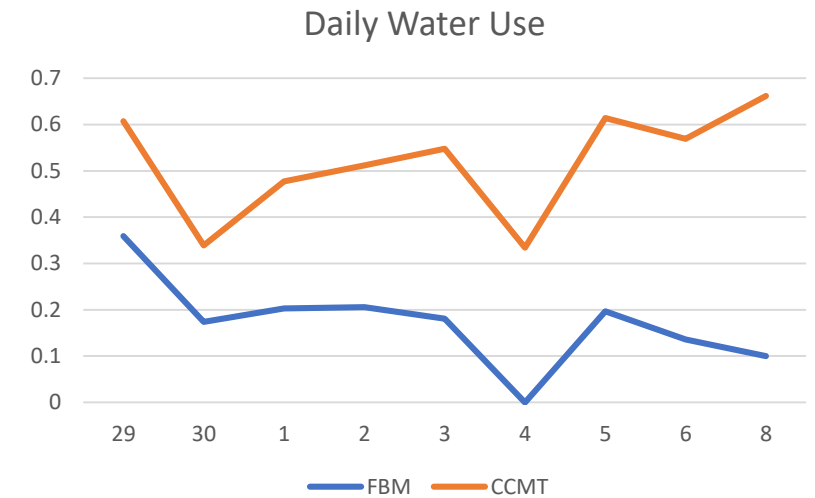
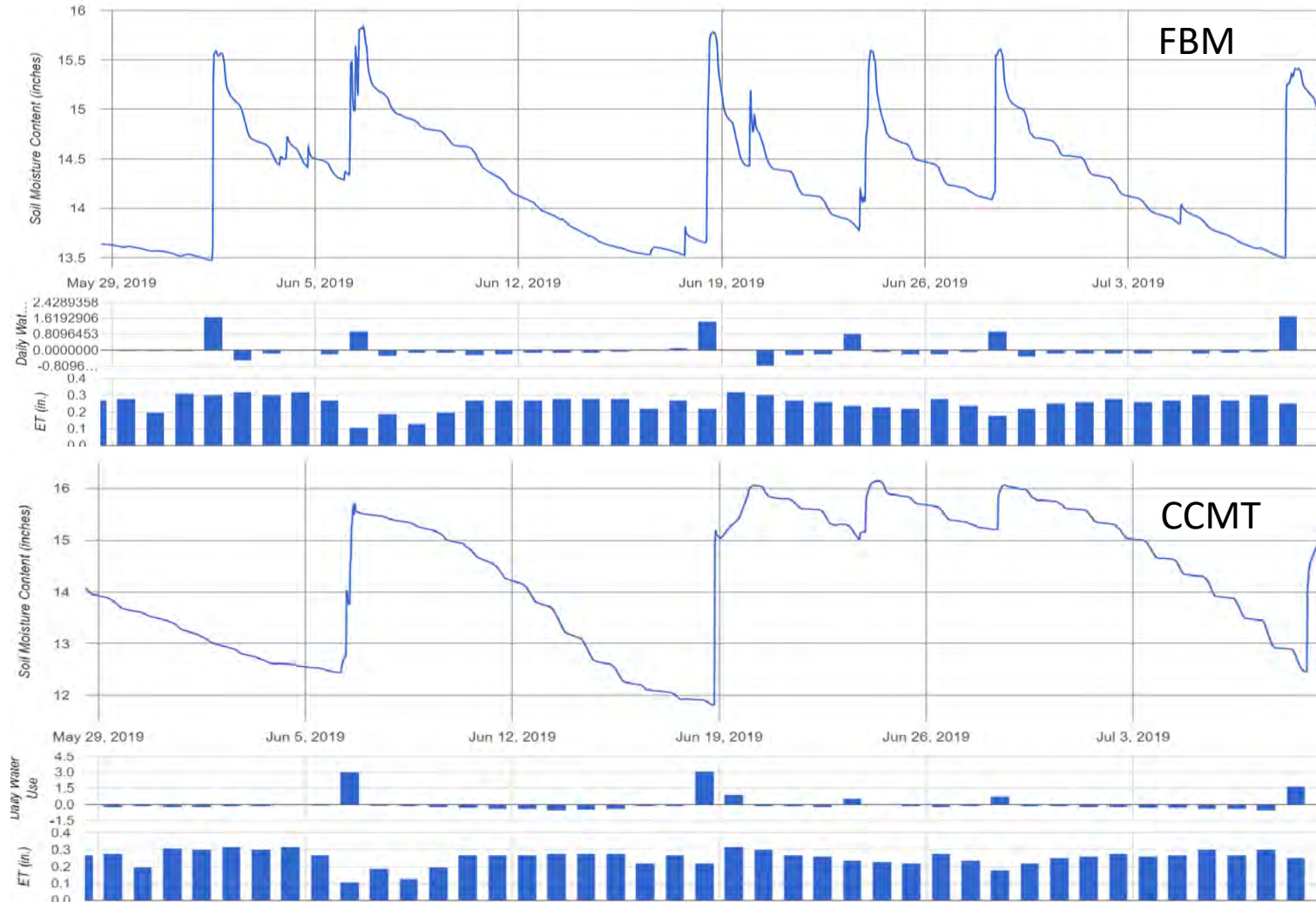


- Active Root Zone = 12"
- Infiltration = 26"



- Active Root Zone = 24"
- Infiltration = 26"

Dundee Silt Loam – Corn (dough stage)



Estimated ET Demand – 0.28 inch/day

Avg FBM Daily Water Use = 0.17 inch/day

Avg CCMT Daily Water Use = 0.35 inch/day

Water Stress & Crop Yield

Table 1. Example corn yield loss estimates when stress occurs for four or more consecutive days. Adapted from Classen and Shaw, 1970; Rhoads and Bennet, 1990; and Shaw, 1988.

Corn Development Stage	Estimated Yield Loss per Day of Stress
Early vegetative (VE - V12)	1 – 3
Late vegetative (V12 to VT)	2 – 5
Pollination to Blister (R2)	3 – 9
Milk (R3)	3 – 6
Dough (R4)	3 – 5
Dent (R5)	2 – 4
Maturity (R6)	0

Crop Stress = Daily Water Use < Daily ET Demand?

From the previous examples:
CCMT Water Use > ET = 95%
FBM Water Use > ET = 5%

Influence of Drought on Corn and Soybean. Integrated Crop Management News, and Iowa State University Extension and Outreach.

<https://crops.extension.iastate.edu/cropnews/2017/07/influence-drought-corn-and-soybean>

What limiting factors can cover crops address?

- ✓ Water Infiltration 4-8"
- ✓ Holding Capacity 3"+
- ✓ Plant Available Water

- ✓ Lower plant stress?
- ✓ Faster field re-entry time?
- ✓ Increased nutrient availability?



Thank You

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Project Funding and Support:

