Purdue Extension
Knowledge to Go

MICHIGAN STATE UNIVERSITY | Extension

Getting more out of Irrigation

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www.msue.msu.edu/stjoseph

- then click the Irrigation button

OUR MISSION

Helping people improve their lives through an educational process that applies knowledge to critical needs, issues, and opportunities.

LOCAL INFORMATION

- Home
- 4-H & Youth
- Agriculture
- Comm. & Economic Development
- Family Consumer Sciences
- Home Horticulture
- Irrigation

St. Joseph County Staff

Dear Friends of Extension:

The St. Joseph County Michigan State University Extension is pleased to make information available to you. Our purpose is to pr programs and assistance in Agriculture and Natural Resources, Children, Youth and Family, and Community and Economic Develop further assistance, please contact us by e-mail, mail, phone, fax or a visit. To view our 2011 Annual Report click here.

Sincerely,

Maury Kaercher
Extension Educator

Diana Fair
Extension Educator, Improving Health & Nutrition Institute

Lyndon Kelley
Extension Educator, Irrigation

Eva Beeker
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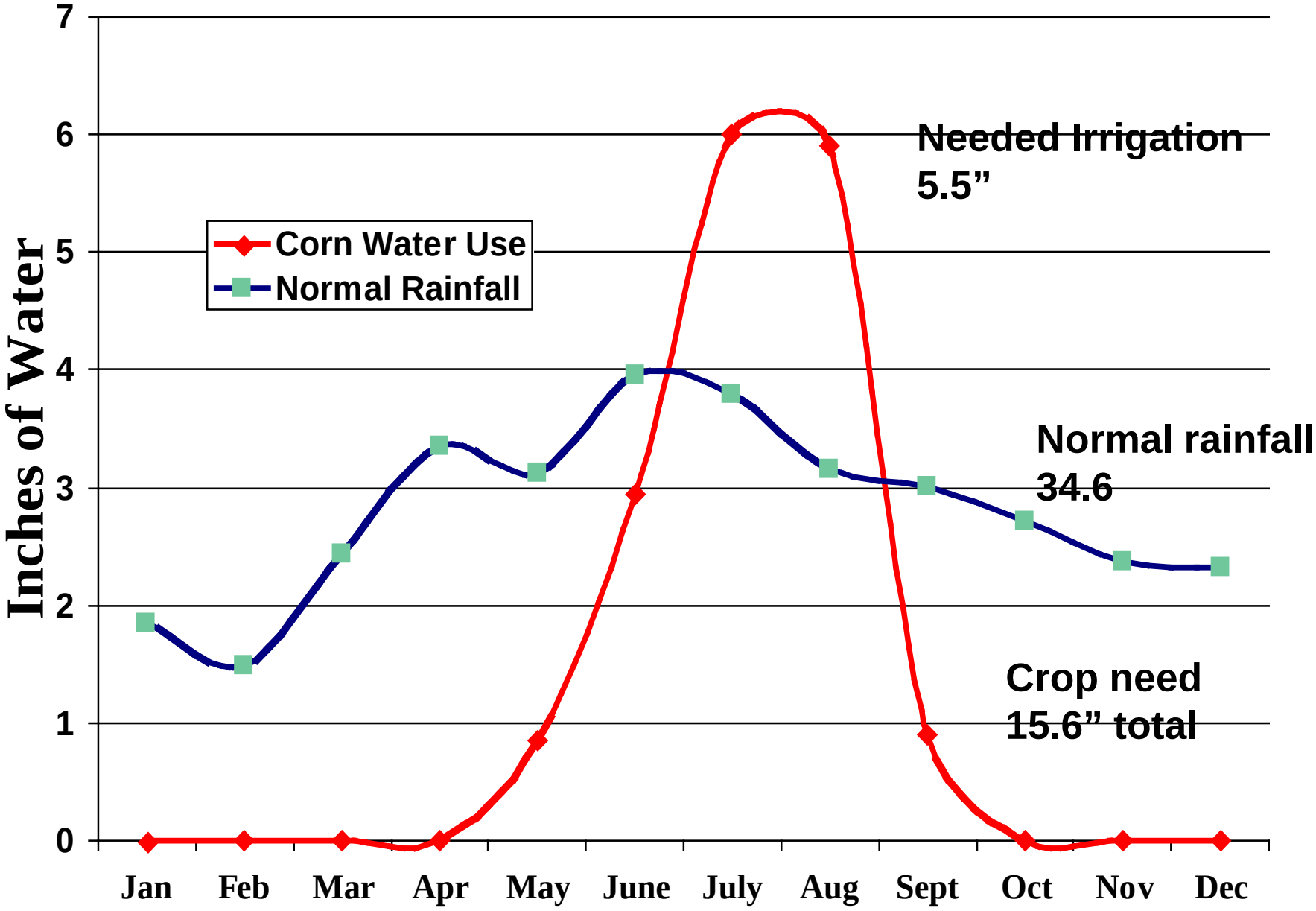

Inches of Water
7
6
5
4
3
2
1
0
Corn Water Use
Normal Rainfall
Needed Irrigation
5.5”
Normal rainfall
34.6
Crop need
15.6” total
Jan
Feb
Mar
Apr
May
June
July
Aug
Sept
Oct
Nov
Dec

Getting more out of Irrigation

- Uniform application of water
- Preventing Irrigation Runoff
- Water Supply- Quantity
- Water Supply - Quality Factors
- Scheduling – water the crop when it needs it
- Fertigation-Chemigation

Irrigation System Uniformity

An 1” application should be 1” everywhere in the irrigated field

- 10% or less deviation from the average is ideal.
- Over applied area will likely be over applied each application
- Under applied areas will likely be under applied each application

A 30% deviation on a field in an 8” irrigation application year will have areas receiving as little as 5.6” and as great as 10.4”

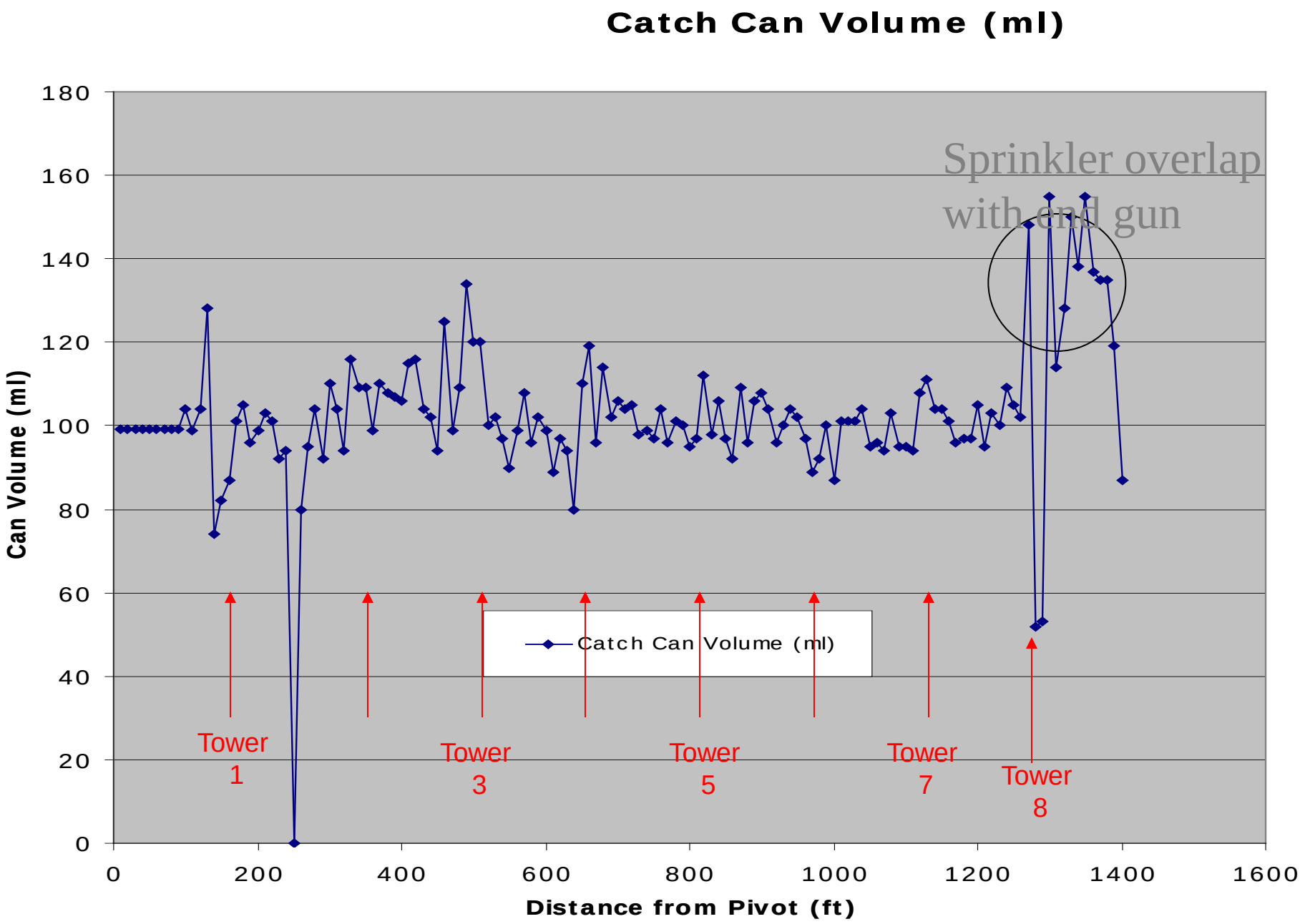
Repair all visible system leaks and problems first.

Irrigation System Uniformity Evaluation

- Identify performance below 85% uniform
- Create a list of needed repairs / improvements
- Determine actual application

Irrigator trainings

- Crop consultants
- CD
- Farmers



http://web1.msue.msu.edu/stjoseph/anr/anr.htm

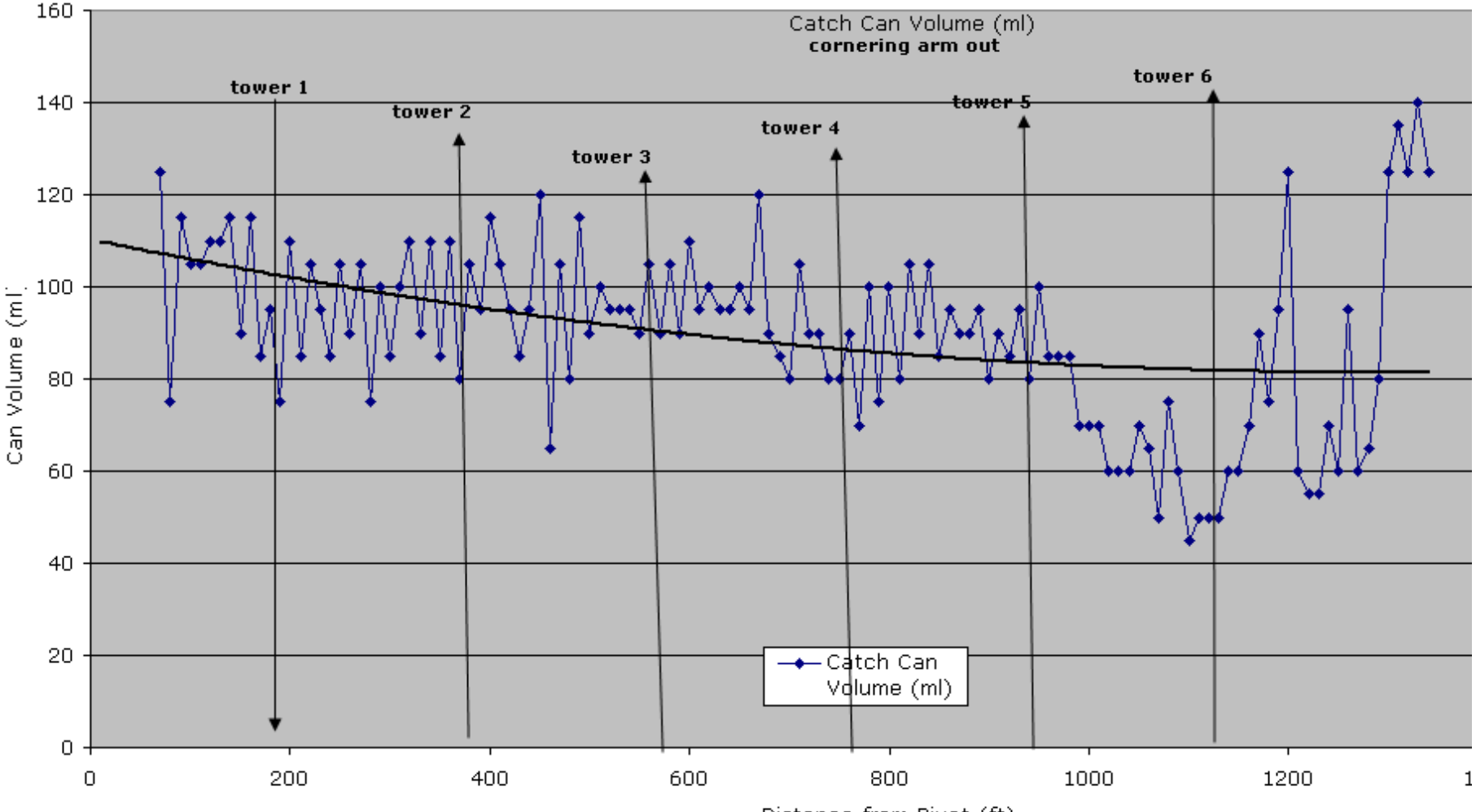
Greatest improvement needed

- End gun stop adjustment
- Water supply over or under design
- End gun orifice, too little or too much
- Wrong sprinkler or tip
- Leaks, plugs and **no turn sprinklers**

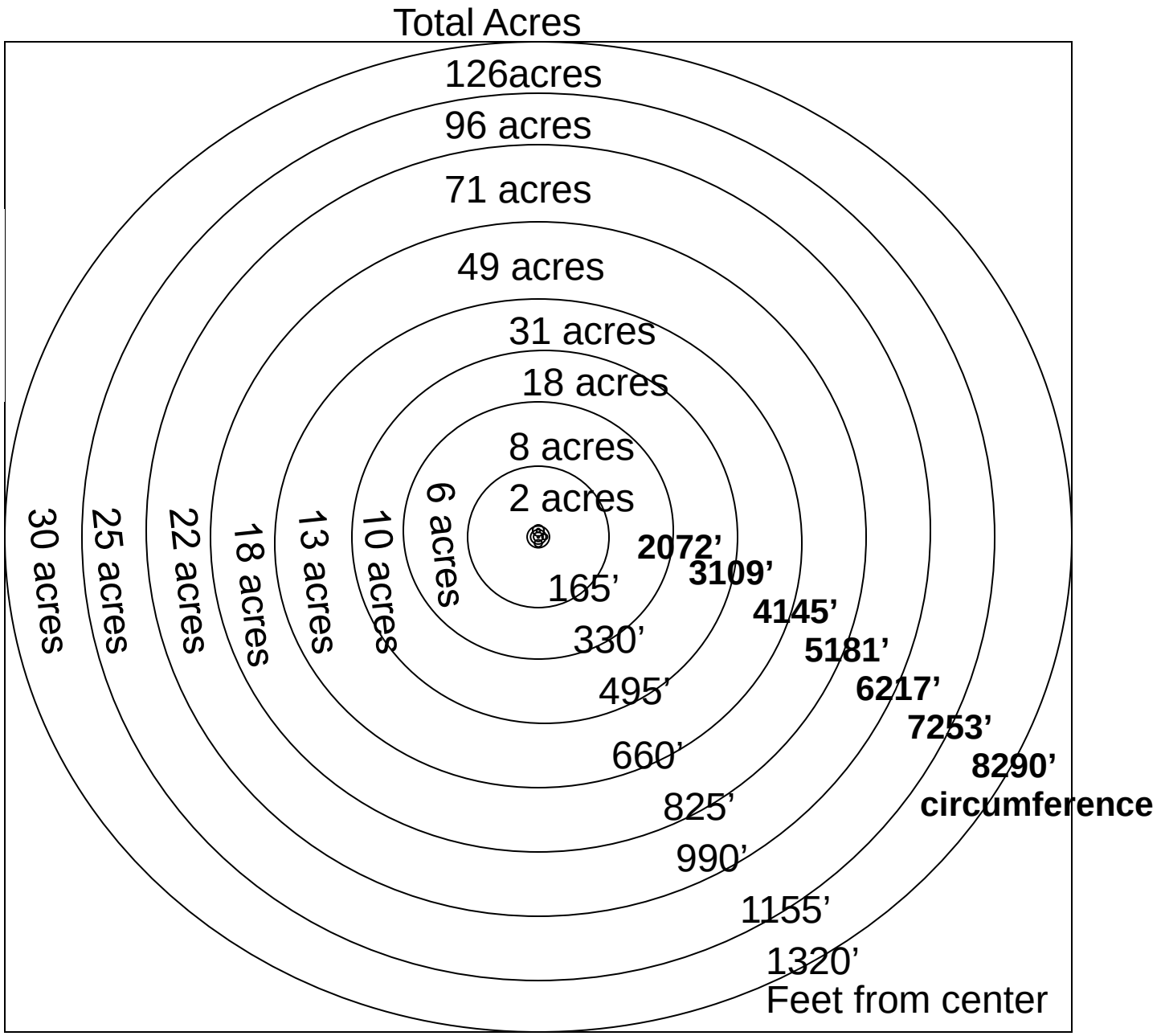
Water supply over or under design

supply over design yield tail up, supply under design yield tail down

Example of Water supply under volume for sprinkler design



Over and under application issue affect the majority of the application area



Most system apply within 85% of the expected application

MSU Extension Irrigation System Evaluation Tool, 1-23-07

Farm Name [redacted] Farm

System Uniformity Coefficient = 79

System Identification: Cornering Arm System on [redacted] Farm-Behind House

Good System uniformity coefficient are 85 or greater

Cornering Arm Extended

Deviation from desired application = -0.04

Application is 4 % under expectation

System Settings

Application rate (in)	0.5	Wind speed (mph)	4 mph
Percent timer Setting (%)	19	Wind Condition (variable or steady)	steady
Operating Pressue (psi)			

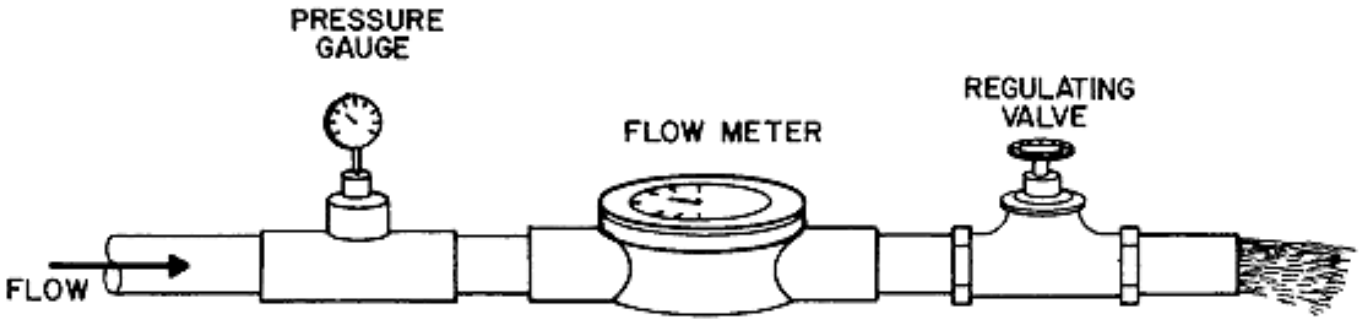
Rate of application calculator

Time from start to end of application at highest rate section of system (min.)	22	Inches/Hour	1.25
Rate of application for the highest rate section of system (minute /one inch)	48.00		
Average Application (cm)			1.164
Length of evaluation area (ft)	1340	Average Application (in)	0.46
Catch Can Spacing Distance (ft)	10		
Average catch, collected only (ml)			88.95
number of cans data collected from	129	*70% average catch can (ml)*	*59.94*
number of cans set	134	Evaluation area, full circle (acres)	122.82
catch can openning area (sq cm)			76.977
Diameter of catch can (cm)	9.9	catch can openning area (sq in)	11.767

catch can number	Distance from center point	catch volume in ml	Data adjustment	Comments	Water volume (cm)	Water volume (in)	% applied of average	Deviation from average (%)	Area covered per catch can (acres)	Area covered per catch can (% of total)	Weighted Deviation
1	10		88.95		1.156	0.455	99.26%	-0.74%	0.01623	0.01%	0.0001
2	20		88.95		1.156	0.455	99.26%	-0.74%	0.02885	0.02%	0.0002
3	30		88.95		1.156	0.455	99.26%	-0.74%	0.04327	0.04%	0.0003
4	40		88.95		1.156	0.455	99.26%	-0.74%	0.05770	0.05%	0.0005
5	50		88.95		1.156	0.455	99.26%	-0.74%	0.07212	0.06%	0.0006
6	60		88.95		1.156	0.455	99.26%	-0.74%	0.08655	0.07%	0.0007
7	70	125	0.00		1.624	0.639	139.48%	39.48%	0.10097	0.08%	0.0011
8	80	75	0.00		0.974	0.384	83.69%	-16.31%	0.11539	0.09%	0.0008
9	90	115	0.00		1.494	0.588	128.32%	28.32%	0.12982	0.11%	0.0014
10	100	105	0.00		1.364	0.537	117.16%	17.16%	0.14424	0.12%	0.0014

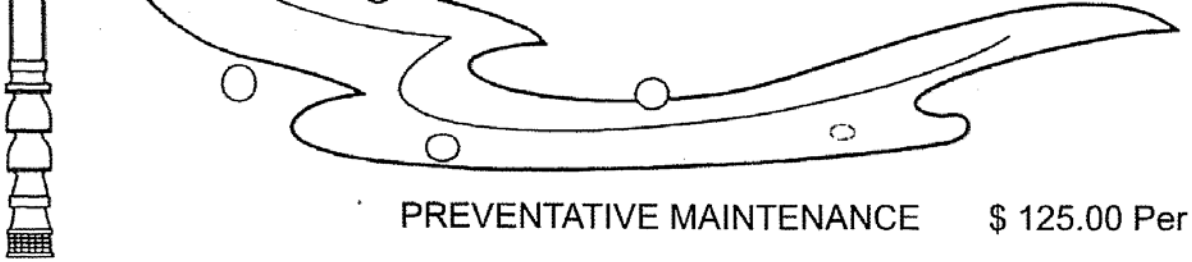
Data Entry | Uniformity Graph

Measure flow at desired pressure prior to ordering sprinkler package



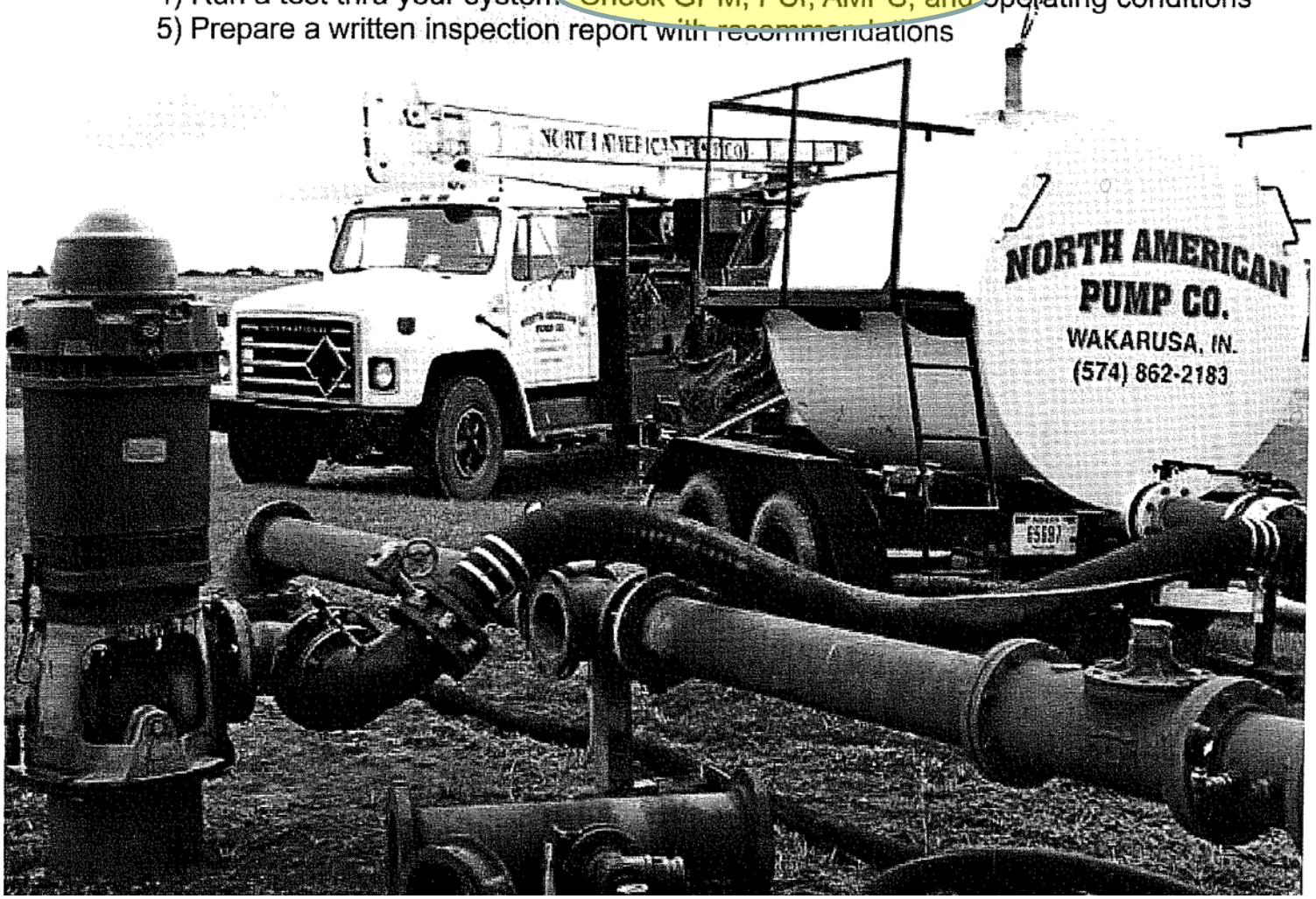
Poor performance:

Ask dealer to measure flow at peak water use season and compare to design parameters.



PREVENTATIVE MAINTENANCE $ 125.00 Per Well

1) Change the oil / grease in the electric motor or gear drive
2) Change the packing
3) Inspect the headshaft area
4) Run a test thru your system -Check GPM, PSI, AMPS, and operating conditions
5) Prepare a written inspection report with recommendations



Preventing Irrigation Runoff

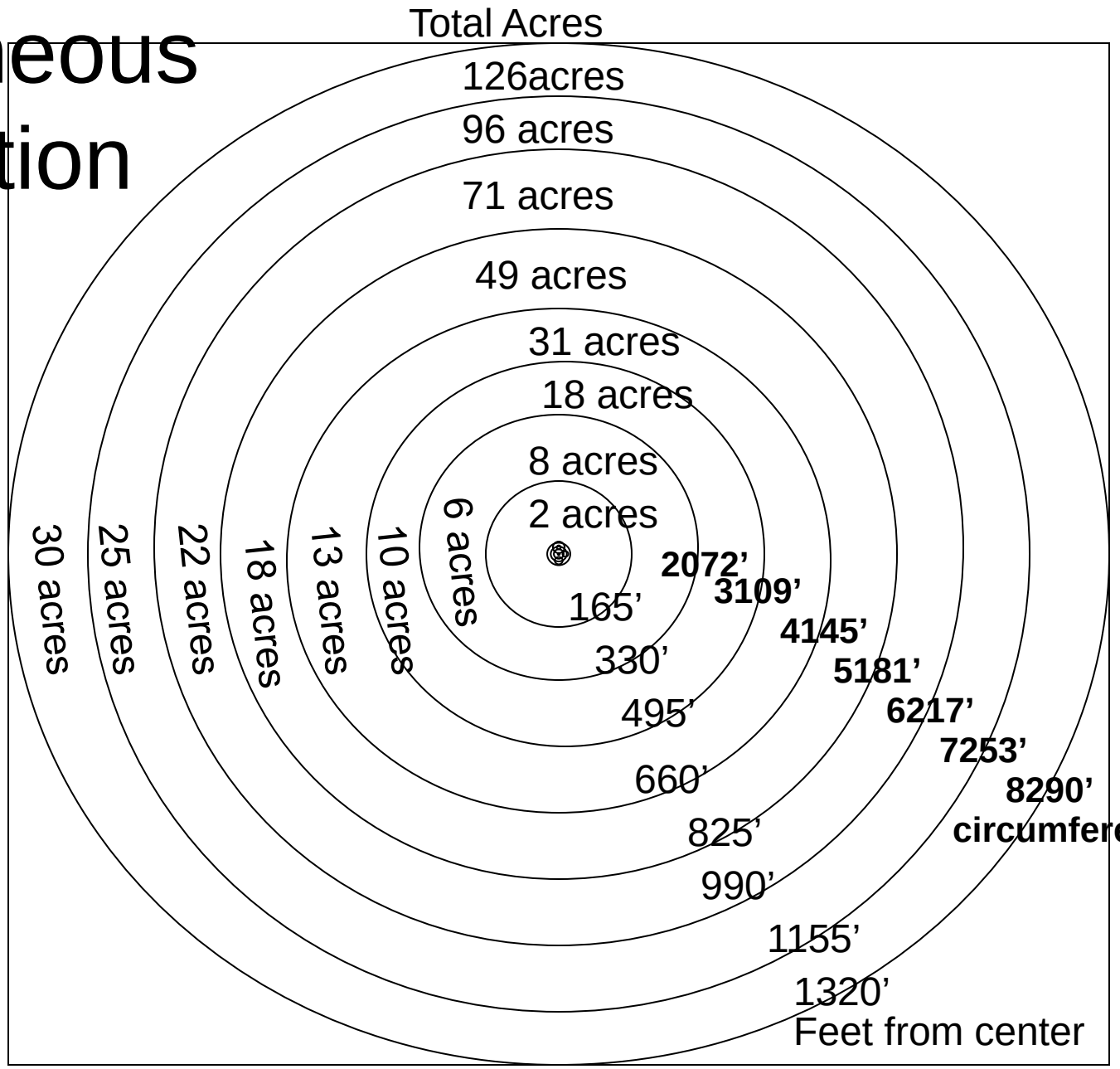
(comparing irrigation application rate to soil infiltration rate)

Sprinkler package or nozzle selection along with pressure dictates water application rate .

Factors that **increase** runoff :

- Small Wetted area or throw of sprinkler
- Low Pressure
- Larger applications volumes
- Soil compaction
- Heavy soils
- Slope
- Row hilling

Instantaneous application rate



3 days / circle @ 1”
3 days = 4320 min.

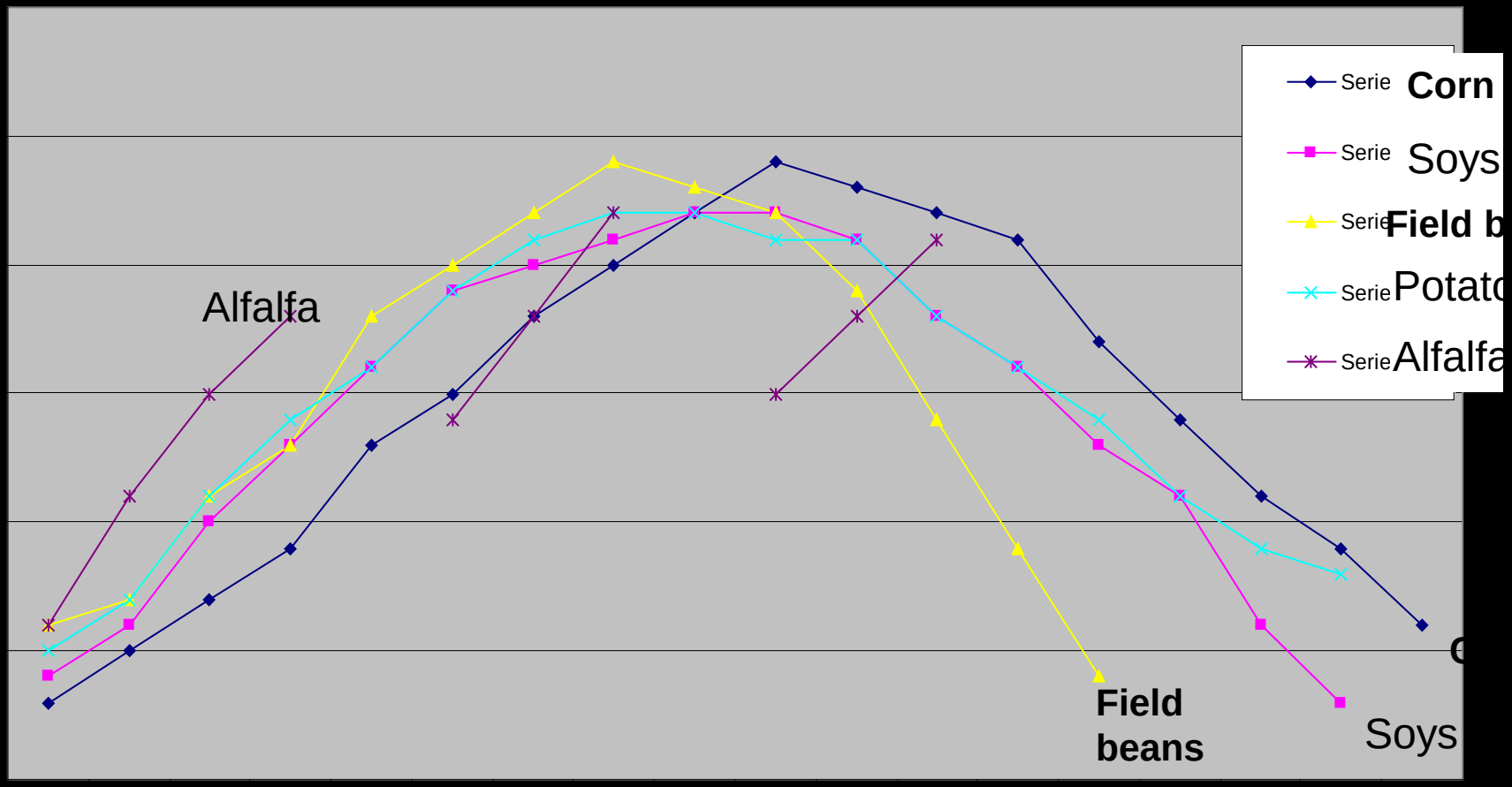
8290’ / 4320 min.=
= 1.92’/minute

20’ ft. wetted area=
= 1” / 10.4 Minutes

40’ ft. wetted area=
= 1” / 20.8 Minutes

Quality Factors

- Foreign material – clogs pumps, screen and nozzles- sand, algae, aquatic plants and fish/frogs
- Salt – salinity (western problem)
- Calcium – and other elements that deposit in pipes
- Disease agents – manure effluent, waste treatment facilities,
- warm surface water- major vegetable production limitations
- Aquatic weed treatment-lake algae milfoil treatment



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

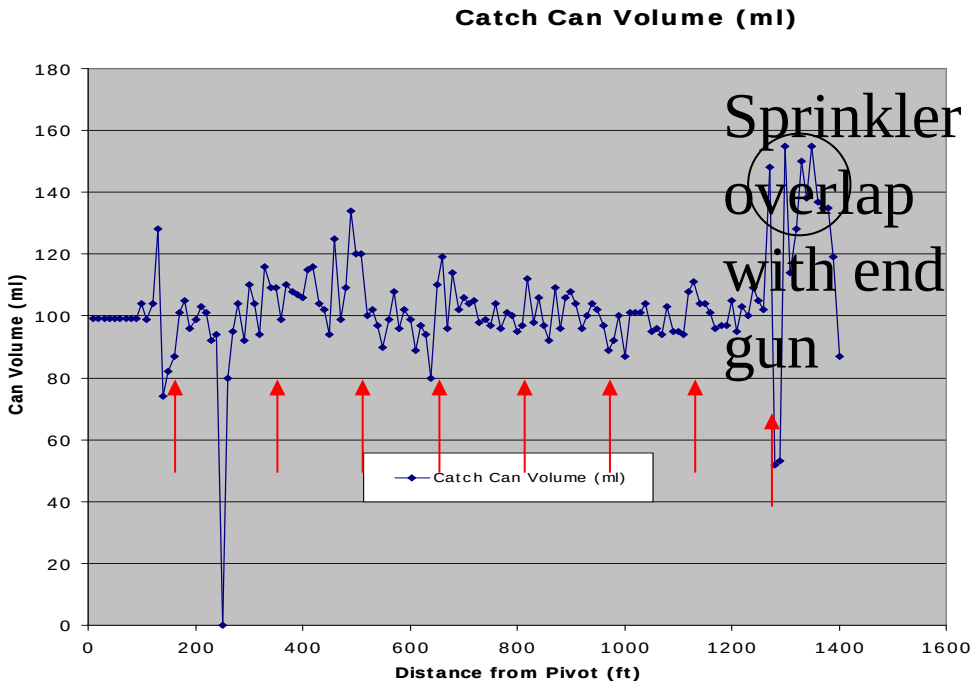
Three factor reducing effective water application

1. Irrigation Runoff

(comparing irrigation application rate to soil infiltration rate) 0 -30 % loss

2. Lack of system uniformity

• 5-35% loss in effectiveness



3. Evaporative loss to the air

•Minimal loss in our humid area

•0 – 6%

•Estimated 4-6% loss in Nebraska

Quantity Needed

- Maximum water use for most crops is .27 - .32 in./day
- 3 gal/minute/acre pump capacity = 1”/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

Can you Irrigate every hour you want ?

Irrigation Scheduling

- Method to determine the appropriate amount of water to be applied to a crop at the correct time to achieve healthy plants and conserve water

- Can measure soil moisture

Or

- estimate evapotranspiration (ET) using weather data

Potential ET measured by weighing lysimeter

Determining irrigation requirements

- The plant water requirement includes the water lost by evaporation into the atmosphere from the soil and soil surface

- and by transpiration, which is the amount of water used by the plant.

- The combination of these is **evapotranspiration (ET).**

FO-01322 Revised 2002

Irrigation Scheduling Checkbook Method

Table 2. Average water use for CORN in inches/day

Temperature F	Week after emergence																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
50-59	.01	.02	.03	.04	.05	.06	.08	.09	.09	.10	.10	.10	.09	.07	.06	.05	.04	.03
60-69	.02	.03	.04	.06	.08	.09	.11	.12	.13	.15	.14	.14	.13	.11	.09	.07	.06	.04
70-79	.03	.04	.05	.07	.10	.12	.15	.16	.17	.19	.19	.18	.17	.14	.11	.09	.07	.05
80-89	.03	.05	.07	.09	.13	.15	.18	.20	.22	.24	.23	.22	.21	.17	.14	.11	.09	.06
90-99	.04	.06	.08	.11	.15	.18	.21	.24	.26	.28	.27	.26	.25	.20	.17	.13	.11	.07
Corn growth stages		↑ 3 leaf			↑ 8 leaf			↑ 1st tassel	↑ silk		↑ blister kernel			↑ early dent	↑ dent			

Table 3. Average water use for SOYBEANS in inches/day

Temperature F	Week after emergence																
	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				↑ 3rd trifoliate				↑ 1st flower	↑ full flower			↑ upper pod filling			↑ 1st yellow pod		

FO-01322 Revised 2002

Irrigation Scheduling Checkbook Method

Table 6. Average water use for ALFALFA in inches/day

	Use this chart for the first 4 weeks after growth starts in the spring.					Use this chart for the first 3 weeks after 1st and 2nd cuttings.				Use this chart for the first 3 weeks after 3rd cutting.			Use this chart for the weeks not covered by earlier charts for the respective months.				
Temperature F	1	2	3	4		1	2	3		1	2	3	May	June	July	Aug	Sept
50-59	.04	.05	.06	.07		.06	.07	.09		.05	.06	.09	.07	.09	.09	.09	.07
60-69	.04	.07	.09	.11		.10	.12	.14		.09	.10	.13	.11	.14	.14	.13	.10
70-79	.05	.09	.12	.14		.12	.15	.18		.12	.14	.17	.14	.18	.18	.17	.13
80-89	.06	.11	.15	.18		.14	.18	.22		.15	.18	.21	.18	.22	.22	.21	.16
90-99	.08	.13	.18	.21		.18	.22	.27		.17	.21	.25	.21	.27	.27	.25	.19
Alfalfa growth stages																	

Table 7. Average water use for WHEAT in inches/day

	Week after emergence													
Temperature F	1	2	3	4	5	6	7	8	9	10	11	12	13	14
50-59	.02	.03	.05	.06	.08	.09	.10	.10	.09	.09	.07	.05	.03	.02
60-69	.03	.05	.07	.09	.12	.13	.15	.14	.13	.13	.10	.07	.05	.03
70-79	.04	.07	.10	.12	.17	.17	.19	.19	.18	.17	.13	.10	.07	.04
80-89	.05	.08	.12	.16	.20	.22	.24	.24	.22	.21	.16	.12	.08	.04
90-99	.06	.10	.15	.18	.24	.26	.29	.28	.26	.25	.19	.15	.10	.05
Wheat growth stages			↑ tillering		↑ jointing		↑ heading		↑ early milk		↑ early dough	↑ hard dough		

FO-01322 Revised 2002

Irrigation Scheduling Checkbook Method

Table 4. Average water use for FIELD BEANS in inches/day

Temperature F	Week after emergence 1	2	3	4	5	6	7	8	9	10	11	12	13	14
50-59	.02	.03	.05	.06	.07	.08	.09	.09	.09	.09	.08	.06	.04	.02
60-69	.04	.04	.07	.08	.11	.12	.13	.14	.14	.13	.12	.09	.06	.03
70-79	.05	.06	.09	.11	.14	.16	.17	.19	.19	.17	.15	.11	.07	.04
80-89	.06	.07	.11	.13	.18	.20	.22	.23	.23	.22	.19	.14	.09	.04
90-99	.07	.09	.13	.16	.21	.24	.25	.26	.26	.25	.23	.17	.11	.05
Field bean growth stages				↑ 2nd trifoliate		↑ 1st flower			↑ seed filling			↑ leaves yellowing		

Table 5. Average water use for POTATOES in inches/day

Temperature F	Week after emergence 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
50-59	.02	.03	.04	.06	.07	.08	.08	.09	.09	.09	.09	.07	.07	.06	.05	.04	.04
60-69	.03	.05	.06	.08	.10	.12	.12	.13	.13	.13	.13	.11	.10	.09	.07	.05	.05
70-79	.04	.06	.09	.11	.13	.16	.18	.18	.18	.17	.17	.14	.13	.11	.09	.07	.07
80-89	.05	.07	.11	.14	.16	.19	.21	.22	.22	.21	.21	.18	.16	.14	.11	.09	.08
90-99	.06	.09	.13	.16	.19	.23	.24	.26	.26	.25	.25	.21	.19	.17	.13	.11	.10
Potato growth stages			↑ 7 in.	↑ budding		↑ full cover											

Minnesota Data

Table 2. Average water use for CORN in inches/day

Temperature F	Week after emergence																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
50-59	.01	.02	.03	.04	.05	.06	.08	.09	.09	.10	.10	.10	.09	.07	.06	.05	.04	.03
60-69	.02	.03	.04	.06	.08	.09	.11	.12	.13	.15	.14	.14	.13	.11	.09	.07	.06	.04
70-79	.03	.04	.05	.07	.10	.12	.15	.16	.17	.19	.19	.18	.17	.14	.11	.09	.07	.05
80-89	.03	.05	.07	.09	.13	.15	.18	.20	.22	.24	.23	.22	.21	.17	.14	.11	.09	.06
90-99	.04	.06	.08	.11	.15	.18	.21	.24	.26	.28	.27	.26	.25	.20	.17	.13	.11	.07
Corn growth stages		↑ 3 leaf			↑ 8 leaf			↑ 1st tassel	↑ silk		↑ blister kernel			↑ early dent	↑ dent			

Michigan Data

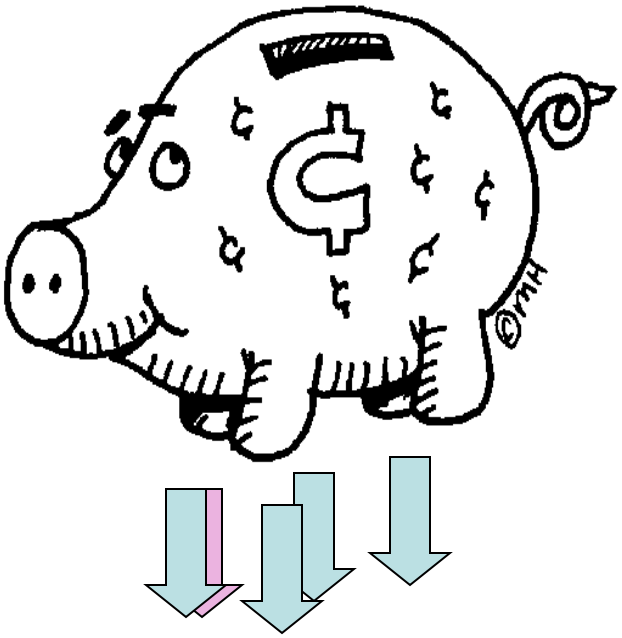
		Weeks from Emergence																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Max Temp	Eto	0.25	0.25	0.25	0.38	0.57	0.75	0.94	1.12	1.2	1.2	1.2	1.2	1.1	0.86	0.62	0.41	0.63
50 - 59	0.07	0.02	0.02	0.02	0.03	0.04	0.05	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.06	0.04	0.03	0.04
60 - 69	0.12	0.03	0.03	0.03	0.05	0.07	0.09	0.11	0.13	0.14	0.14	0.14	0.14	0.13	0.10	0.07	0.05	0.08
70 - 79	0.15	0.04	0.04	0.04	0.06	0.09	0.11	0.14	0.17	0.18	0.18	0.18	0.18	0.17	0.13	0.09	0.06	0.09
80 - 89	0.17	0.04	0.04	0.04	0.06	0.10	0.13	0.16	0.19	0.20	0.20	0.20	0.20	0.19	0.15	0.11	0.07	0.11
90 +	0.21	0.05	0.05	0.05	0.08	0.12	0.16	0.20	0.24	0.25	0.25	0.25	0.25	0.23	0.18	0.13	0.09	0.13

Think of your soil as a bank

Water holding capacity:
The soil (bank) can hold only a given volume of water before it allows 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.

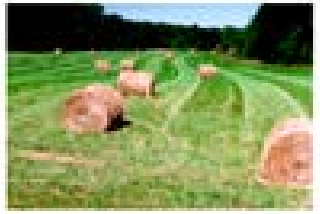


Rooting depth:
The plant can only get water to the depth of it's roots.

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.

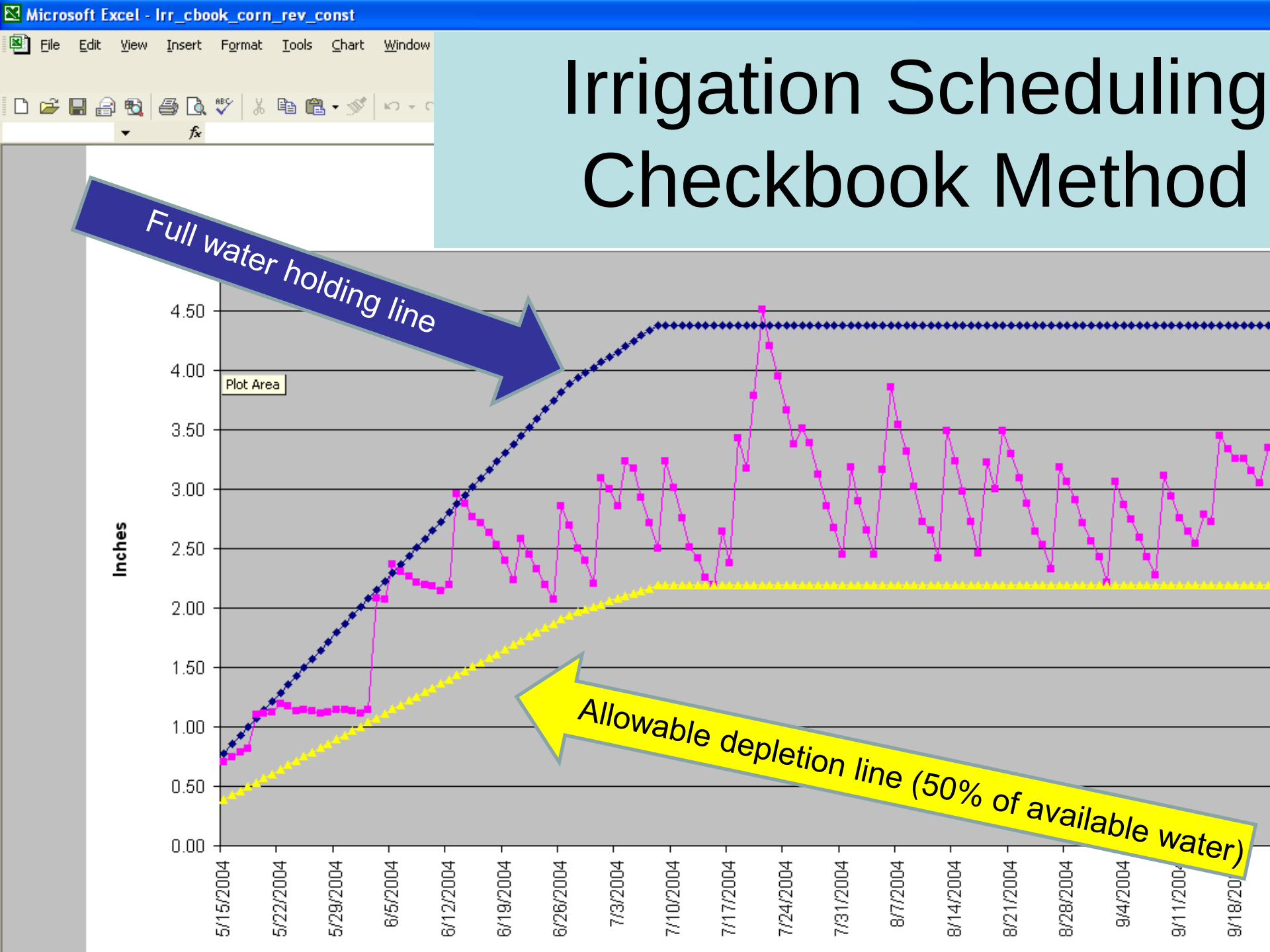
Calculating Water Holding Capacity



Data from “Soil survey of Fulton County Indiana”

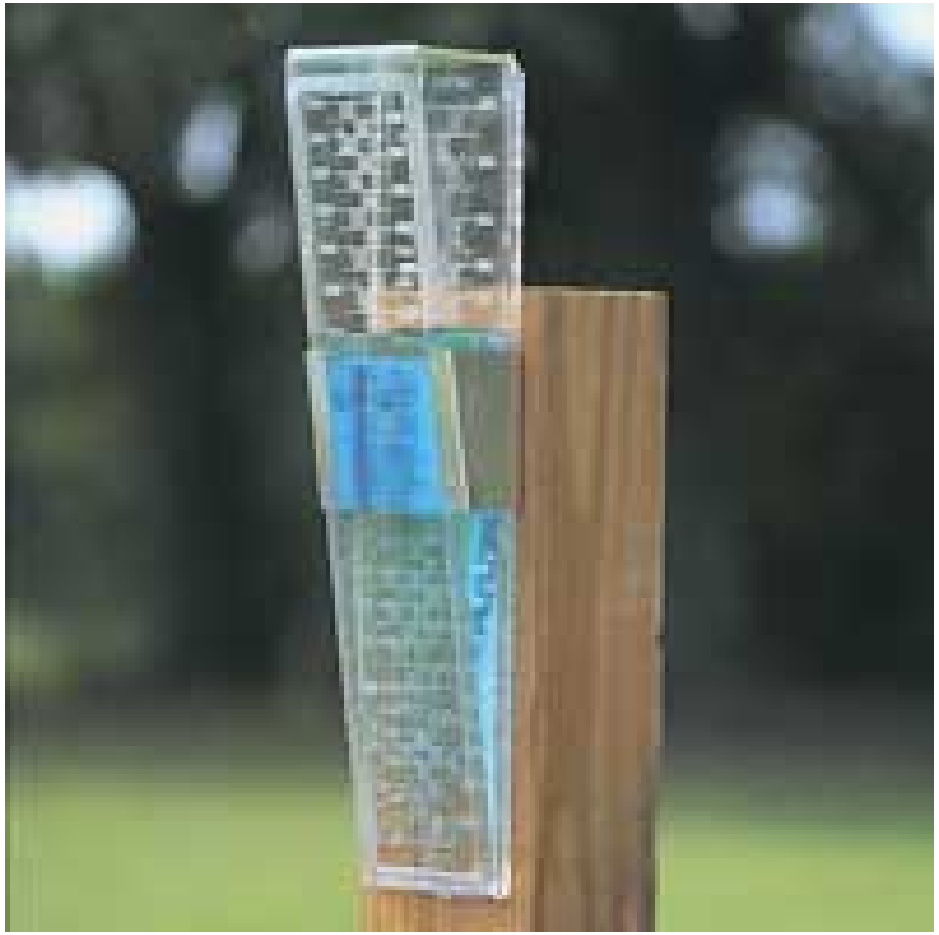
Soil Name	Depth Inches	Available water holding capacity	Average Available water holding capacity	Ave. Available water holding capacity (24 in.)	Ave. Available water holding capacity (36 in.)
Gilford	0 – 10 10 –24 24 - 60	0.16 – 0.18 0.12 – 0.14 0.05 – 0.08	0.17 0.13 0.07	10” x 0.17 = 1.70 14” x 0.13 = 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

Irrigation Scheduling Checkbook Method



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

Draft SOIL WATER BALANCE SHEET

MICHIGAN STATE UNIVERSITY Extension

Field:_____ Crop:_____ Emergence date:_____

Pumping capacity:_____gpm per acre = _____net application inches per day

Available Water Capacity:		inches	Root Zone	Inches		
Growth Stage:	Vegetative		Critical Growth		Maturing	
Allowable Soil Water Deficit:	_____	%	_____	%	_____	%
	_____	inches	_____	inches	_____	inches

Starting Soil Water Deficit: **0.1** SWD - CWU + Rainfall + Net Irr = New SWD

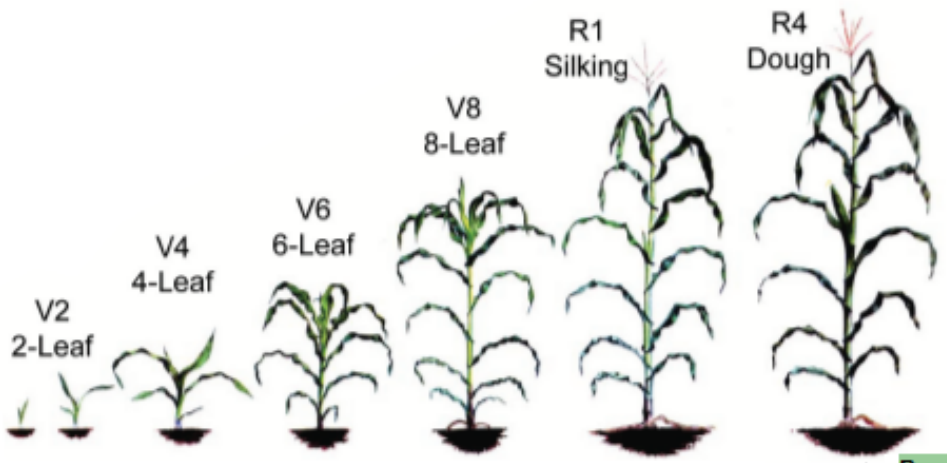
Date	Kc	Potential ET (PET)	Crop Water Use (CWU)= PET*Kc	Rainfall	Net Irrigation (Net Irr)	Soil water deficit (SWD)	Notes
6/25/2013		0.16	0			1.00	
6/26/2013		0.16	0			1.16	
6/27/2013		0.16	0			1.32	
6/28/2013		0.16	0			1.48	
6/29/2013		0.19	0	0.60		1.07	
6/30/2013		0.19	0			1.26	
7/1/2013		0.19	0			1.45	
7/2/2013		0.19	0			1.64	
7/3/2013		0.2	0		1.00	0.84	
7/4/2013		0.2	0			1.04	
7/5/2013		0.2	0			1.24	
7/6/2013		0.2	0			1.44	
7/7/2013		0.2	0			1.64	
7/8/2013		0.2	0			1.84	
7/9/2013		0.2	0		1.00	1.04	

		Weeks from Emergence																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Max Temp	Eto	0.25	0.25	0.25	0.38	0.57	0.75	0.94	1.12	1.2	1.2	1.2	1.2	1.1	0.86	0.62	0.41	0.63
50 - 59	0.07	0.02	0.02	0.02	0.03	0.04	0.05	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.06	0.04	0.03	0.04
60 - 69	0.12	0.03	0.03	0.03	0.05	0.07	0.09	0.11	0.13	0.14	0.14	0.14	0.14	0.13	0.10	0.07	0.05	0.08
70 - 79	0.15	0.04	0.04	0.04	0.06	0.09	0.11	0.14	0.17	0.18	0.18	0.18	0.18	0.17	0.13	0.09	0.06	0.09
80 - 89	0.17	0.04	0.04	0.04	0.06	0.10	0.13	0.16	0.19	0.20	0.20	0.20	0.20	0.19	0.15	0.11	0.07	0.11
90 +	0.21	0.05	0.05	0.05	0.08	0.12	0.16	0.20	0.24	0.25	0.25	0.25	0.25	0.23	0.18	0.13	0.09	0.13

Crop Water Use by Growth Stage – Corn

Information on this page from the University of Nebraska Extension

Crop Stage	Kc
V2	0.1
V4	0.18
V6	0.35
V8	0.51
V10	0.69
V12	0.88
V14	1.01
V16-Beginning Dent	1.1
Silking	1.1
Blister	1.1
Dough	1.1
Begin Dent.	1.1
Full Dent.	0.96
Black Layer	0.6
Full Maturity	0.1



Corn Growth Stages

2 leaf (V2): Two collars visible.
4 leaf (V4): Four collars visible.
6 leaf (V6): Growing point above ground, tassel forms.*
8 leaf (V8): Ear formation begins.
Silking (R1): Silks are visible outside husk.
Dough (R4): Endosperm milk turns thick and pasty.

*** Paint/Mark V6 leaf to make counting easier!**

Pumping capacity (gpm/acre)	Average Application Efficiency		
	65%	75%	85%
	***** net inches per day *****		
4	0.14	0.16	0.18
5	0.17	0.20	0.23
6	0.21	0.24	0.27
7	0.24	0.28	0.32
8	0.28	0.32	0.36
9	0.31	0.36	0.41

Draft SOIL WATER BALANCE SHEET

MICHIGAN STATE UNIVERSITY Extension

Field:_____ Crop:_____ Emergence date:_____

Pumping capacity:_____gpm per acre = _____net application inches per day

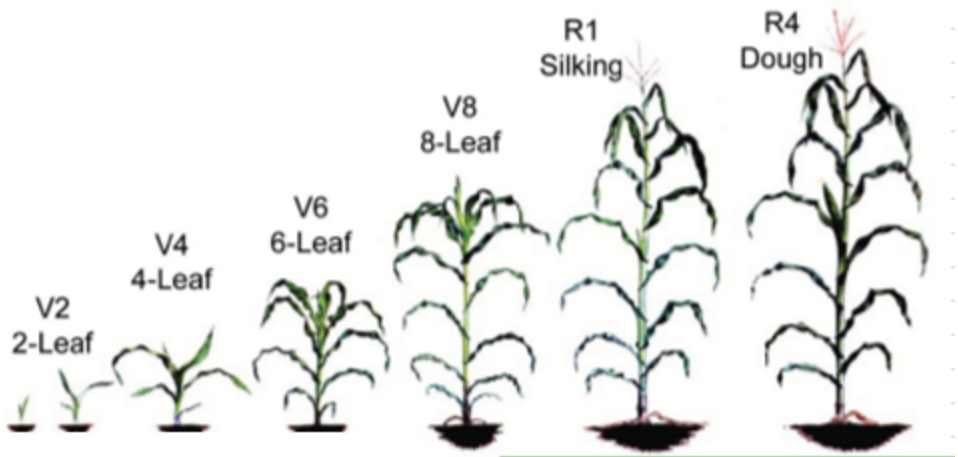
Available Water Capacity:		inches		Root Zone		Inches		
Growth Stage:		Vegetative			Critical Growth		Maturing	
Allowable Soil Water Deficit:		% inches			% inches		% inches	
Starting Soil Water Deficit:	0.1	SWD - CWU + Rainfall + Net Irr = New SWD						

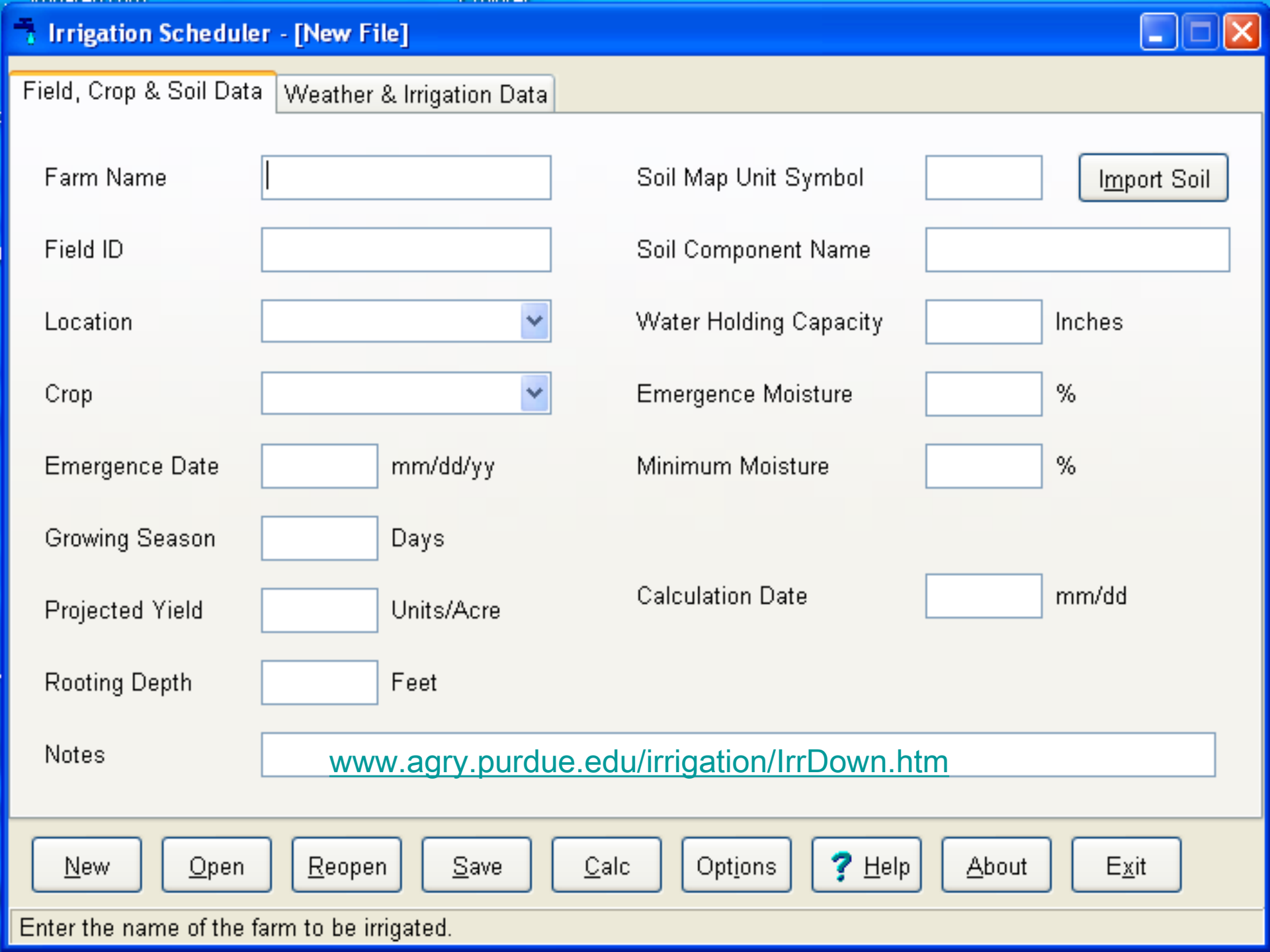
Date	Crop Stage	Kc	Potential ET (PET)	Crop Water Use (CWU)= PET*Kc	Rainfall	Net Irrigation (Net Irr)	Soil water deficit (SWD)	Notes
6/25/2013	V-12	1	0.2	0.2			0.30	
6/26/2013	V-12	1	0.21	0.21			0.51	
6/27/2013	V-14	1.1	0.21	0.231			0.74	
6/28/2013	V-14	1.1	0.2	0.22			0.96	
6/29/2013	V-14	1.1	0.2	0.22	0.60		0.58	
6/30/2013	V-14	1.1	0.2	0.22			0.80	
7/1/2013	V-16-VT	1.20	0.2	0.24			1.04	
7/2/2013	V-16-VT	1.20	0.2	0.24			1.28	
7/3/2013	V-16-VT	1.20	0.2	0.24		1.00	0.52	
7/4/2013	V-16-VT	1.20	0.2	0.24			0.76	
7/5/2013	V-16-VT	1.20	0.2	0.24			1.00	
7/6/2013	S	1.20	0.2	0.24			1.24	
7/7/2013	S	1.20	0.2	0.24			1.48	
7/8/2013	S	1.20	0.2	0.24			1.72	
7/9/2013	S	1.20	0.2	0.24		1.00	0.96	

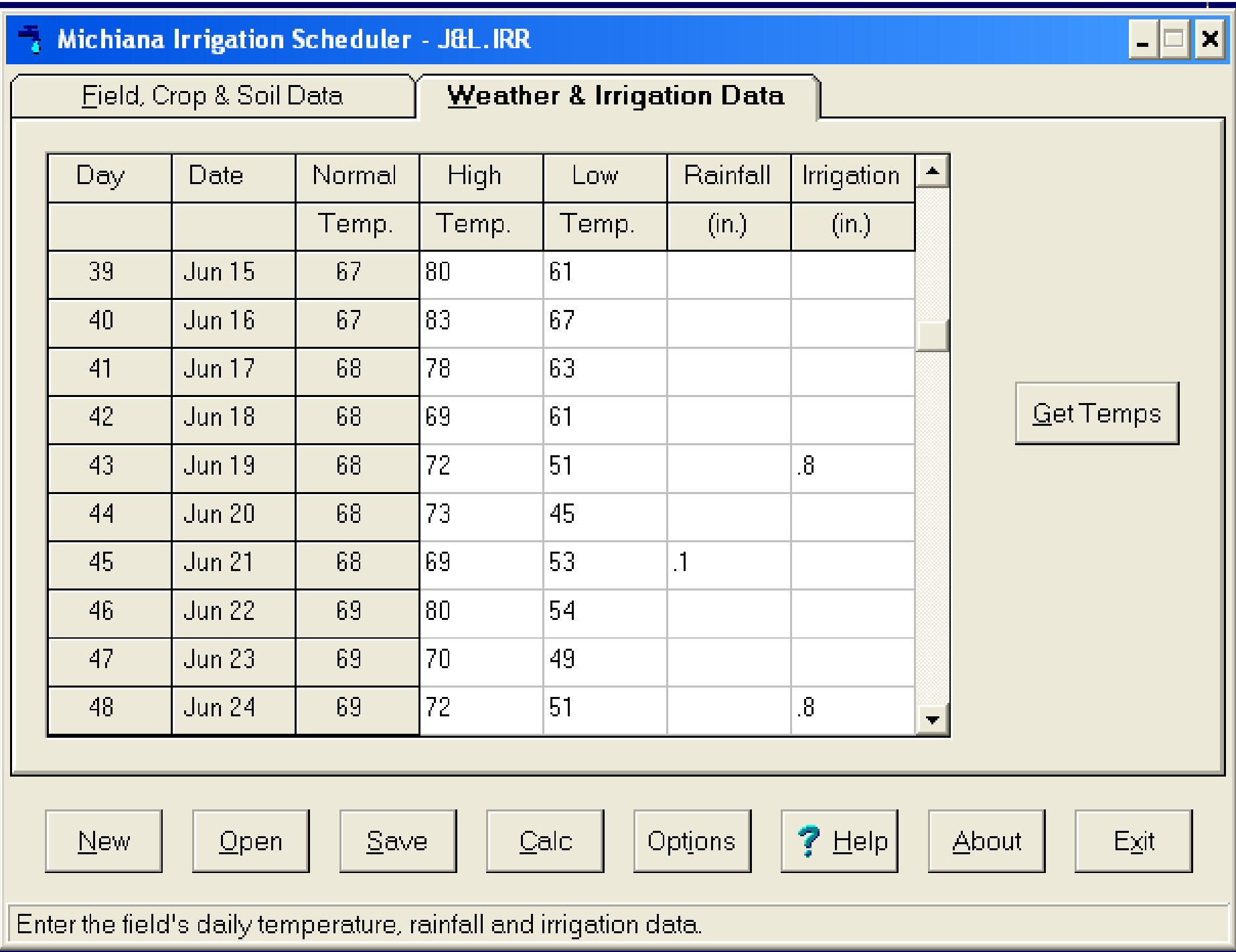
Crop Water Use by Growth Stage – Corn

Crop Stag	K_c	Rooting D
V2	0.11	6
V4	0.20	10
V6	0.39	15
V8	0.56	20
V10	0.76	23
V12	1.0	26
V14	1.1	28
V16-VT	1.2	30
Silking	1.2	30
Blister	1.2	30
Dough	1.2	30
Begin Den	1.2	30
Full Dent	1.0	30
Black Laye	0.66	30
Full Maturi	0.11	30

Informationon this page from the university of Nebraska




Irrigation Scheduler - [New File]
Field, Crop & Soil Data
Weather & Irrigation Data
Farm Name
Field ID
Location
Crop
Emergence Date
mm/dd/yy
Growing Season
Days
Projected Yield
Units/Acre
Rooting Depth
Feet
Notes
Soil Map Unit Symbol
Import Soil
Soil Component Name
Water Holding Capacity
Inches
Emergence Moisture
%
Minimum Moisture
%
Calculation Date
mm/dd
www.agry.purdue.edu/irrigation/IrrDown.htm
New
Open
Reopen
Save
Calc
Options
Help
About
Exit
Enter the name of the farm to be irrigated.


Michiana Irrigation Scheduler - J&L.IRR
Field, Crop & Soil Data
Weather & Irrigation Data
Day
Date
Normal Temp.
High Temp.
Low Temp.
Rainfall (in.)
Irrigation (in.)
39 Jun 15 67 80 61
40 Jun 16 67 83 67
41 Jun 17 68 78 63
42 Jun 18 68 69 61
43 Jun 19 68 72 51 .8
44 Jun 20 68 73 45
45 Jun 21 68 69 53 .1
46 Jun 22 69 80 54
47 Jun 23 69 70 49
48 Jun 24 69 72 51 .8
Get Temps
New
Open
Save
Calc
Options
Help
About
Exit
Enter the field's daily temperature, rainfall and irrigation data.

Preview Irrigation Schedule - J&L.IRR

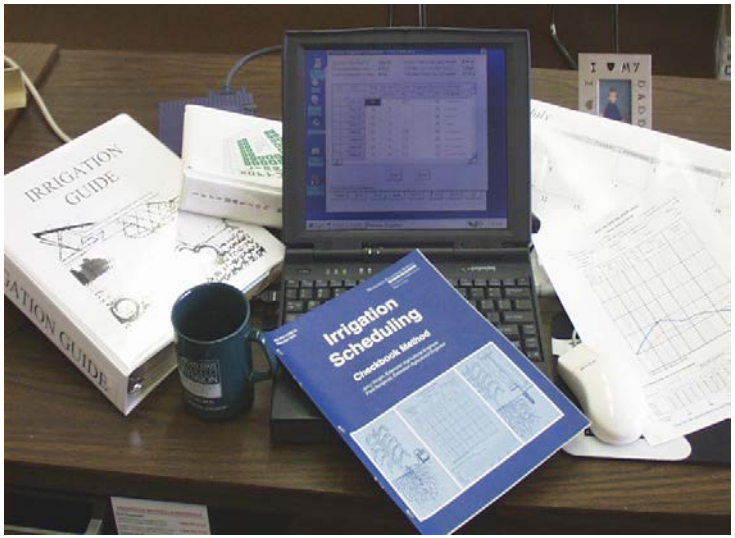
Schedule Calculated For	**Sep 20**	Amount That Can Be Safely Added	**0.01 in.**
Evapotranspiration Rate	**0.00 in.**	If No Rain, You Can Add 1 Inch In	**354 days**
Soil Profile Moisture Content	**100 %**	Estimated Water Loss For Season	**17.39 in.**

Day	Date	Temp. (°F)	Dev. from Normal	Rainfall (in.)	Irrigation (in.)	Soil Mois. (%)	Soil Mois. (relative)
1	May 08	66	+14			100	+++++++
2	May 09	70	+17	0.70		105	++++++++
3	May 10	70	+17	0.10		113	++++++++++
4	May 11	73	+19	0.10		105	++++++++
5	May 12	68	+13			100	+++++++
6	May 13	70	+15	1.00		105	++++++++
7	May 14	54	-2	0.70		103	++++++++
8	May 15	57	+1			100	+++++++

Print Close

Browse the daily calculations.

Irrigation Scheduling Checkbook Challenges



Errors will accumulate over time -Weekly ground truthing needed

Rainfall variability is more than often considered

Only "effective" rainfall and irrigation should be considered - Only water entering root zone uniformly is "effective"

Corn crop mature in program by calendar, not heat

?? Soil Moisture ??

Methods to Estimate Soil Moisture

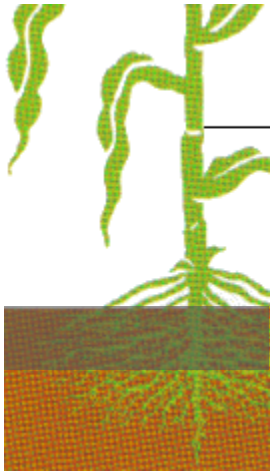
- Feel and Appearance
- Electrical resistance – electrodes on blocks in soil
- Tensiometers – measures soil moisture tension

Fine sand and loamy fine sand soils

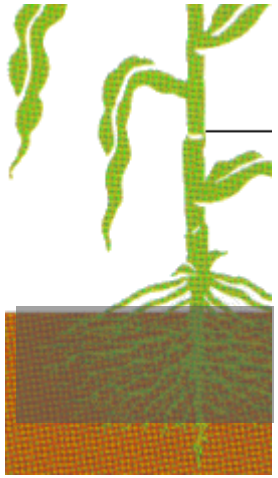
Appearance of fine sand and loamy fine sand soils at various soil moisture conditions.
Available water capacity ..... 0.6–1.2 inches/foot

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.	

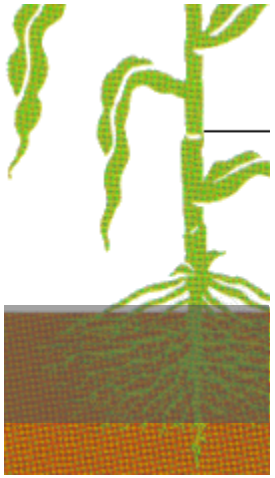
Monitoring soil wetted front -12 hrs. after irrigation



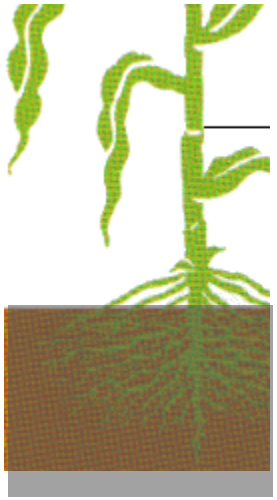
½” into dry soil



½” into moist soil



1” into dry soil



1” into moist soil

If your 1” application did not go down as far as it did last week ???

- your irrigation is not keeping up.

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

Assure the best plant stand possible

- Irrigate, if necessary, to make sure to get maximum germination and uniform emergence.
- ½ inch in most irrigated soil within five days of planting.
- Maintain a moist surface,0.10” to 0.20” applications, till spike.
- Are you ready to irrigate the day you plant?

Using irrigation to get the most from pesticides and nutrients

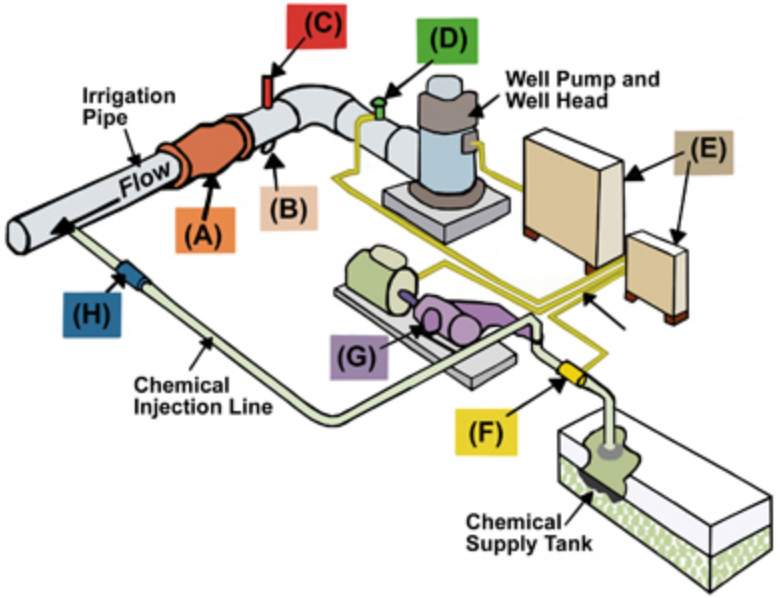
Timely application of irrigation water:

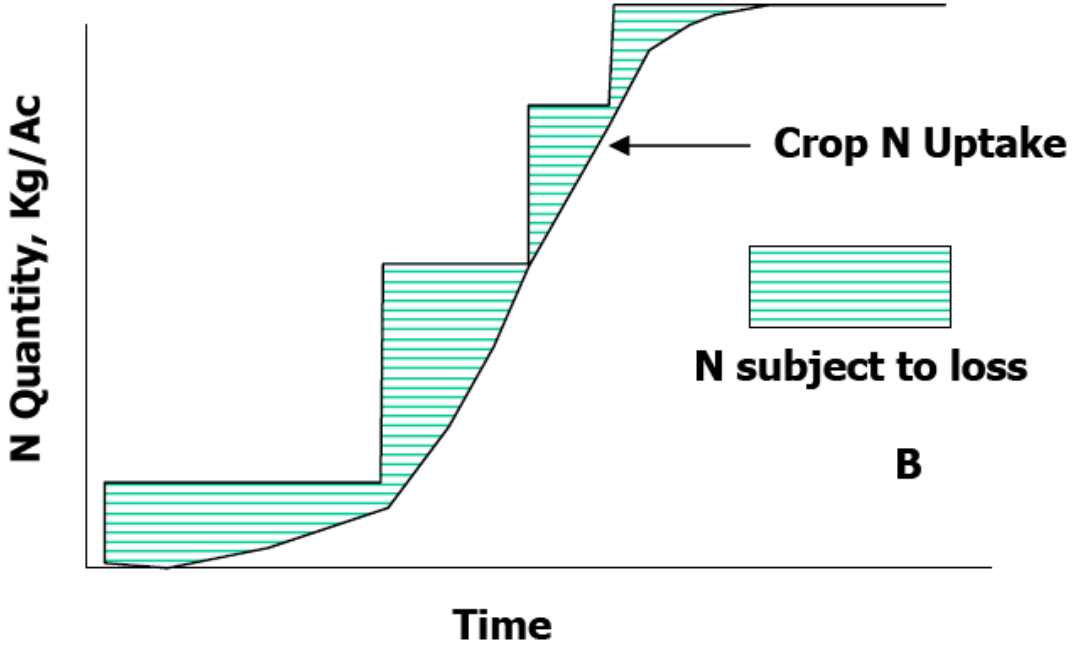
- Improves incorporation of herbicides.
- Improves activation of herbicides.
- Improves activation/reactivation of insecticides.

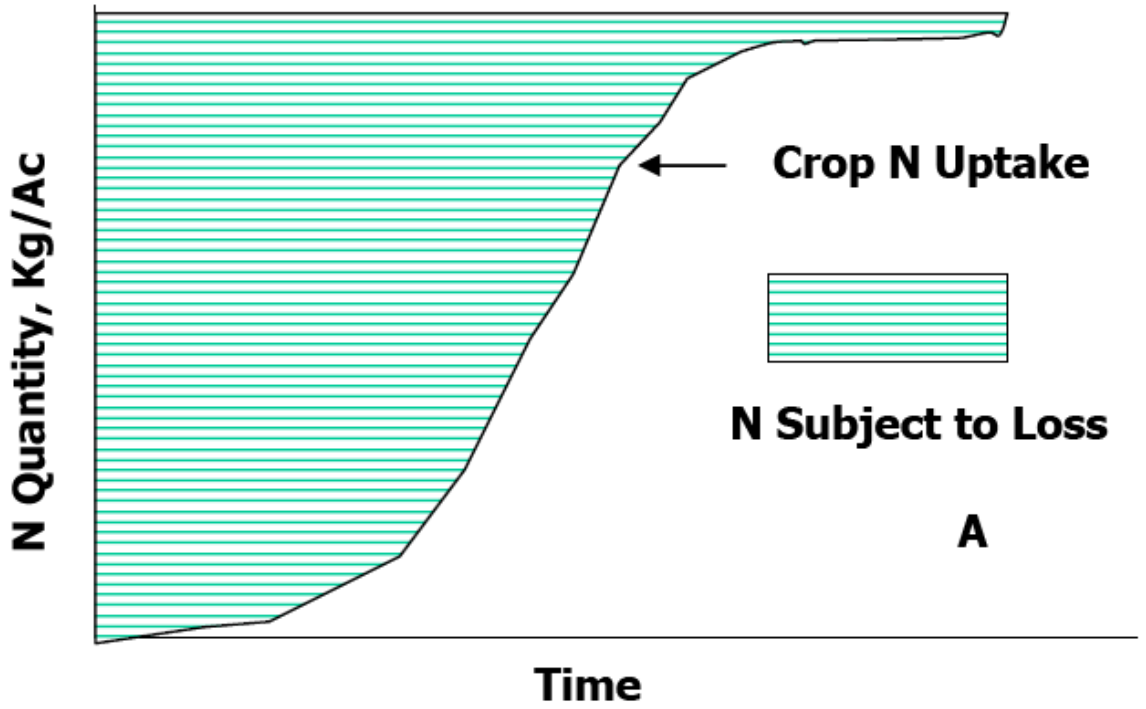
- Reduces nitrogen volatilization.
- Maximizes yield to utilize the resources.

Chemigation – Application of pesticide via irrigation water.

Fertigation – Application of fertilizer via irrigation water.







The quantity of N taken up by the crop or subject to loss from a single N application (A) or split N applications (B) (Adapted from Doerge et al., 1991).

Example N plan :
200 bu/acre irrigated commercial corn

Expected yield goal 200 bu/acre resulting in 220 lb. N recommendation

35 lbs. in starter at planting
135 lbs. as sidedress
50 lbs fertigation, 2 week prior to tassel

50 lbs. in starter at planting
70 lbs. as sidedress
100 lbs fertigation, 2 week prior to tassel

50 lbs. in starter at planting
70 lbs. sidedress or fertigation, knee high
50 lbs. fertigation, waste high
50 lbs. fertigation, 2 week prior to tassel

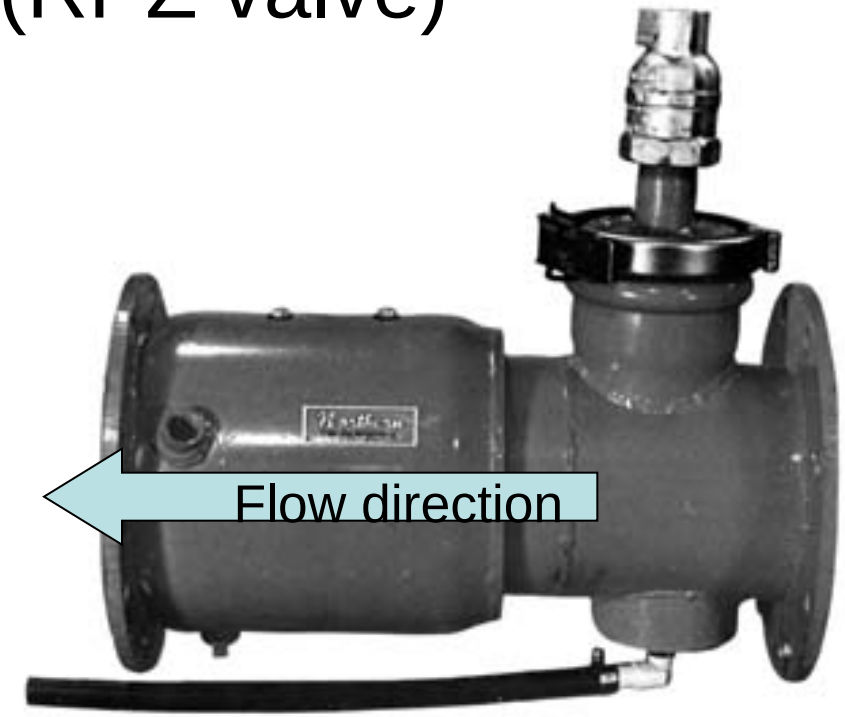
50 lbs. in starter at planting
75 lbs. sidedress or fertigation, knee high
75 lbs. fertigation, 2 week prior to tassel
20 lbs. fertigation, at tassel

Chemigation Valve Requirements

Indiana and Michigan have specific chemigation valve requirements for public water supply connections but not for private water supplies. (RPZ valve)

Both Indiana and Michigan require adequate protection of water supply in law or well code.

(Chemigation Valve)



Are appropriate backflow prevention devices in place and properly maintained if fertigation or chemigation is used?

Backflow prevention safety devices are used and properly maintained if fertigation or chemigation are used.