

Maximizing Irrigation Efficiency: A Tool To Increase Profitability

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Irrigation Scheduling

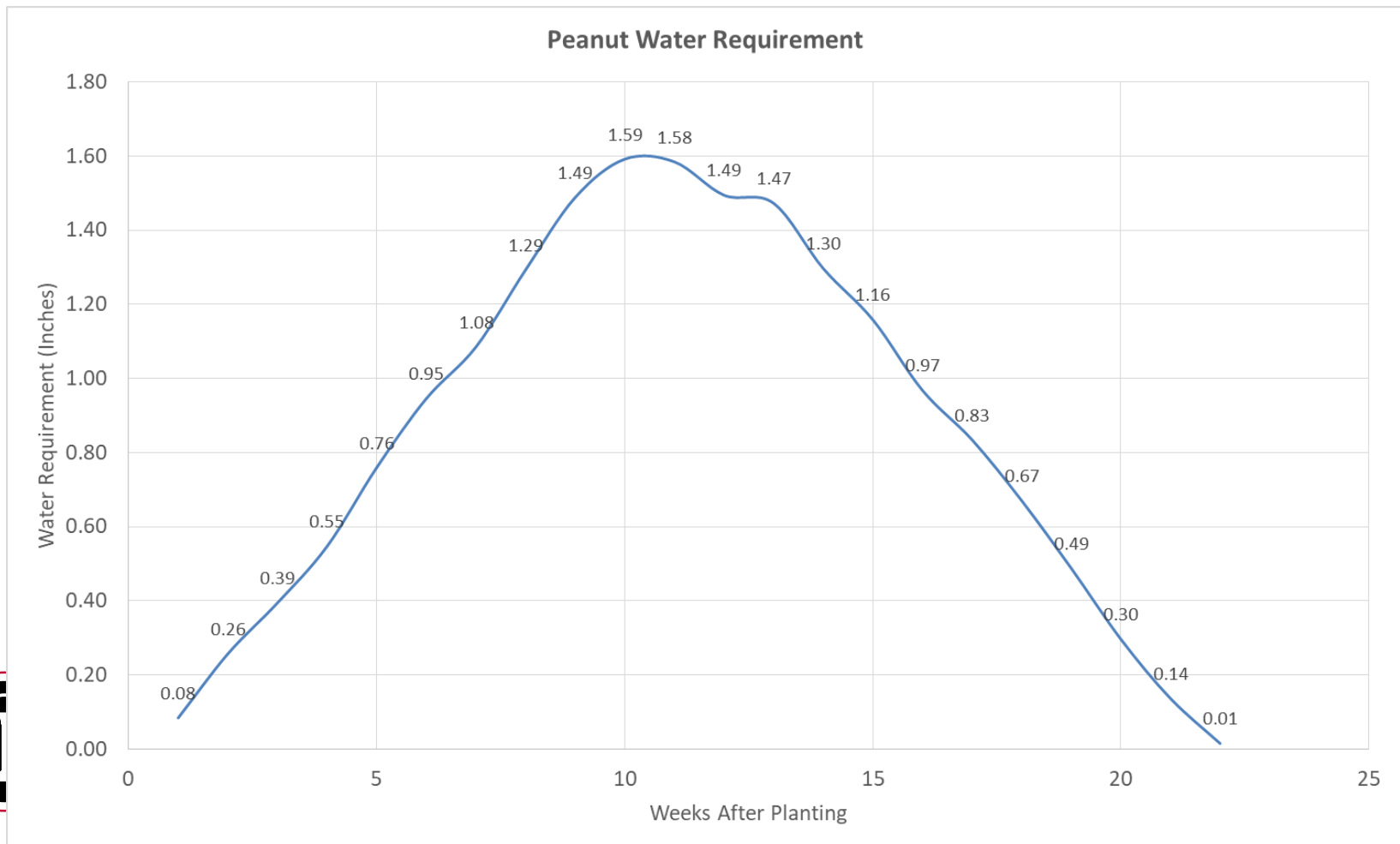
- **A technique that involves:**
 - Determining how much water is needed
 - When to apply it to the field to meet crop demands.
- **Main purpose is:**
 - To increase the profitability and/or quality of the crop by increasing the efficiency of using water and energy or by increasing crop productivity.

Irrigation Cost

- Average Irrigation cost ~ \$7.50/ac-in applied:
 - ~\$6/ac-in for electric
 - ~\$9/ac-in for diesel (2014 around \$18/ac-in)
- So for 1,000 acres of irrigated land @ 10 inches of irrigation:
 - \$75,000

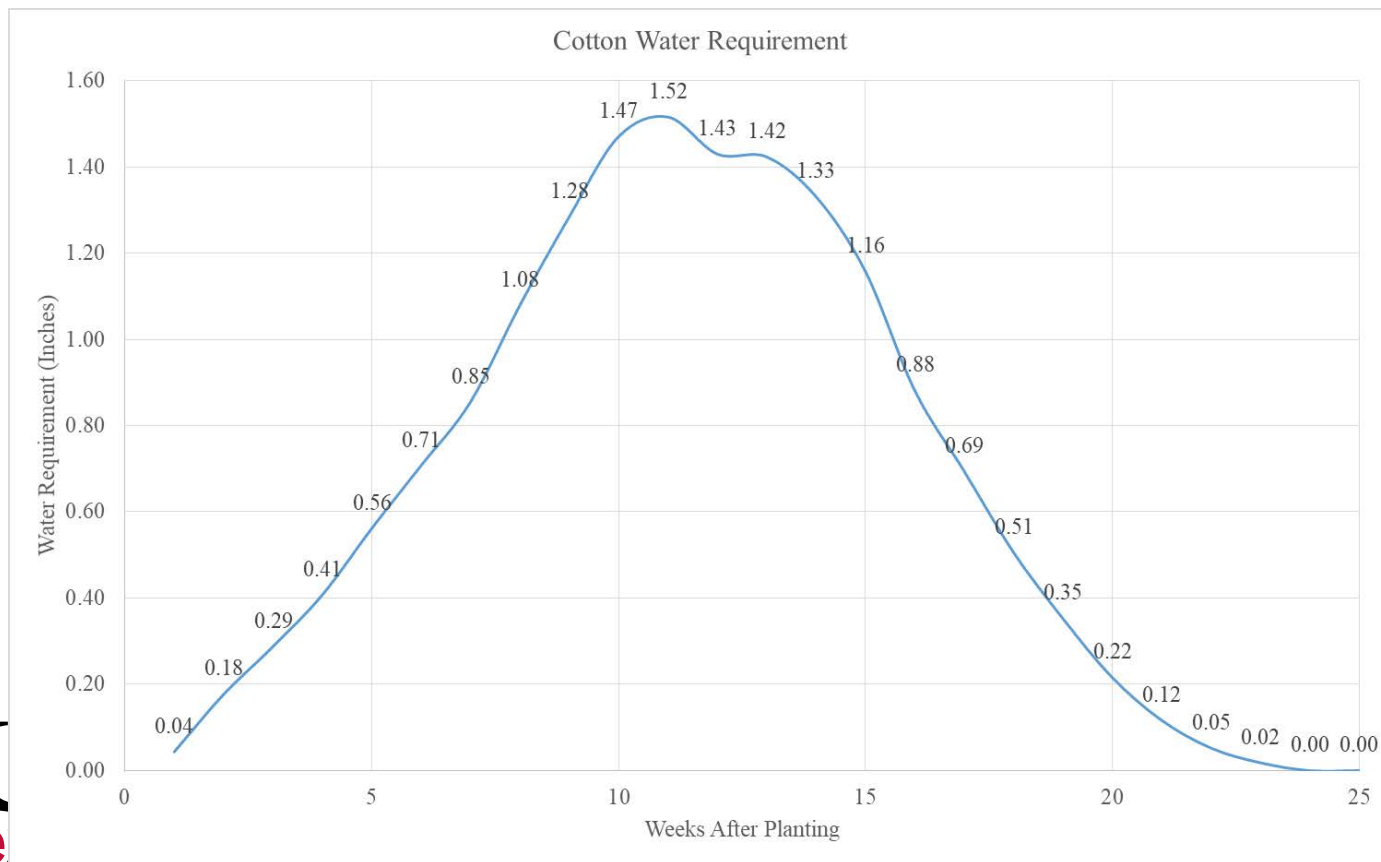
Water Requirements: Peanuts

- Peanut requires approximately 23 inches of water from planting until harvest.



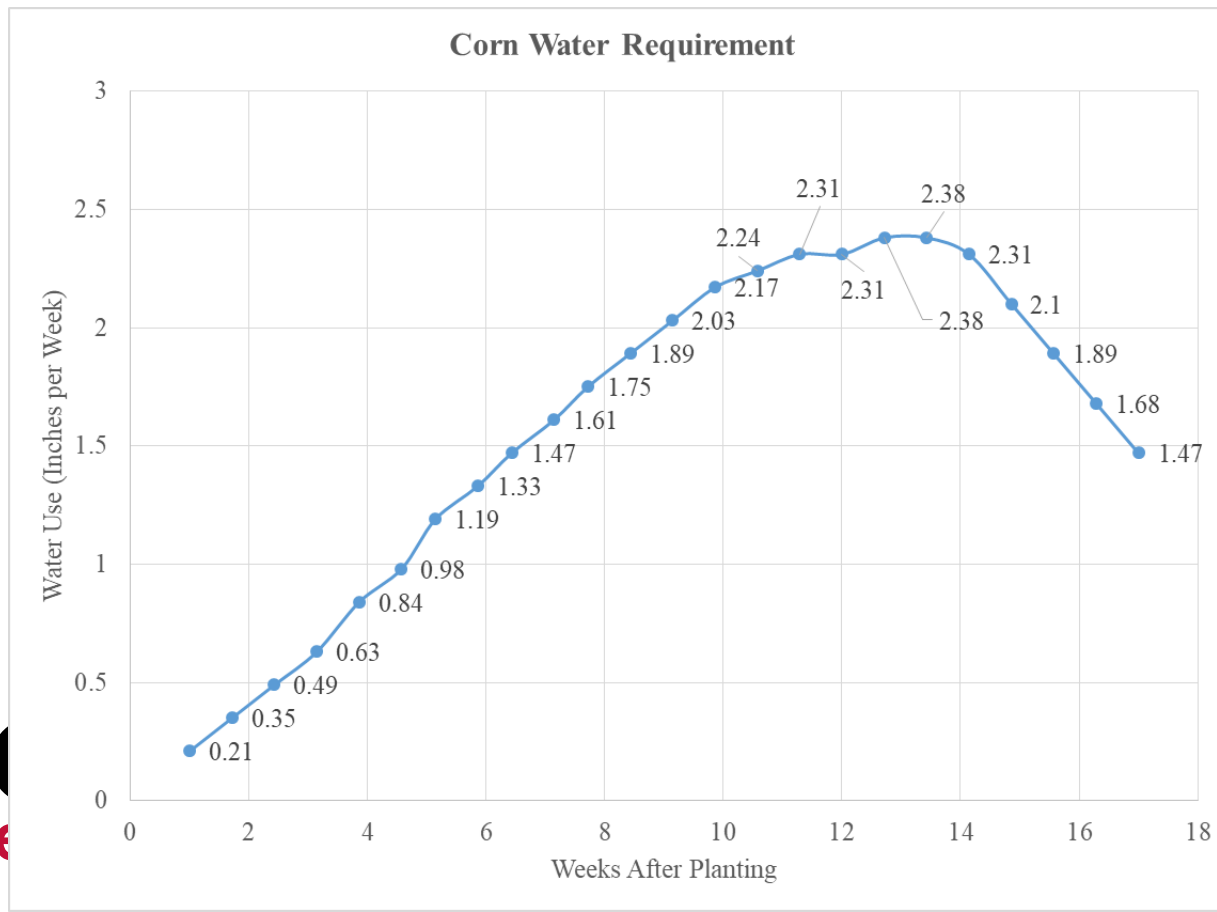
Water Requirements: Cotton

- Cotton's peak water demand begins once it begins to flower, it is critical that cotton be fully irrigated during bloom.



Water Requirements: Corn

- Corn is known as a higher water using crop.
- Unlike cotton and peanuts typically on corn more water means higher yields.



Water Requirements: Soybeans

- Soybeans peak water demand begins once it begins to flower up to full seed.

Growth Stage	Water Requirement	
	Per day	Per week
	----- inches -----	
Germination/Seedling	0.05 to 0.10	0.35 to 0.70
Vegetative Growth	0.10 to 0.20	0.70 to 1.40
Flower to Full Seed	0.25 to 0.35	1.75 to 2.45
Maturity to Harvest	0.05 to 0.20	0.30 to 1.40

Growth Stage	Trigger	Amount
Stand Establishment	Irrigate prior to planting	1 - 1.5"
Prior to 1 st Bloom (VE - R1)	Wilting by late afternoon	1 - 1.5"
1 st Bloom - Beginning Pod Elongation (R1 - R4)	Wilting by mid-day	1.0 - 1.5"
Beginning Seed - Full Seed (R5 - R6)	Keep from wilting	1.0 - 1.5"
Full Seed - Maturity (R6 - R7)	Wilting by late afternoon	1.0"

Irrigation Scheduling

- According to the USDA NASS Irrigation is scheduled based on:

Irrigation Scheduling Method	Entire US (%)	AL (%)	FL (%)	GA (%)	SC (%)	MS (%)
Visible Stress	78	90	85	88	90	91
Feel of Soil	40	42	37	40	40	46
Soil Moisture Sensor	10	7	10	9	6	11
Scheduling Service	8	3	6	7	4	5
Weather Report	8	4	4	7	3	5
Calendar Schedule	21	16	14	12	17	15
When Neighbor Irrigates	6	0.6	2	2	2	6

Cotton Irrigation 2013-2014

Method	Conservation Tillage		Conventional Tillage	
	Lint Yield (lb/ac)	Water Use (in)	Lint Yield (lb/ac)	Water Use (in)
Checkbook	1350	12.7	1150	12.2
Cotton App	1485	3.0	1259	3.0
CWSI	1430	5.0	1305	2.3
Irrigator Pro	1455	2.8	1200	4.3
Rainfed	1450	1.5	-	-
2014				
Checkbook			1596	16.8
Cotton App			1573	10.1
Limited Water	1050	3.81		
Dryland	490	0.0		



Cotton Irrigation 2015-2016

Method	Conservation Tillage		Conventional Tillage	
	Lint Yield (lb/ac)	Water Use (in)	Lint Yield (lb/ac)	Water Use (in)
Checkbook	1560	6.5	1621	6.5
Cotton App	1643	5.0	1710	5.8
WaterMark (45 kPa)	1749	3.0	1661	7.8
Rainfed	1760	0.5	-	-
2016				
Checkbook	909	8	724	8
Cotton App	1066	5.25	980	5.25
WaterMark (45 kPa)	1103	3.25	1233	2.25
Rainfed	1224	0.75	-	-



Cotton Irrigation 2017

Method	Conservation Tillage		Conventional Tillage	
	Lint Yield (lb/ac)	Water Use (in)	Lint Yield (lb/ac)	Water Use (in)
Checkbook	1219	9.5	1162	9.5
Cotton App	1363	4.5	1387	4.5
WaterMark (45 kPa)	1334	1.75	1277	4.0
Rainfed	1300	0.5	-	-

Rainfall = 24.3 inches

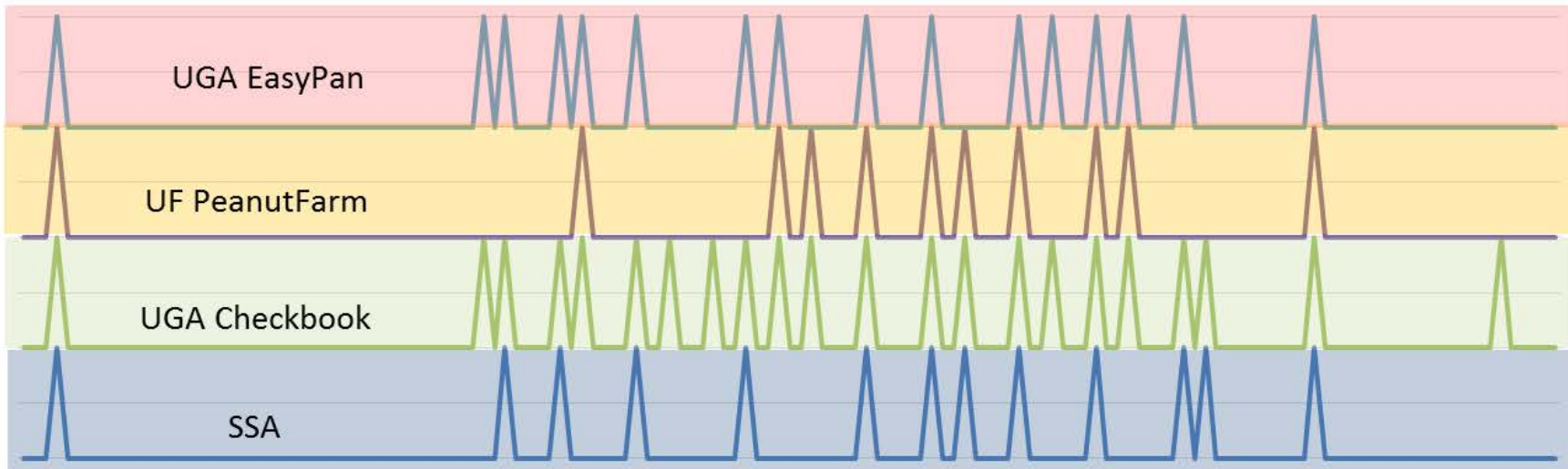
Peanut Irrigation Scheduling 2014

Irrigation Scheduling Method	Irrigation Amount (in)	Total Water (in)	Yield (lb/ac)
Dryland	0.40	12.73	465.2
WaterMark (45 kPa)	9.40	21.73	6052.3
SmartCrop	6.40	18.73	5642.0
EasyPan	11.65	23.98	5725.0
UGA ET Checkbook	15.02	27.35	5025.5
UF Peanut Farm	7.90	20.23	4802.5

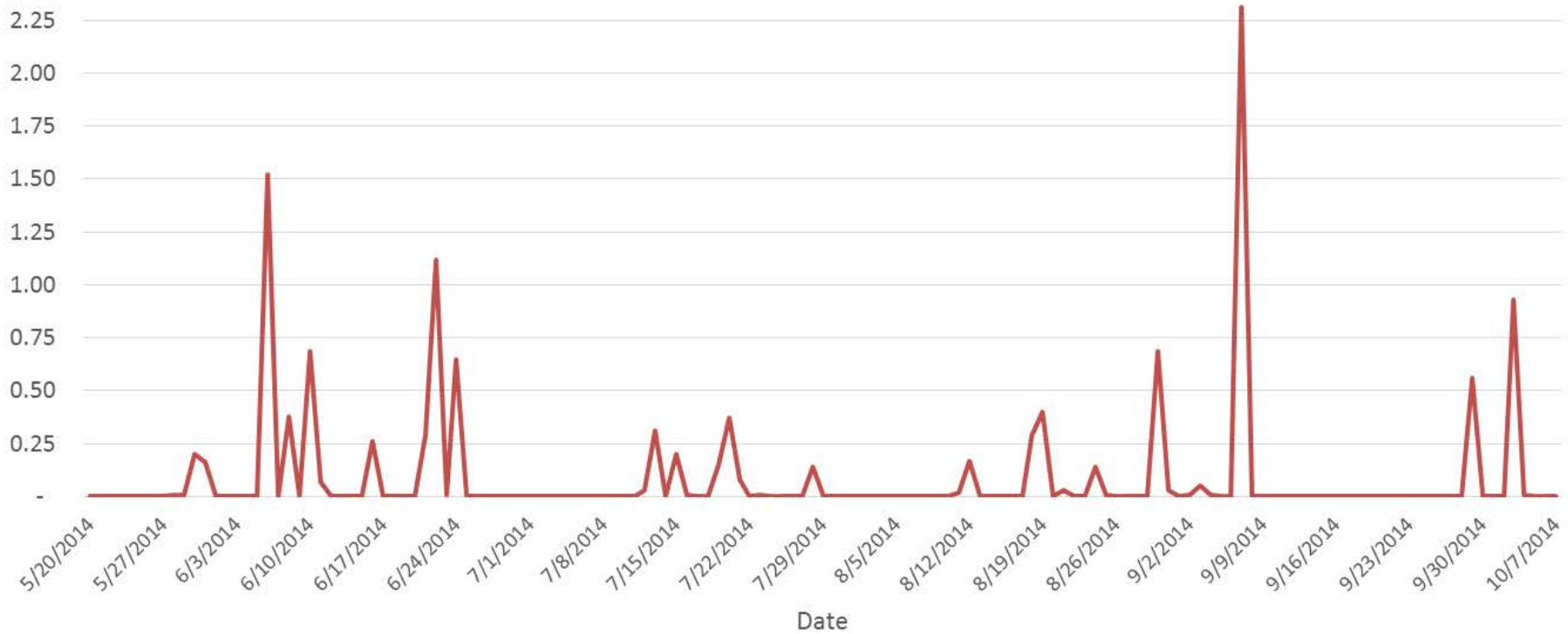
Planted: May 20, 2014
Dug: October 10, 2014
Harvested: October 17, 2014
Rainfall: 12.33 inches



Scheduling Technique



Rainfall (in)



Peanut Irrigation Scheduling 2015

Irrigation Scheduling Method	Irrigation Amount (in)	Total Water (in)	Yield (lb/ac)
Dryland	0.50	23.30	5193.6
WaterMark (45 kPa)	4.45	27.25	5478.6
CWSI	3.55	26.35	5172.8
UGA ET Checkbook	12.50	35.30	5313.4
UGA EasyPan	5.20	28.00	5404.9
UF PeanutFarm	5.20	28.00	5327.3
IrrigatorPro	2.80	25.60	5542.6
50% Checkbook	6.76	29.56	5176.1

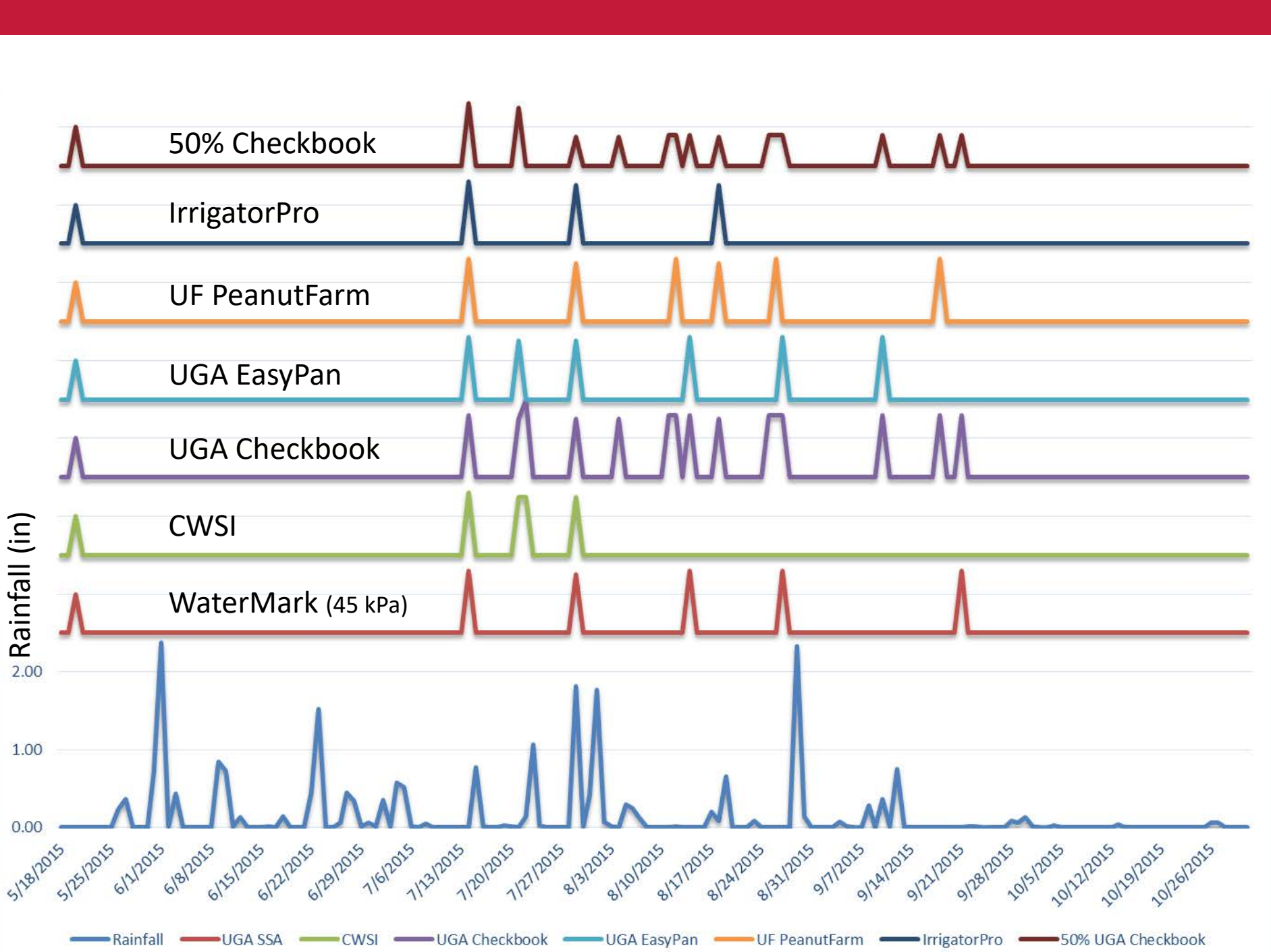
Planted: May 18, 2015

Dug: October 5, 2015

Harvested: October 12, 2015

Rainfall: 22.65 inches





Peanut Irrigation Scheduling 2016

Irrigation Scheduling Method	Irrigation Amount (in)	Total Water (in)	Yield (lb/ac)
Dryland	1.00	26.80	5249.0
WaterMark (45 kPa)	9.25	35.05	6292.0
SmartField CWSI	13.00	38.80	6019.0
PeanutFARM	7.75	33.55	6371.0
IrrigatorPro	10.00	35.80	6540.0
50% Checkbook	8.43	34.23	6367.0

Planted: May 13, 2016

Dug: October 8, 2016

Harvested: October 15, 2016

Rainfall: 25.80 inches



Economic Analysis

- Net dollar benefits of scheduling methods
- 2017 Estimated Costs from UGA Agricultural and Applied Economics Peanut Enterprise Budgets
 - Irrigation: \$8.25/ac-in
 - Weed control: \$44.35 dryland/\$39.48 irrigated
 - Disease control: \$46.92 dryland/\$87.63 irrigated
 - Assume all other input costs are constant
 - Does not include opportunity cost of management
 - Current marketing price: \$0.19/lb or \$380/ton



Net Benefit on 2014 Trial

Irrigation Scheduling Method	Irrigation Amount (in)	Total Water (in)	Georgia-06G	Georgia-12Y	TufRunner 511	TufRunner 727
Dryland	0.40	12.73	Base	Base	Base	Base
UGA SSA	9.40	21.73	\$1,064.34	\$903.50	\$1,001.07	\$836.93
SmartCrop	6.40	18.73	\$949.31	\$835.44	\$1,028.67	\$779.60
UGA EasyPan	11.65	23.98	\$968.45	\$859.39	\$902.90	\$752.09
UGA Checkbook	15.02	27.35	\$798.96	\$764.48	\$689.84	\$586.73
UF PeanutFarm	7.90	20.23	\$758.71	\$647.12	\$808.87	\$690.79

Rainfall = 12.33 in



Net Benefit on 2015 Trial

Irrigation Scheduling Method	Irrigation Amount (in)	Total Water (in)	Georgia-06G	Georgia-12Y	TufRunner 511	TufRunner 727
Dryland	0.50	23.15	Base	Base	Base	Base
UGA SSA	4.45	27.10	-\$48.15	\$83.42	\$76.76	-\$166.49
UGA EasyPan	5.20	27.85	-\$41.12	\$6.33	\$35.77	-\$119.40
UGA Checkbook	12.50	35.15	-\$90.06	-\$163.46	-\$52.67	-\$66.87
PeanutFARM	5.20	27.85	-\$86.09	\$6.33	-\$13.59	-\$36.93
CWSI	3.55	26.20	-\$35.12	-\$52.11	\$8.92	-\$83.88
IrrigatorPro	2.80	25.45	-\$83.99	\$57.44	\$200.74	-\$76.12
50% UGA Checkbook	6.76	29.41	-\$22.22	-\$192.18	-\$15.76	-\$54.50

Rainfall = 22.65 in



Net Benefit on 2016 Trial

Irrigation Scheduling Method	Irrigation Amount (in)	Total Water (in)	Georgia-06G	Georgia-12Y	TufRunner 511	TufRunner 727
Dryland	1.00	26.80	Base	Base	Base	Base
UGA SSA	9.25	35.05	\$77.62	\$61.16	\$150.33	\$87.68
PeanutFARM	7.75	33.55	\$77.65	\$128.86	\$241.35	\$38.33
CWSI	13.00	38.80	-\$11.84	-\$55.74	\$123.50	-\$10.47
IrrigatorPro	10.00	35.80	\$213.64	\$121.73	\$164.26	\$41.26
50% UGA Checkbook	8.43	34.23	\$156.68	\$5.78	\$204.23	\$94.49

Rainfall = 25.8 in





Georgia Precision Ag

@GeorgiaPrecisionAg

College & University in Tifton, Georgia

Always Open

UGA team members sharing information and updates on latest Precision Agriculture Research and Extension activities within the State of Georgia.

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Georgia Precision Ag added 7 new photos
March 10 at 10:42am

First Corn trial of the season planted at Stripling Irrigation Research Park by UGA team memberst #Plant17 #VRPrecisionPlantStudy #GeorgiaPrecisionAg with Simer Virk Wes Porter Calvin Perry



Like



Georgia Precision Ag shared a link
March 3 at 8:26am



Precision Agriculture Makes Farming More Sustainable, Profitable | PrecisionAg

Joe Luck (left) and Rachel Stevens check seed placement of a multi-hybrid planter being tested as part of a collaborative research project being conducted by...



GA Ext PrecisionAg

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FOLLOWS YOU
UGA Extension Precision Ag and Irrigation Information, w/ a focus in Precision Ag, Ag Machinery, and Precision Irrigation

Tifton, GA

TWEETS
795

Tweets

GA Ext PrecisionAg @WesleyMPorter · Mar 22
Pivot training for SE District agents at Midville, @StriplingPark



GA Ext PrecisionAg @WesleyMPorter · 20 Sep 2016
Check out @CottonInc cottoncultivated cottoninc.com new Mid-Week Weather Outlook for the cotton belt. Could be very helpful during #harvest16



Cotton Cultivated

Providing the cotton growing community quick and easy access to cotton production resources
cottoncultivated cottoninc.com

