Irrigation scheduling

Why and How

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http://msue.anr.msu.edu/resources/irrigation

https://engineering.purdue.edu/ABE/Engagement/Irrigation

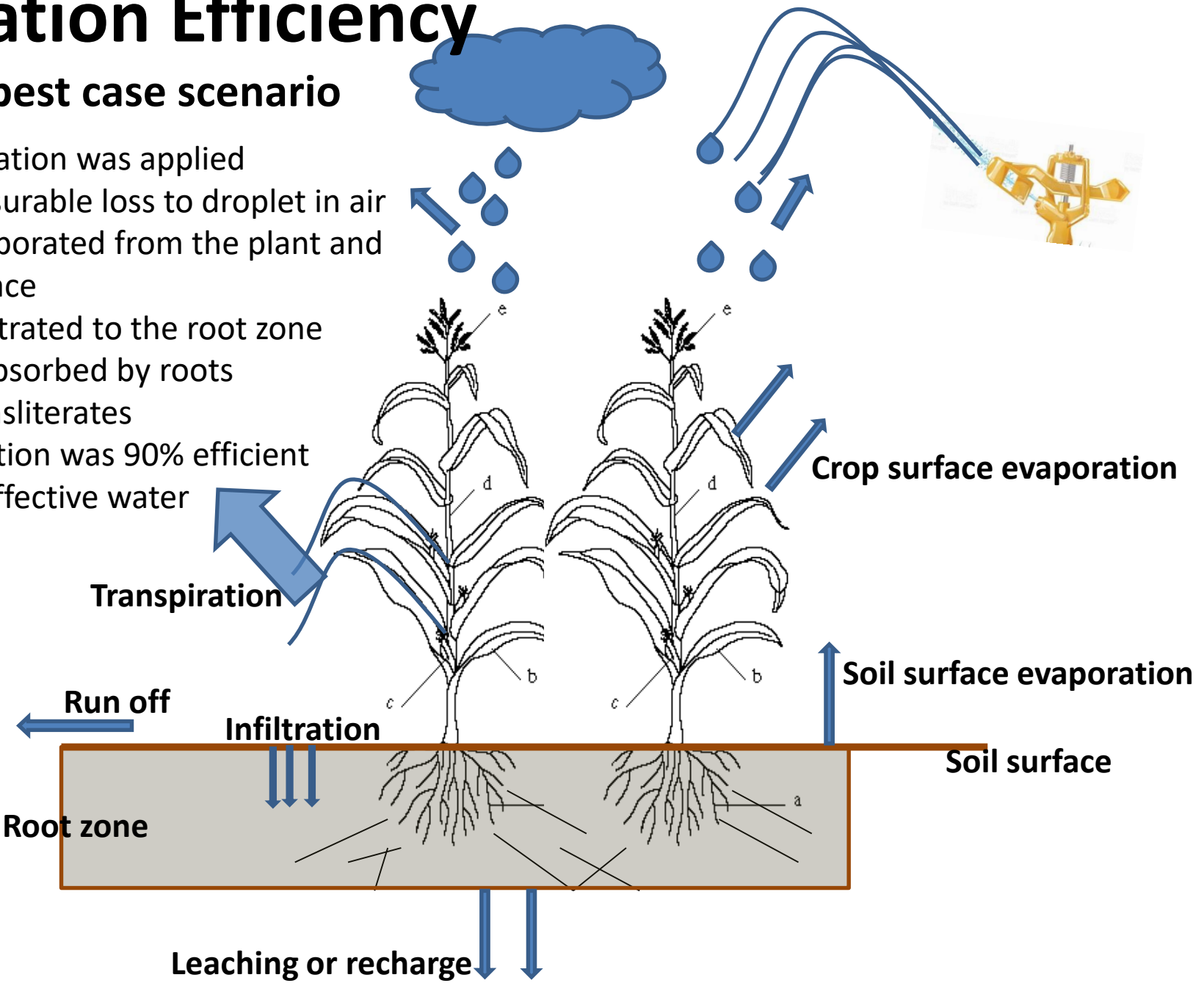
Irrigation Efficiency

best case scenario

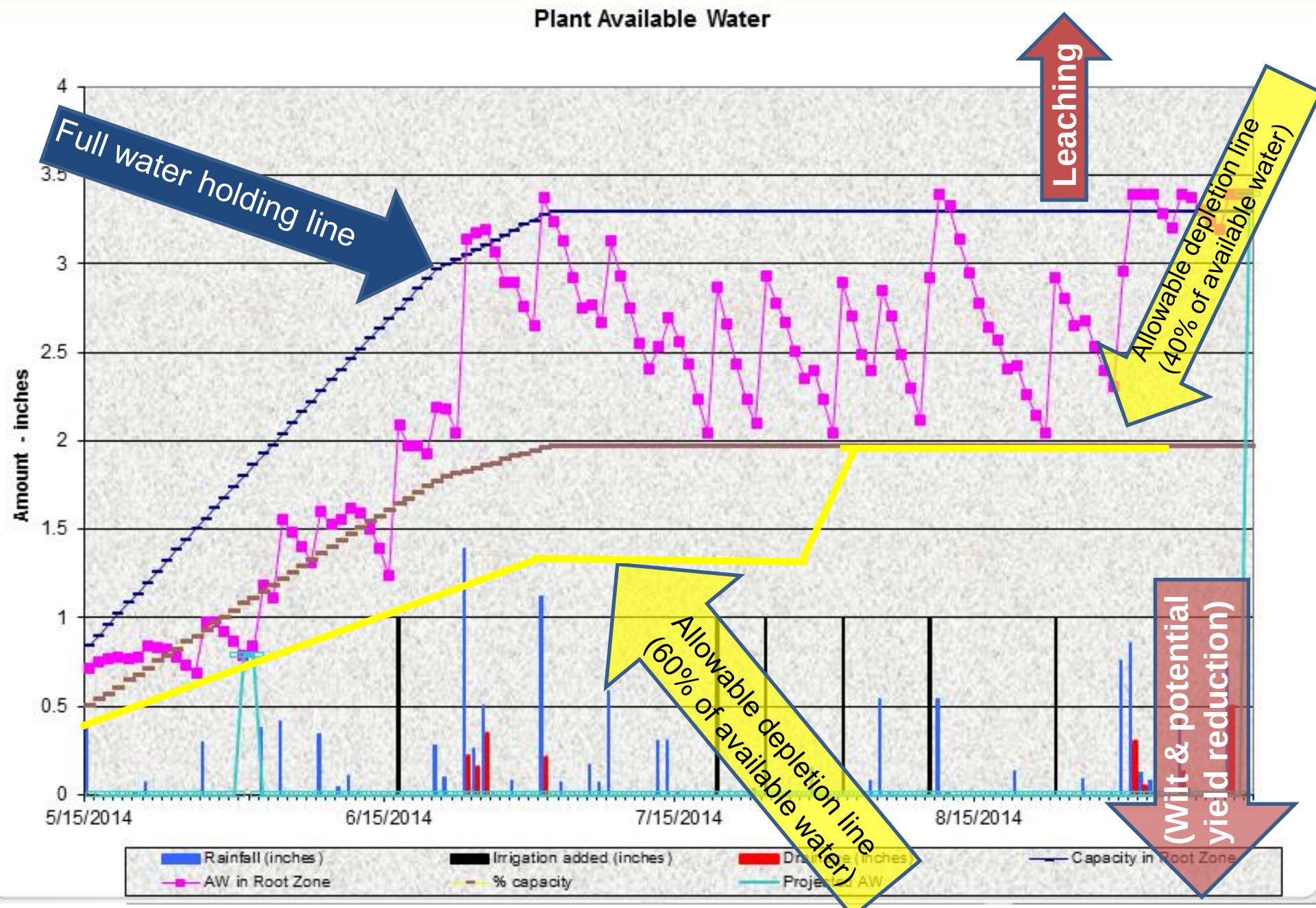
If 1” of irrigation was applied

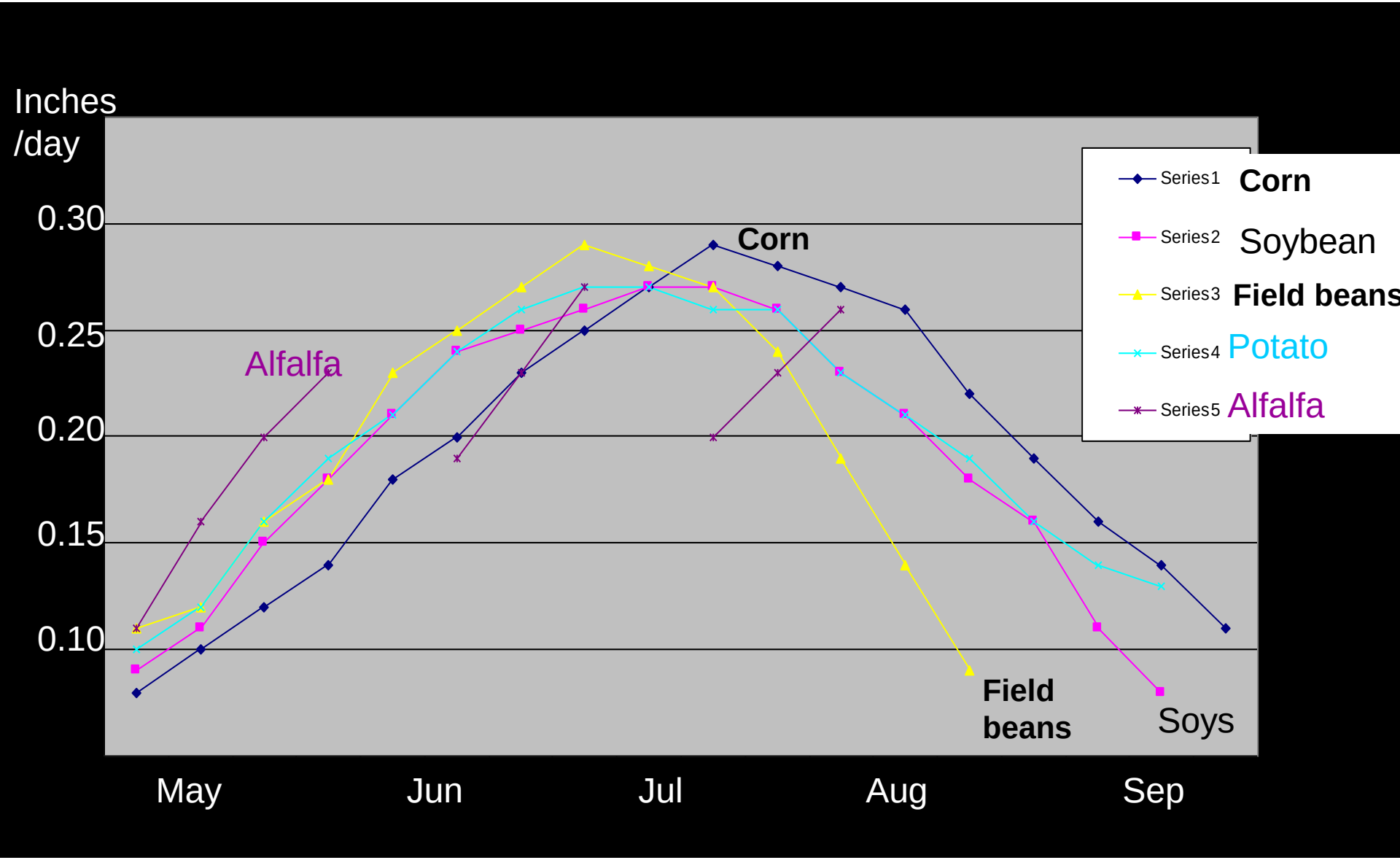
- No measurable loss to droplet in air
- 0.1” evaporated from the plant and soil surface
- 0.9” infiltrated to the root zone
- 0.9” is absorbed by roots
- 0.9” transliterates

The application was 90% efficient or 0.9” of effective water



MSU Excel Irrigation Schedule Checkbook Method - Mendon 2014

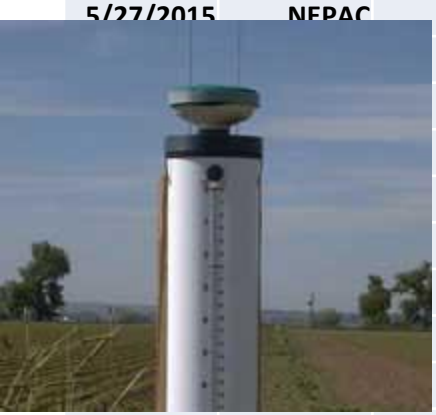




From Minnesota Extension bulletin “Irrigation Scheduling”, assuming temperature 80-89

SW PAC – Potential Evapotranspiration (PET)-http://iclimate.org

Date	PACId	Ref ET (inch)	Date	PACId	Ref ET (inch)	Date	PACId	Ref ET (inch)
5/23/2015	NEPAC	1.3	6/17/2015	NEPAC	0.13	7/12/2015	NEPAC	0.1
5/24/2015	NEPAC	0.17	6/18/2015	NEPAC	0.01	7/13/2015	NEPAC	0.04
5/25/2015	NEPAC	0.17	6/19/2015	NEPAC	0.07	7/14/2015	NEPAC	0.08
5/26/2015	NEPAC	0.13	6/20/2015	NEPAC	0.04	7/15/2015	NEPAC	0.09
5/27/2015	NEPAC	0.1	6/21/2015	NEPAC	0.1	7/16/2015	NEPAC	0.15
		0.07	6/22/2015	NEPAC	0.11	7/17/2015	NEPAC	0.07
		0.15	6/23/2015	NEPAC	0.1	7/18/2015	NEPAC	0.1
		0.15	6/24/2015	NEPAC	0.18	7/19/2015	NEPAC	0.11
		0.07	6/25/2015	NEPAC	0.13	7/20/2015	NEPAC	0.07
		0.02	6/26/2015	NEPAC	0.06	7/21/2015	NEPAC	0.13
		0.07	6/27/2015	NEPAC	0.03	7/22/2015	NEPAC	0.15
		0.1	6/28/2015	NEPAC	0.03	7/23/2015	NEPAC	0.16
		0.08	6/29/2015	NEPAC	0.15	7/24/2015	NEPAC	0.16
6/5/2015	NEPAC	0.14	6/30/2015	NEPAC	0.03	7/25/2015	NEPAC	0.16
6/6/2015	NEPAC	0.15	7/1/2015	NEPAC	0.1	7/26/2015	NEPAC	0.11
6/7/2015	NEPAC	0.14	7/2/2015	NEPAC	0.1	7/27/2015	NEPAC	0.14
6/8/2015	NEPAC	0.06	7/3/2015	NEPAC	0.11	7/28/2015	NEPAC	0.19
6/9/2015	NEPAC	0.07	7/4/2015	NEPAC	0.1	7/29/2015	NEPAC	0.18
6/10/2015	NEPAC	0.09	7/5/2015	NEPAC	0.14	7/30/2015	NEPAC	0.14
6/11/2015	NEPAC	0.15	7/6/2015	NEPAC	0.15	7/31/2015	NEPAC	0.18
6/12/2015	NEPAC	0.17	7/7/2015	NEPAC	0.14	8/1/2015	NEPAC	0.16
6/13/2015	NEPAC	0.06	7/8/2015	NEPAC	0.04	8/2/2015	NEPAC	0.17
6/14/2015	NEPAC	0.1	7/9/2015	NEPAC	0.03	8/3/2015	NEPAC	0.17
6/15/2015	NEPAC	0.07	7/10/2015	NEPAC	0.03			
6/16/2015	NEPAC	0.04	7/11/2015	NEPAC	0.11			



PET * Kc = crop ET

crop ET / effectiveness factor – rainfall = needed irrigation

http://www.egr.msu.edu/bae/water/irrigation-scheduling

Constantine Potential Evapotranspiration Daily Summary (Report issued 6/30/2014 14:51)

Note that frozen precipitation amounts may not be accurate.

Day	Date	Max Temp (° F)	Min Temp (° F)	Ave Temp (° F)	Rainfall (in.) Today	Rainfall (in.) Since 6/28	Chance of Rain	Reference Potential Evapotranspiration (in.) Daily Total	Reference Potential Evapotranspiration (in.) Since 6/28
Sat	6/28/14	82.7	65.8	74.3	0	0	--	0.12	0.12
Sun	6/29/14	86.3	70.9	78.6	0	0	--	0.17	0.29

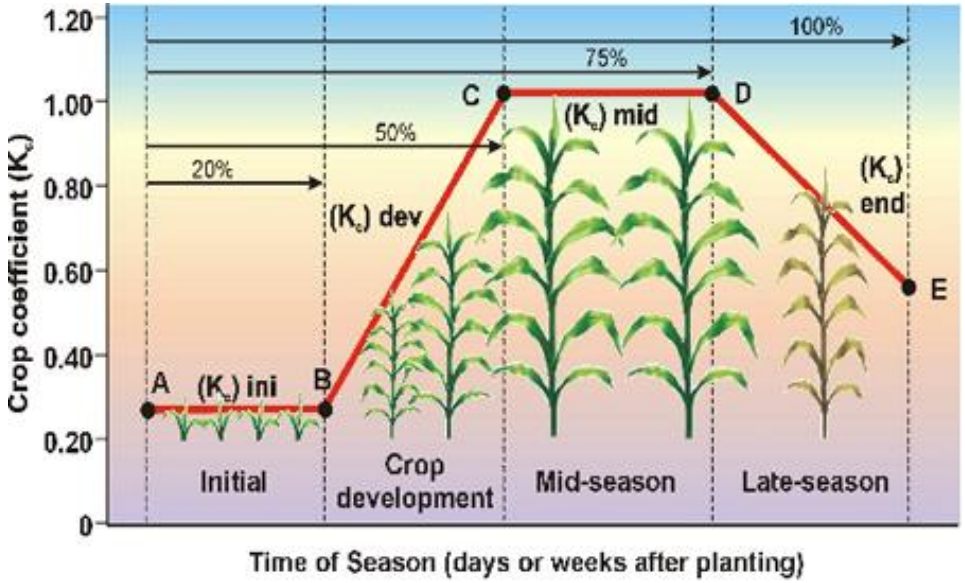
Today's data:

Day	Date	Max Temp (° F)	Min Temp (° F)	Ave Temp (° F)	Rainfall (in.) Today	Rainfall (in.) Since 6/28	Chance of Rain	Reference Potential Evapotranspiration (in.) Daily Total	Reference Potential Evapotranspiration (in.) Since 6/28
Mon	6/30/14	Forecast: 80	Actual (7:30-7:35AM): 70.6	75.3	0	0	44%	Observed: 0.05 Forecast: 0.13	0.42

Forecast data:

Day	Date	Max Temp (° F)	Min Temp (° F)	Ave Temp (° F)	Rainfall (in.) Today	Rainfall (in.) Since 6/28	Chance of Rain	Reference Potential Evapotranspiration (in.) Daily Total	Reference Potential Evapotranspiration (in.) Since 6/28
Tue	7/1/14	82	70	76	--	--	75%	0.2	0.62
Wed	7/2/14	69	60	64.5	--	--	38%	0.11	0.73
Thu	7/3/14	71	51	61	--	--	32%	0.17	0.9
Fri	7/4/14	75	50	62.5	--	--	10%	0.18	1.08
Sat	7/5/14	77	54	65.5	--	--	12%	0.19	1.27
Sun	7/6/14	80	58	69	--	--	19%	0.16	1.43

http://www.enviroweather.msu.edu



Crop Coefficients - Kc

http://cropwatch.unl.edu/estimating-crop-evapotranspiration

http://irrigationtoolbox.com/ReferenceDocuments/Extension/BCExtension/577100-5.pdf

Table 3 Crop Coefficients for Forage, Vegetables and Berries

Crop	Kc_{ini}	Kc_{mid}	Kc_{end}
alfalfa	0.4	1.2	1.15
asparagus	0.3	0.95	0.3
beans, green	0.5	1.05	0.9
beets	0.5	1.05	0.95
blueberries	0.4	1.0	0.75
broccoli	0.7	1.05	0.95
cabbage	0.7	1.05	0.95
cabbage -local	0.7	1.05	0.95
carrots	0.7	1.05	0.95
cauliflower	0.7	1.05	0.95
cranberries	0.4	0.9	0.50
celery	0.7	1.05	0.95
cereal	0.3	1.15	0.25
corn	0.3	1.15	0.4
cucumber	0.6	1	0.75
green onions	0.7	1.05	0.95
lettuce	0.7	1	0.95

Crop	Kc_{ini}	Kc_{mid}	Kc_{end}
onions	0.7	1.05	0.95
pasture (grass)	0.4	1.0	0.85
peas	0.5	1.15	1.1
potato	0.5	1.15	0.75
pumpkin	0.5	1	0.8
radish	0.7	0.9	0.85
raspberries	0.4	1.2	0.75
small vegetables	0.70	1.05	0.95
spinach	0.7	1.05	0.95
strawberries	0.4	1.05	0.7
squash	0.5	0.95	0.75
sweet corn	0.3	1.15	0.4
sweet peppers	0.7	1.05	0.85
tomato	0.7	1.05	0.8
tubers	0.5	1.05	0.95
watermelon	0.4	1	0.75

Crop Coefficients
Root depth
Growth
Threshold

Crop / root depth	% of total growth	Root depth (inches)	Kc %	Moisture threshold %
Cucumber P18	10	11	0.33	50
Cucumber P18	20	16	0.53	50
Cucumber P18	30	21	0.78	50
Cucumber P18	40	24	0.9	50
Cucumber P18	50	24	0.9	50
Cucumber P18	60	24	0.9	50
Cucumber P18	70	24	0.9	50
Cucumber P18	80	24	0.9	50
Cucumber P18	90	24	0.88	50
Cucumber P18	100	24	0.85	50

- Apple
- BlueBerries12
- BlueBerries18
- BlueBerries24
- Broccoli
- Carrot12
- Carrot18
- Carrot24
- Carrot36
- Cauliflower12
- Cauliflower18
- Celery
- Cherries
- Corn18
- Corn24
- Corn27
- Corn36
- Cucumber F12
- Cucumber F18
- Cucumber F24
- Cucumber F36
- Cucumber P12
- Cucumber P18
- Cucumber P24
- Cucumber P36
- Dry Beans18
- Dry Beans21

- Dry Onion12
- Dry Onion15
- Dry Onion18
- Green Beans
- Green Onion12
- Green Onion18
- Green Onion24
- MuskMelon12
- MuskMelon15
- MuskMelon18
- MuskMelon36
- Peaches
- Pears
- Peas
- Plums
- Potatoes12
- Potatoes18
- Potatoes24
- Squash
- Strawberries
- Tomatoes S12
- Tomatoes S18
- Tomatoes S24
- Tomatoes T12
- Tomatoes T18
- Tomatoes T24
- Wheat/Barley T 24

Do I have enough capacity

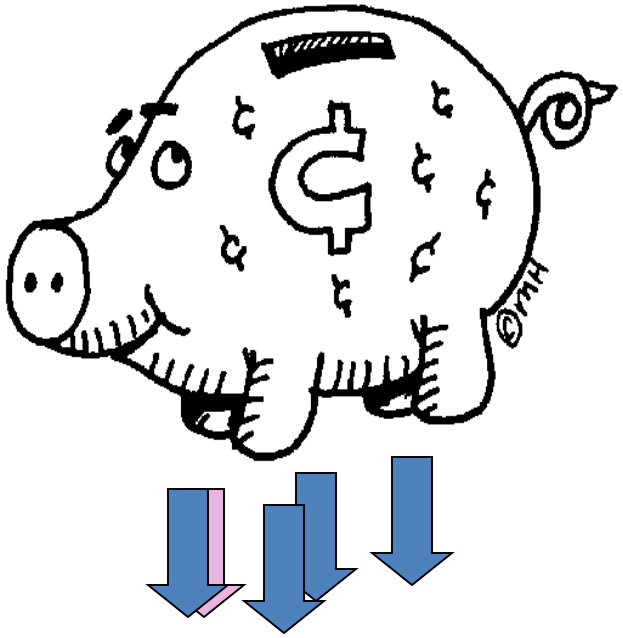
- Maximum water use for most crops is .27 - .32 in./day
- 3 gal/minute/acre pump capacity = 1in. /week
- 5 gal/minute/acre pump capacity = .25 in./day
- 7 gal/minute/acre pump capacity =.33 in./day, 1” every 3 days
- 500 gal/minute pump can provide 1” every 4 days on 100 acres

Think of your soil as a bank

Water holding capacity:
The soil (bank) can hold only a given volume of water before it allow it to pass lower down.

Soil type :
Heavier soil can hold more water / foot of depth than light soils

Intake rate:
Water applied faster than the soil intake rate is lost.



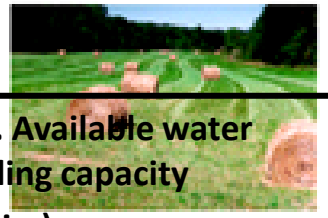
Rooting depth:
The plant can only get water to the depth of it's roots.

Deletion:
Plants can pull out only 30 - 60% of the water

Water lost from the bottom of the profile can wash out (leach) water soluble nutrients and pesticides.

Calculating Water Holding Capacity

Data from "Soil survey of Fulton County, Indiana and St Joseph County, Michigan "



Soil Name	Depth Inches	Available water holding capacity	Average Available water holding capacity	Ave. Available water holding capacity (24 in.)	Ave. Available water holding capacity (36 in.)
Gilford	0 – 10 10 –24 24 - 60	0.16 – 0.18 0.12 – 0.14 0.05 – 0.08	0.17 0.13 0.07	10" x 0.17 = 1.70 14" x 0.13 = 1.82 ---------- = 3.52	10" x 0.17 = 1.70 14" x 0.13 = 1.82 12" x 0.07 = 0.84 = 4.36
Sebewa	0 – 11 11 – 30 30 - 60	0.12 – 0.20 0.15 – 0.19 0.02 – 0.04	0.16 0.17 0.03	11" x 0.16 = 1.76 13" x 0.17 = 2.21 ---------- = 3.97	11" x 0.16 = 1.76 13" x 0.17 = 2.21 12" x 0.03 = 0.36 = 4.33
Oshtemo	0 - 14 14 – 35 35 - 60	0.10 – 0.15 0.12 – 0.19 0.06 – 0.10	0.125 0.155 0.08	14" x 0.125=1.75 10" x 0.155=1.55 ---------- = 3.3	14" x 0.125= 1.75 21" x 0.155= 3.26 1" x 0.08 = 0.08 = 5.09
Spinks	0 – 10 10 – 26 26 - 60	0.08 – 0.10 0.08 – 0.10 0.04 – 0.08	0.09 0.09 0.06	10" x 0.09= 0.9 14" x 0.09= 1.26 ---------- = 2.16	10" x 0.09= 0.9 16" x 0.09= 1.26 8" x 0.06= 0.48 = 2.64

Rain Gauges and data

- Basic unit – 2 inch opening
- Cost less than $10
- One rain gauge for each 80 acres.
- Recording rain gauge cost $50 - $100

http://www.cocorahs.org/state.aspx?state=in

Soybean Water use

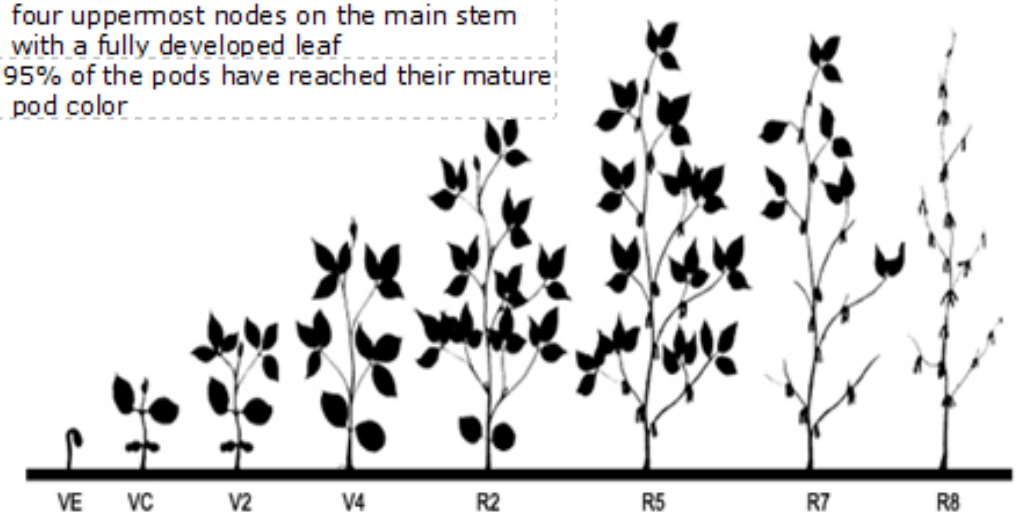
Average water use for Soybeans in inches/day–adapted From " Irrigation Scheduling Checkbook Method, Jerry Wright, University of Minnesota, 2002

	Week after emergence																
Temperature	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
50-59	02	02	.04	.04	.06	.07	.08	.09	09	09	09	08	.07	.05	.05	.03	.02
60-69	.02	.03	.05	.07	.09	.10	.11	.13	.13	.13	.13	.11	.10	.08	.07	.04	.02
70-79	.03	.05	.07	.09	.12	.13	.15	.17	.18	.18	.17	.15	.13	.10	.09	.05	.03
80-89	.04	.06	.10	.13	.16	.19	.20	.21	.22	.22	.21	.18	.16	.13	.11	.06	.03
90-99	.05	.07	.11	.14	.17	.20	.22	.25	.26	.26	.25	.22	.19	.16	.13	.08	.05
Soybean growth stages				2nd trifoli-ate		1st flower			seed filling			leaves yel-lowing					

Crop Stage	Crop coeffient Kc	Root Depth (in)	% of Grow-ing Season
V2	0.1	6	0
	0.17	11.14	10
V4	0.27	16.28	20
	0.39	21.43	30
	0.58	24	40
R1	0.74	24	50
	0.89	24	60
R3	1.02	24	70
	0.92	24	80
	0.77	24	90
R8	0.66	24	100

Soybean Growth Stages

V2	Unifoliolate and first two trifoliolate leaves are fully developed
V6	Unifoliolate and six trifoliolate leaves are fully developed
R1	Open flower at any node on the main stem
R3	Pod is 5 mm (3/16 inch) long at one of the four uppermost nodes on the main stem with a fully developed leaf
R8	95% of the pods have reached their mature pod color



MICHIGAN STATE UNIVERSITY Extension

Draft SOIL WATER BALANCE SHEET

Field:_____Crop:_____
_Emergence date:_____ Sweet Corn Emergence May1

Pumping capacity:_550_____gpm per acre = _4.5_____net application inches per day 0.25

Soil AW (in/in) 0.13 inches Root Zone Inches

Starting AW % 100 SWD - CWU + Rainfall + Net Irr = New SWD

Date	Crop Stage	Kc	Rooting Depth	Potential ET (PET)	Crop Water Use (CWU)= PET*Kc	Rainfall	Net Irrigation (Net Irr)	Available Water (AW)	% AW	Soil water deficit (SWD)	Notes
6/25/2013	V-12	1	30					4.68	100%	0.00	
6/26/2013	V-12	1	30	0.2	0.20			4.48	96%	0.20	
6/27/2013	V-14	1.1	30	0.2	0.22			4.26	91%	0.42	
6/28/2013	V-14	1.1	30	0.2	0.22			4.04	86%	0.64	
6/29/2013	V-14	1.1	30	0.2	0.22			3.82	82%	0.86	
6/30/2013	V-14	1.1	30	0.2	0.22			3.60	77%	1.08	
7/1/2013	V-16-VT	1.20	30	0.2	0.24			3.36	72%	1.32	
7/2/2013	V-16-VT	1.20	30	0.15	0.18			3.18	68%	1.50	
7/3/2013	V-16-VT	1.20	30	0.15	0.18			3.00	64%	1.68	
7/4/2013	V-16-VT	1.20	30	0.15	0.18			2.82	60%	1.86	
7/5/2013	V-16-VT	1.20	30	0.15	0.18			2.64	56%	2.04	
7/6/2013	S	1.20	30	0.2	0.24			2.40	51%	2.28	
7/7/2013	S	1.20	30	0.2	0.24		1.0	3.16	68%	1.52	
7/8/2013	S	1.20	30	0.2	0.24			2.92	62%	1.76	
7/9/2013	S	1.20	30	0.2	0.24			2.68	57%	2.00	
7/10/2013	S	1.20	30	0.2	0.24		1.0	3.44	74%	1.24	
7/11/2013	S	1.20	30	0.2	0.24			3.20	68%	1.48	
7/12/2013	S	1.20	30								
7/13/2013	S	1.20	30								
7/14/2013	S	1.20	30								

For example, 120 day Corn36 (a corn variety with an effective rooting depth of 36 inches) and has an emergence date of May 15th, 10% of the growing season is May 27th.

10% of 120 = 12 15 + 12 = 27

Fill in Root Depth

Fill in Canopy Cover

http://www.enviroweather.msu.edu

Available water (AW) holding capacity of soil – (inches water/inch soil). See								
Range (in)	0 - 6	6 - 12	12 - 18	18 - 24	24 - 30	30 - 36	36 - 42	42 - 48
AW (in/in)	0.125	0.125	0.125	0.150	0.084	0.070	0.070	0.030
Capacity filled (%)	60	80	95	95	95	95	95	95

Soil Type (Bronson or Oshtemo)	Oshtemo
Crop (Corn24 or Corn36):	Corn36
Length of Growing Season (days	105
Emergence Date (mm/dd/yyyy):	5/20/2014

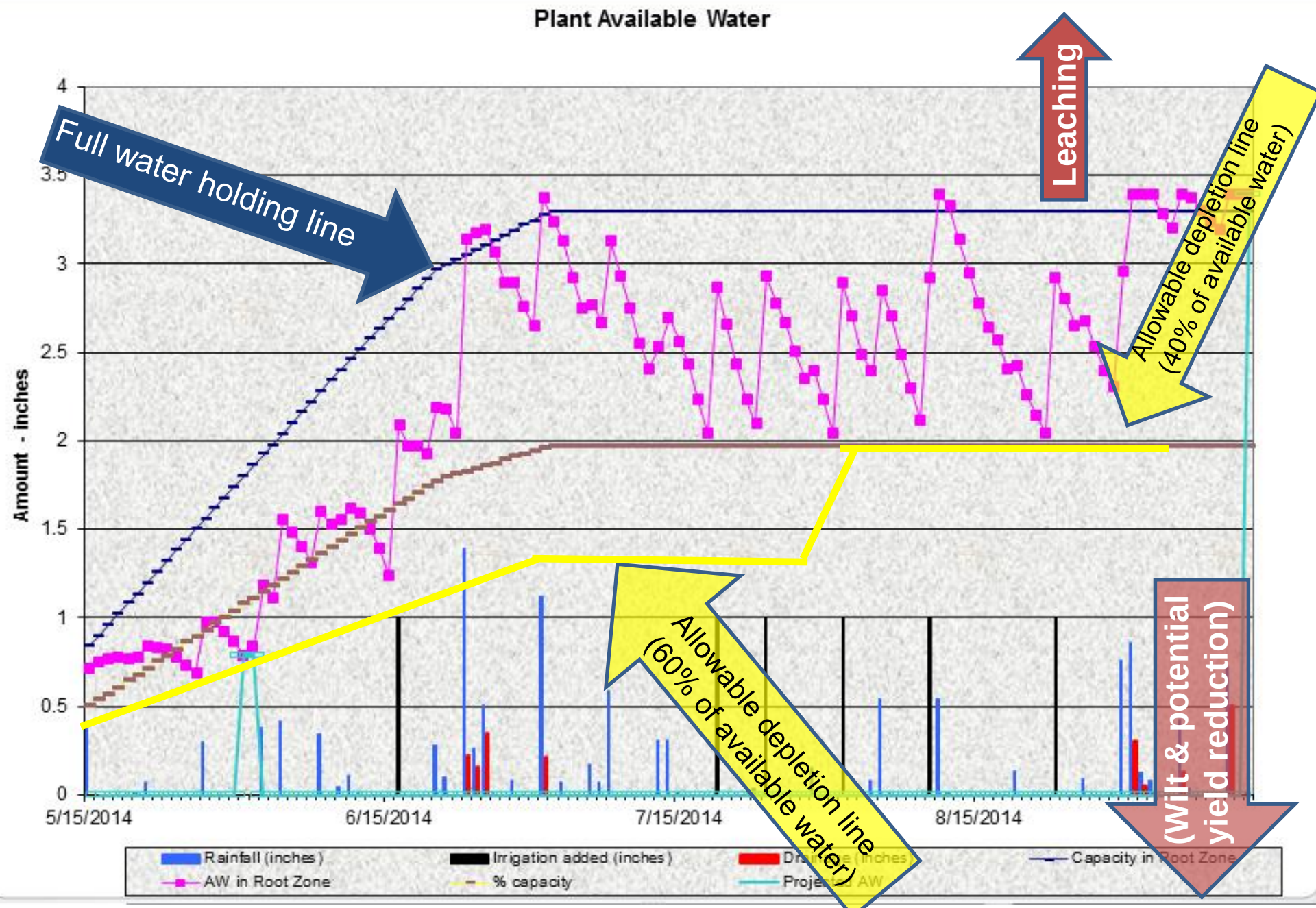
Irrigation increment/amount per application (inches)	1	Irrigate at this % of Available Soil Water in Root Zone	60

						Calculated in XLS								
Date	Root Depth (inches)	Rainfall (inches)	Irrigation added (inches)	Potential ET (inches)	% Canopy Cover (Kc)	ET modified for crop (inches)	Capacity of root zone (inches)	Available Water in root zone (inches)	% capacity filled	Drainage (inches)	Additional capacity of root zone	Proj ETO	Proj ET	NOTES
23-Jun	28.67	2.5		0.08	0.66	0.05	3.54	3.65	103	2.27	0.00		0.00	
24-Jun	29.34	0.7		0.09	0.70	0.06	3.60	3.71	103	0.58	0.00		0.00	
25-Jun	30	0.1		0.15	0.74	0.11	3.66	3.73	102	0.00	0.00		0.00	
26-Jun	30.67	0		0.18	0.78	0.14	3.70	3.62	98	0.00	0.08		0.00	
27-Jun	31.34	0		0.19	0.82	0.16	3.75	3.49	93	0.00	0.26		0.00	
28-Jun	32	0		0.12	0.86	0.10	3.80	3.41	90	0.00	0.38		0.00	
29-Jun	32.67	0		0.17	0.90	0.15	3.84	3.29	86	0.00	0.55		0.00	
30-Jun	33				0.91	0.00	3.87	3.30	85	0.00	0.58		0.00	
1-Jul	33.34				0.92	0.00	3.89	3.32	85	0.00	0.59		0.00	
2-Jul	33.67				0.93	0.00	3.91	3.33	85	0.00	0.59		0.00	
3-Jul	34				0.94	0.00	3.94	3.35	85	0.00	0.60		0.00	
4-Jul	34.34				0.95	0.00	3.96	3.36	85	0.00	0.61		0.00	
5-Jul	34.67				0.96	0.00	3.98	3.37	84	0.00	0.62		0.00	
6-Jul	35				0.97	0.00	4.01	3.39	84	0.00	0.63		0.00	
7-Jul	35.33				0.98	0.00	4.03	3.40		0.00			0.00	
8-Jul	35.67				0.99	0.00	4.05	3.42		0.00			0.00	
9-Jul	36				1.00	0.00	4.08	3.43		0.00			0.00	

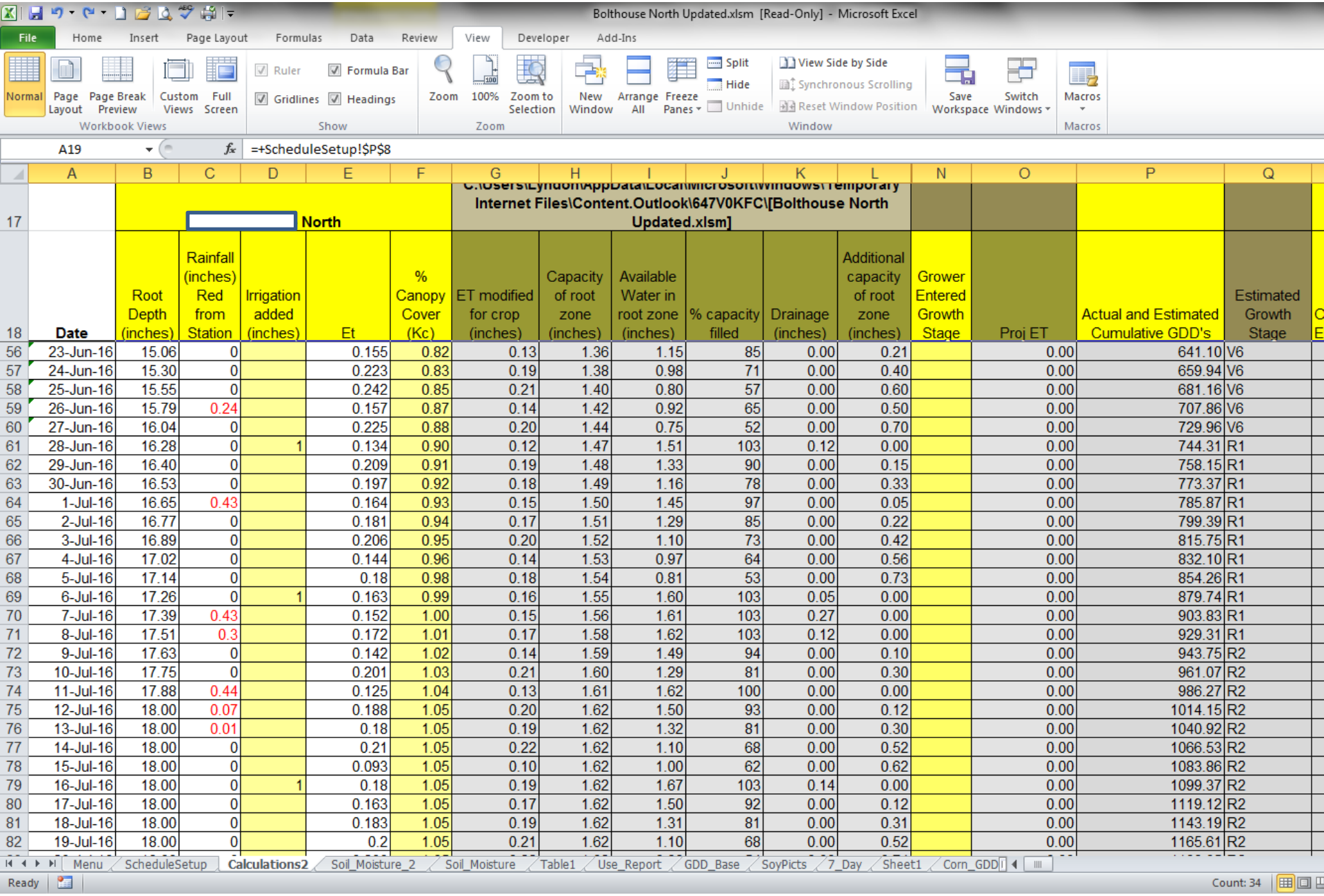
Help | Calculations | Soil Moisture | Cumulative data | Table1 | Caluations | Crop & Soil Tables

Ready

MSU Excel Irrigation Schedule Checkbook Method - Mendon 2014



https://mawn.geo.msu.edu/irrigation



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Zoom 100% Zoom to Selection — Zoom
New Window Arrange All Freeze Panes Split Hide Unhide View Side by Side Synchronous Scrolling Reset Window Position — Window
Save Workspace Switch Windows — Window
Macros — Macros

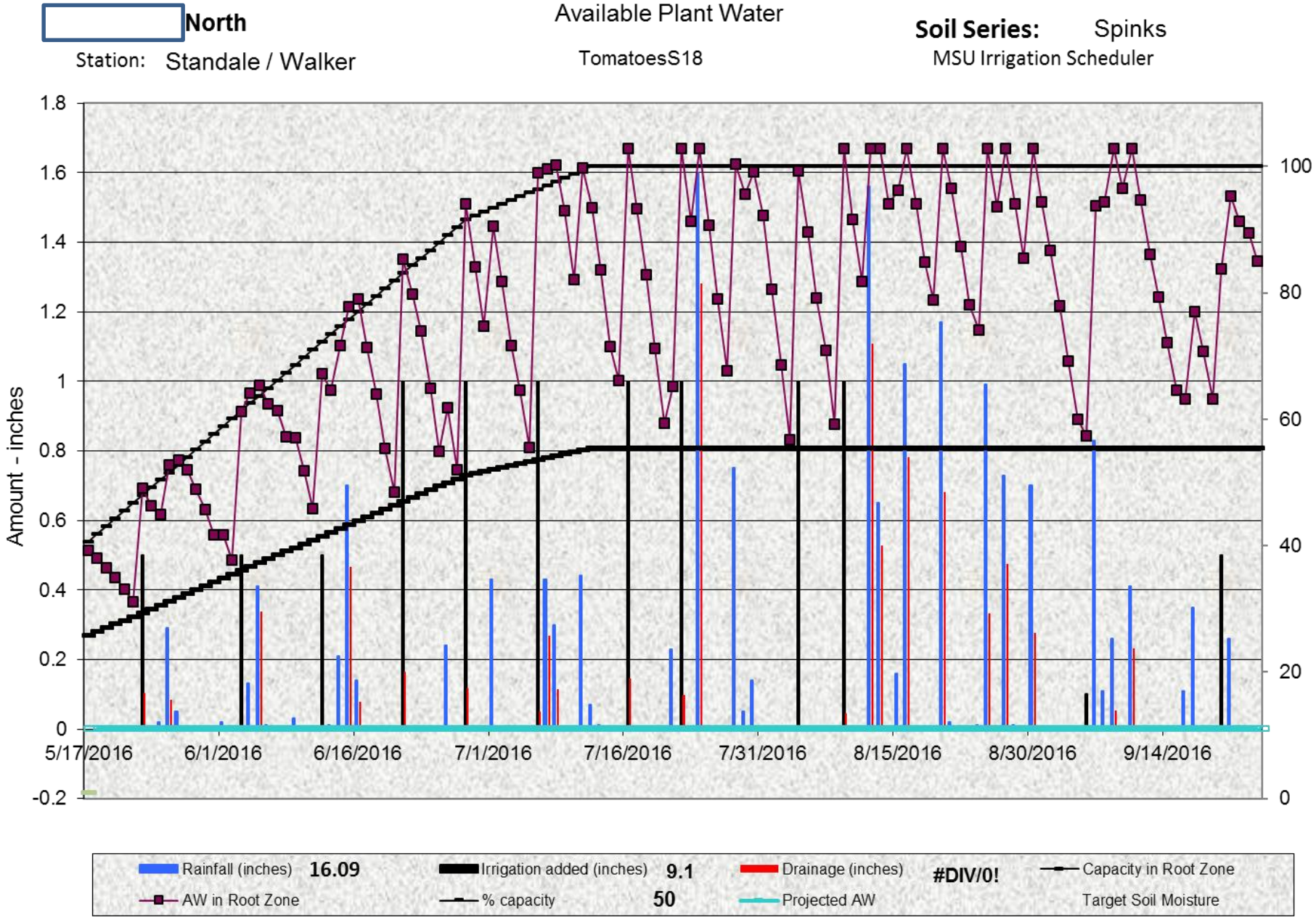
A19 =+ScheduleSetup!P8

	A	B	C	D	E	F	G	H	I	J	K	L	N	O	P	Q
17				North			C:\Users\Lyndon\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Outlook\647V0KFC\[Bolthouse North Updated.xlsm]									
18	Date	Root Depth (inches)	Rainfall (inches) Red from Station	Irrigation added (inches)	Et	% Canopy Cover (Kc)	ET modified for crop (inches)	Capacity of root zone (inches)	Available Water in root zone (inches)	% capacity filled	Drainage (inches)	Additional capacity of root zone (inches)	Grower Entered Growth Stage	Proj ET	Actual and Estimated Cumulative GDD's	Estimated Growth Stage
56	23-Jun-16	15.06	0		0.155	0.82	0.13	1.36	1.15	85	0.00	0.21		0.00	641.10	V6
57	24-Jun-16	15.30	0		0.223	0.83	0.19	1.38	0.98	71	0.00	0.40		0.00	659.94	V6
58	25-Jun-16	15.55	0		0.242	0.85	0.21	1.40	0.80	57	0.00	0.60		0.00	681.16	V6
59	26-Jun-16	15.79	0.24		0.157	0.87	0.14	1.42	0.92	65	0.00	0.50		0.00	707.86	V6
60	27-Jun-16	16.04	0		0.225	0.88	0.20	1.44	0.75	52	0.00	0.70		0.00	729.96	V6
61	28-Jun-16	16.28	0	1	0.134	0.90	0.12	1.47	1.51	103	0.12	0.00		0.00	744.31	R1
62	29-Jun-16	16.40	0		0.209	0.91	0.19	1.48	1.33	90	0.00	0.15		0.00	758.15	R1
63	30-Jun-16	16.53	0		0.197	0.92	0.18	1.49	1.16	78	0.00	0.33		0.00	773.37	R1
64	1-Jul-16	16.65	0.43		0.164	0.93	0.15	1.50	1.45	97	0.00	0.05		0.00	785.87	R1
65	2-Jul-16	16.77	0		0.181	0.94	0.17	1.51	1.29	85	0.00	0.22		0.00	799.39	R1
66	3-Jul-16	16.89	0		0.206	0.95	0.20	1.52	1.10	73	0.00	0.42		0.00	815.75	R1
67	4-Jul-16	17.02	0		0.144	0.96	0.14	1.53	0.97	64	0.00	0.56		0.00	832.10	R1
68	5-Jul-16	17.14	0		0.18	0.98	0.18	1.54	0.81	53	0.00	0.73		0.00	854.26	R1
69	6-Jul-16	17.26	0	1	0.163	0.99	0.16	1.55	1.60	103	0.05	0.00		0.00	879.74	R1
70	7-Jul-16	17.39	0.43		0.152	1.00	0.15	1.56	1.61	103	0.27	0.00		0.00	903.83	R1
71	8-Jul-16	17.51	0.3		0.172	1.01	0.17	1.58	1.62	103	0.12	0.00		0.00	929.31	R1
72	9-Jul-16	17.63	0		0.142	1.02	0.14	1.59	1.49	94	0.00	0.10		0.00	943.75	R2
73	10-Jul-16	17.75	0		0.201	1.03	0.21	1.60	1.29	81	0.00	0.30		0.00	961.07	R2
74	11-Jul-16	17.88	0.44		0.125	1.04	0.13	1.61	1.62	100	0.00	0.00		0.00	986.27	R2
75	12-Jul-16	18.00	0.07		0.188	1.05	0.20	1.62	1.50	93	0.00	0.12		0.00	1014.15	R2
76	13-Jul-16	18.00	0.01		0.18	1.05	0.19	1.62	1.32	81	0.00	0.30		0.00	1040.92	R2
77	14-Jul-16	18.00	0		0.21	1.05	0.22	1.62	1.10	68	0.00	0.52		0.00	1066.53	R2
78	15-Jul-16	18.00	0		0.093	1.05	0.10	1.62	1.00	62	0.00	0.62		0.00	1083.86	R2
79	16-Jul-16	18.00	0	1	0.18	1.05	0.19	1.62	1.67	103	0.14	0.00		0.00	1099.37	R2
80	17-Jul-16	18.00	0		0.163	1.05	0.17	1.62	1.50	92	0.00	0.12		0.00	1119.12	R2
81	18-Jul-16	18.00	0		0.183	1.05	0.19	1.62	1.31	81	0.00	0.31		0.00	1143.19	R2
82	19-Jul-16	18.00	0		0.2	1.05	0.21	1.62	1.10	68	0.00	0.52		0.00	1165.61	R2

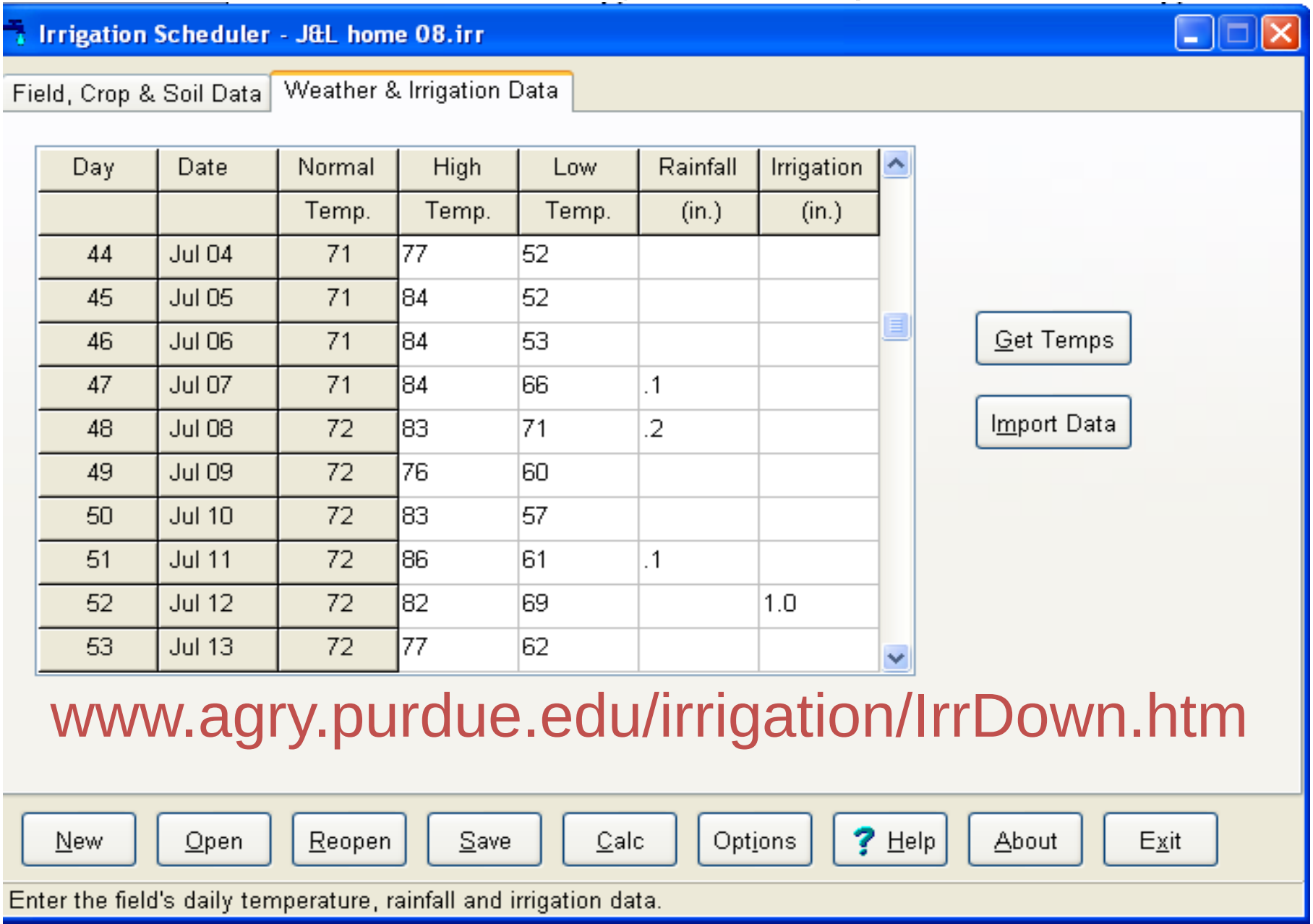
Menu ScheduleSetup Calculations2 Soil_Moisture_2 Soil_Moisture Table1 Use_Report GDD_Base SoyPicts 7_Day Sheet1 Corn_GDD

Ready Count: 34

North


North
Station: Standale / Walker
Available Plant Water
TomatoesS18
Soil Series: Spinks
MSU Irrigation Scheduler
Amount - inches
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
100
80
60
40
20
0
5/17/2016
6/1/2016
6/16/2016
7/1/2016
7/16/2016
7/31/2016
8/15/2016
8/30/2016
9/14/2016
Rainfall (inches) 16.09
Irrigation added (inches) 9.1
Drainage (inches)
#DIV/0!
Capacity in Root Zone
AW in Root Zone
% capacity 50
Projected AW
Target Soil Moisture

Michiana Irrigation Scheduler: Purdue Agronomy web site –Est. From High/Low temp. & date



Day	Date	Normal Temp.	High Temp.	Low Temp.	Rainfall (in.)	Irrigation (in.)
44	Jul 04	71	77	52		
45	Jul 05	71	84	52		
46	Jul 06	71	84	53		
47	Jul 07	71	84	66	.1	
48	Jul 08	72	83	71	.2	
49	Jul 09	72	76	60		
50	Jul 10	72	83	57		
51	Jul 11	72	86	61	.1	
52	Jul 12	72	82	69		1.0
53	Jul 13	72	77	62		

www.agry.purdue.edu/irrigation/IrrDown.htm

Michiana Irrigation Scheduler – out put

Preview Irrigation Schedule - J&L home 08.irr

Schedule Calculated For	Aug 01	Amount That Can Be Safely Added	-0.06 in.
Evapotranspiration Rate	0.23 in.	If No Rain, You Can Add 1 Inch In	5 days
Soil Profile Moisture Content	101 %	Estimated Water Loss For Season	3.01 in.

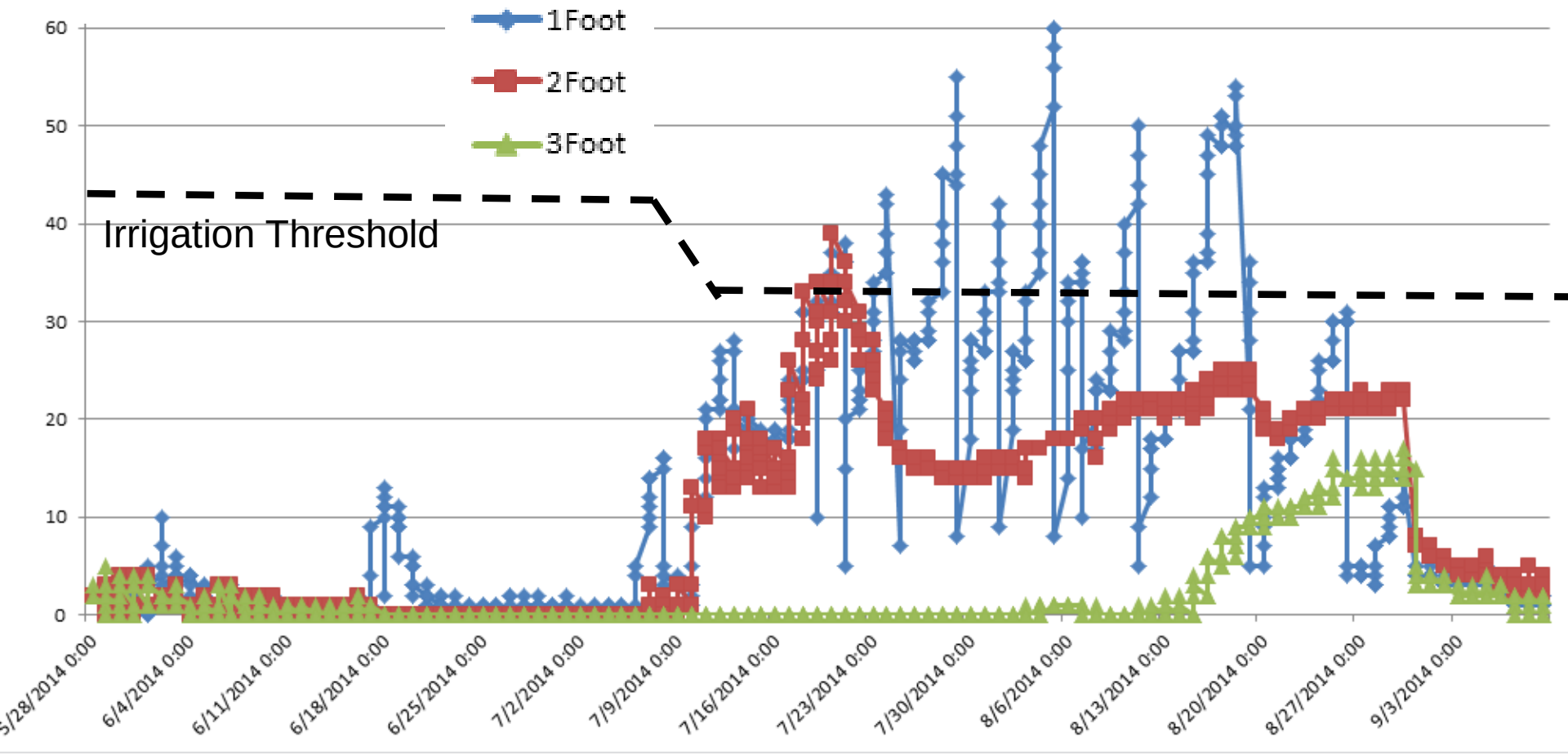
Day	Date	Temp. (°F)	Dev. from Normal	Rainfall (in.)	Irrigation (in.)	Soil Mois (%)	Soil Moisture (relative)	Yield with Irrigation	Yield w/o Irrigation
45	Jul 05	68	-3			96	+++++++	185	185
46	Jul 06	68	-3			91	++++++	185	185
47	Jul 07	75	+4	0.10		88	++++++	185	185
48	Jul 08	77	+5	0.20		87	+++++	185	185
49	Jul 09	68	-4			82	++++	185	185
50	Jul 10	70	-2			78	+++	185	185
51	Jul 11	74	+2	0.10		75	+++	185	185
52	Jul 12	76	+4		1.00	91	++++++	185	185

Print Close

www.agry.purdue.edu/irrigation/IrrDown.htm

Browse the daily calculations.

Watermark Soil Moisture, 2014
Soybean, Constantine MI



Probe or dig to find root depth, wetted front and soil moisture

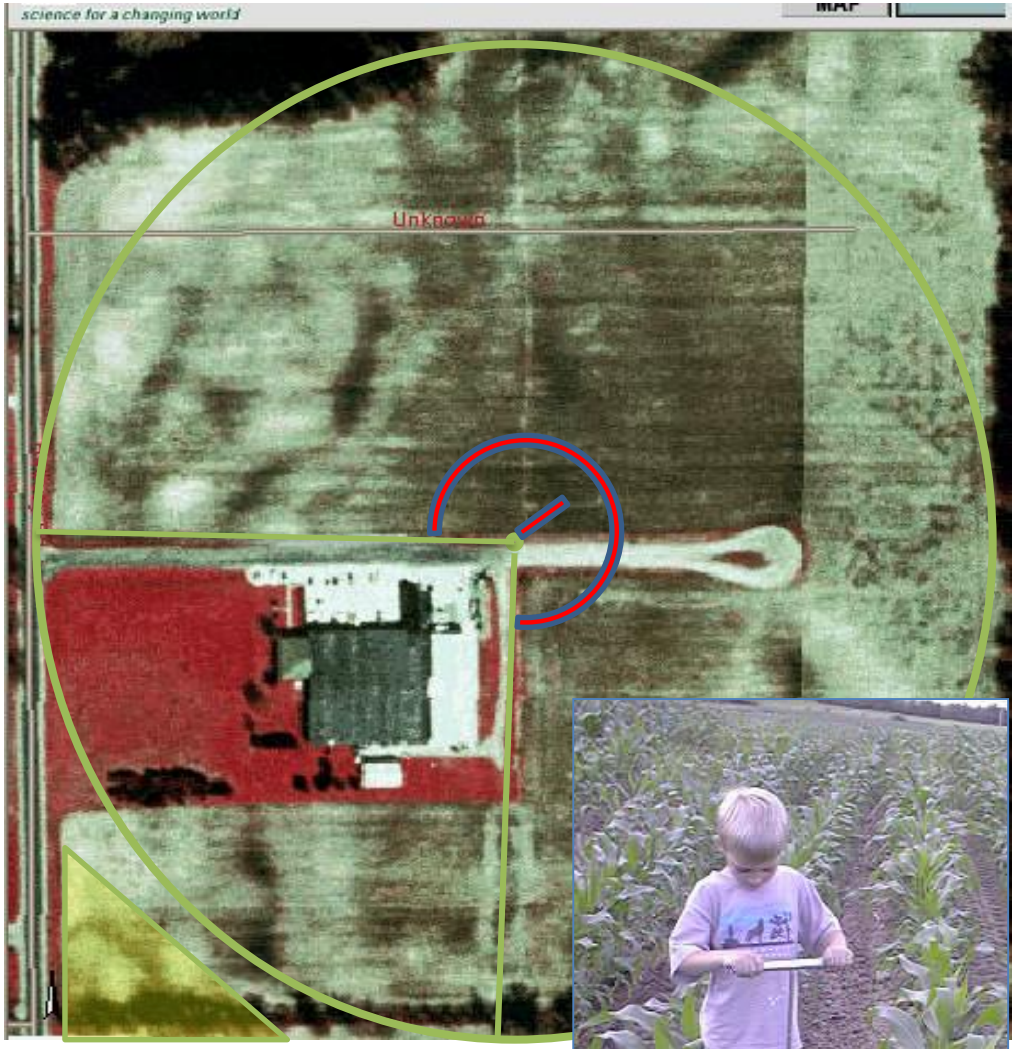
Available Soil Moisture	Description	Illustration
0-25	Appears dry, will hold together if not disturbed, loose sand grains on fingers.	
25-50	Slightly moist, forms a very weak ball with well-defined finger marks, light coating of loose and aggregated sand grains remain on fingers.	
50-75	Moist, forms a weak ball with loose and aggregated sand grains on fingers, darkened color, light uneven water staining on fingers.	

Scheduling by comparison

Irrigated portion of field should look better than the dry corners/area

Over water observation area should not look significantly better than the adjacent irrigated portion of field.

Probe and compare:
- Dry corners
- Over irrigated
- Normal irrigated field



- Soaker hose attached at pivot point
- 100% higher output sprinkler