Crop Production Clinics

Pivot Management – In Drought Years

Chuck Burr, Extension Educator
Aaron Nygren, Extension Educator
Derrel Martin, Extension Irrigation Specialist

Crop Production Clinics

slido

On your smart phone or web browser go to: slido.com
Code # CPCPivot

ⓘ Start presenting to display the poll results on this slide.

slido

Myth Busters. I don't have enough capacity to keep up in extreme conditions!

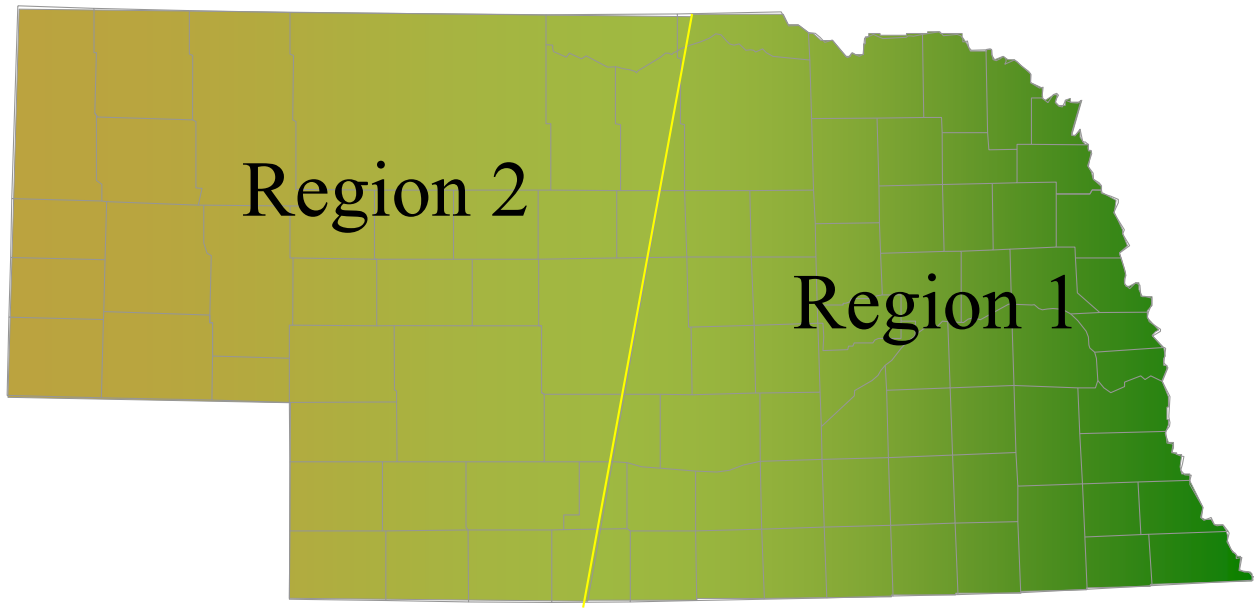
Start presenting to display the poll results on this slide.

Crop Production Clinics

Determine how much flow is needed for system

NebGuide 1851 – Minimum Center Pivot Design Capacities in Nebraska

Minimum
Net System Capacity Regions



Nebraska Net System Capacity Recommendations

Net Capacity (to fully meet needs 9 out of 10 years)

Soil Texture	Available Water (in/ft)	Region 1 (gpm/ac)	Region 2 (gpm/ac)
Silt Loam	2.5	3.9	4.6
Sandy Clay Loam	2.0	4.1	4.9
Silty Clay Loam	2.0	4.2	5.1
Silty Clay	1.6	4.4	5.1
Sandy Loam	1.4	4.5	5.2
Loamy Sand	1.1	4.8	5.4
Fine Sand	1.0	5.0	5.9
Peak ET		5.7	6.6

Pump Capacity Needed

- East
  - Peak - 5.7 gpm/ac* 130 ac/85% = 871 gpm
  - Sandy Loam – 4.5 gpm/ac * 130 ac/85% = 688 gpm

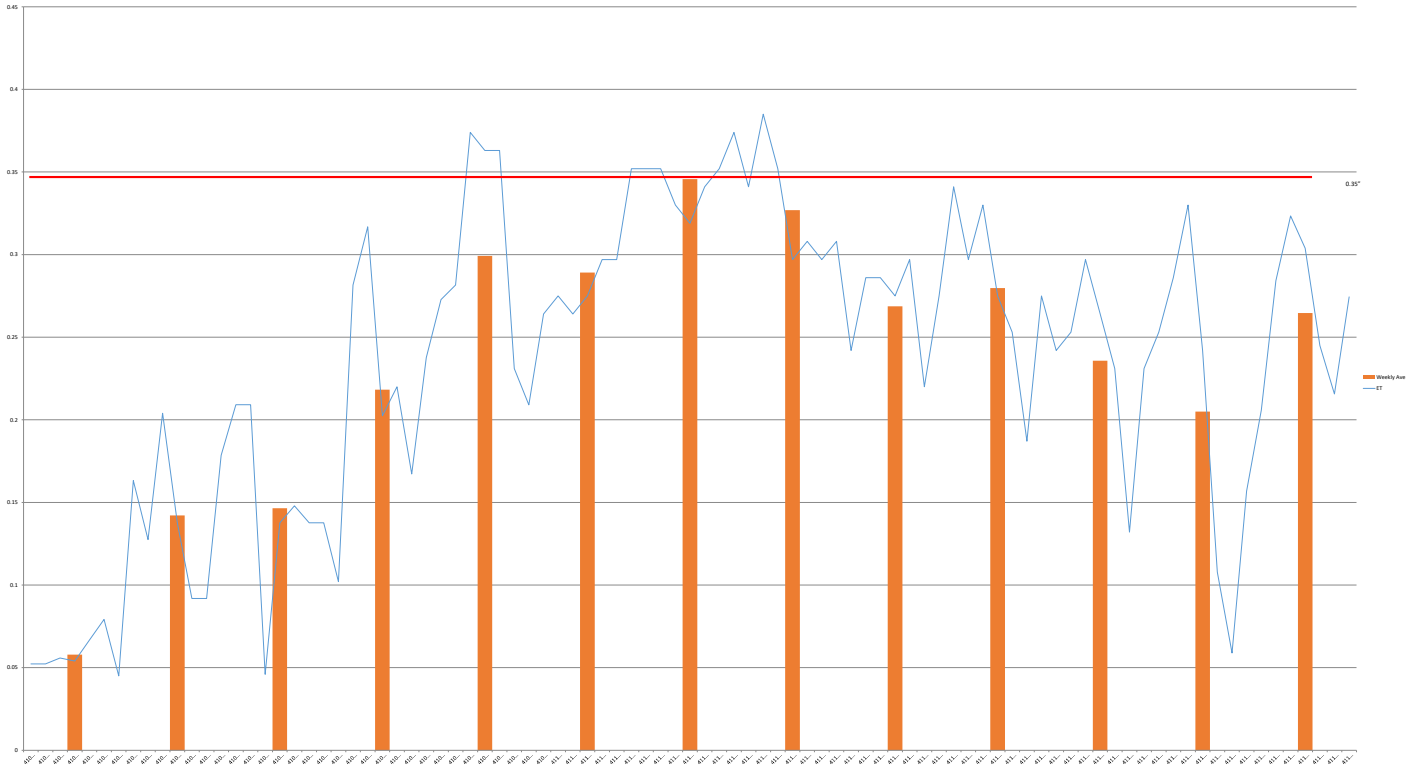
- West
  - Peak - 6.6 gpm/ac * 130 ac/85% = 1,010 gpm
  - Sandy Loam – 5.2 gpm/ac * 130 ac/85% = 795 gpm

Know how much water you are applying

System Capacity, gpm/acre	System Flow Rate for Land Acres of: 120	130	160	240	Depth Applied per Day, inches/day	Depth Applied per Week, inches/week	Time to Apply one-inch, days
3.0	360	390	480	720	0.16	1.1	6.3
3.5	420	455	560	840	0.19	1.3	5.4
4.0	480	520	640	960	0.21	1.5	4.7
4.5	540	585	720	1080	0.24	1.7	4.2
5.0	600	650	800	1200	0.27	1.9	3.8
5.5	660	715	880	1320	0.29	2.0	3.4
6.0	720	780	960	1440	0.32	2.2	3.1
6.5	780	845	1040	1560	0.34	2.4	2.9
7.0	840	910	1120	1680	0.37	2.6	2.7
7.5	900	975	1200	1800	0.40	2.8	2.5
8.0	960	1040	1280	1920	0.42	3.0	2.4
8.5	1020	1105	1360	2040	0.45	3.2	2.2

Crop Production Clinics

Daily Average Et Data
Holdrege 2012



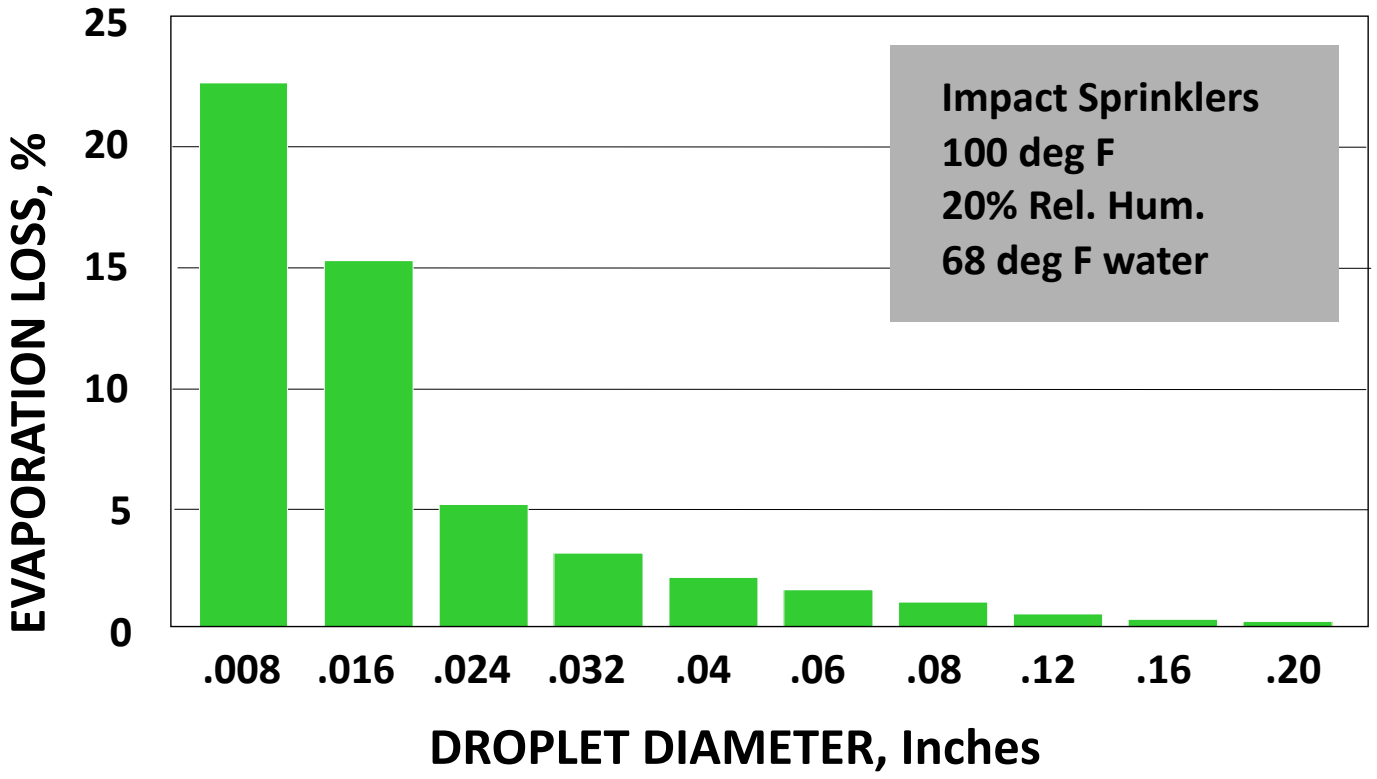
slido

Myth Busters: I need to just irrigate at night to reduce evaporation!

Start presenting to display the poll results on this slide.

Evaporation and Drift Losses are Usually Overestimated

Small Droplets Evaporate the Most



slido

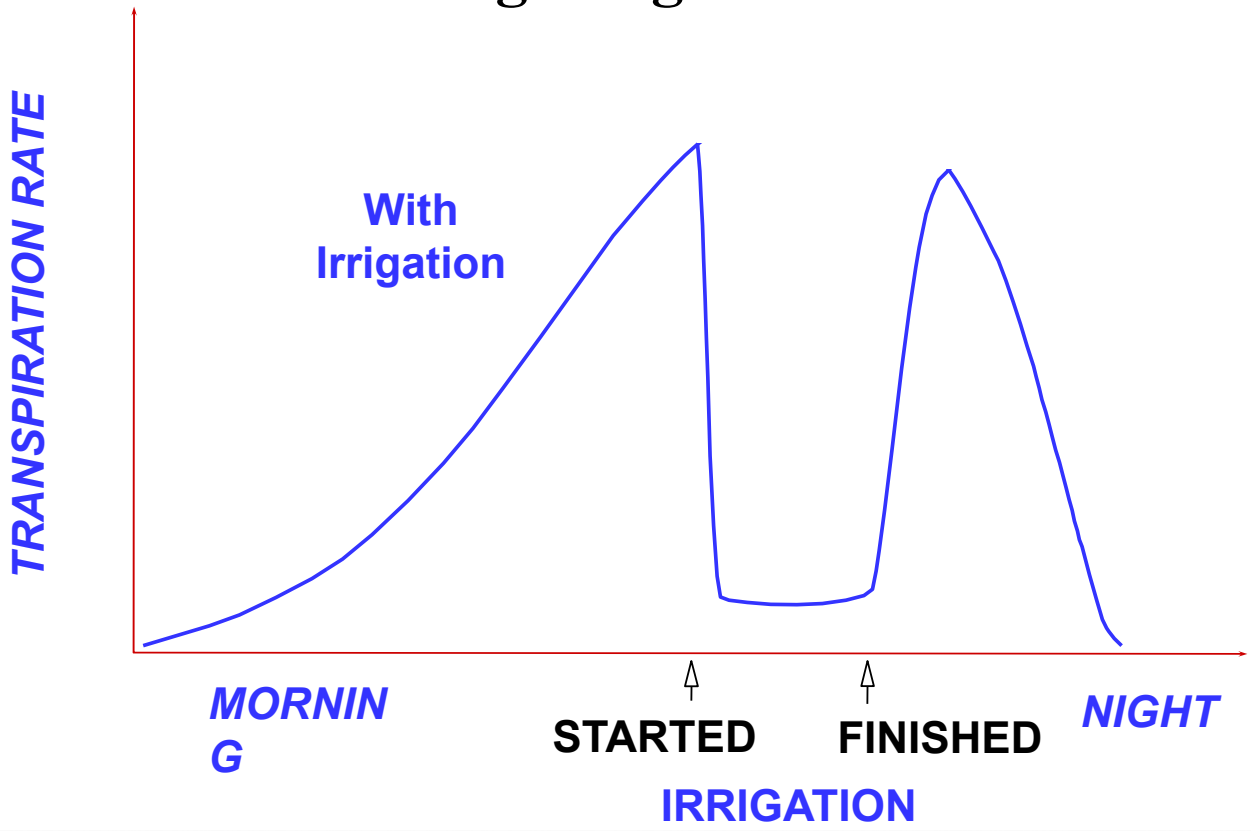
Myth Busters: I need to irrigate small amounts often to keep the corn cool!

Start presenting to display the poll results on this slide.

Frequent Wetting

- During each irrigation roughly 0.10 in evaporates from water that wetted the leaves or gets hung up in the canopy
- Irrigate Once a week - Evaporation = 0.10 in
- Irrigate Twice a week - Evaporation = 0.20 in
- Irrigate 4 times a week - Evaporation = 0.40 in
- Evaporation leads to cooling the canopy – but not necessary
- Wetting canopy actually reduces ET
- Net effect is less water actually reaching the soil profile where it can be used by the crop

Transpiration Decreases During Irrigation



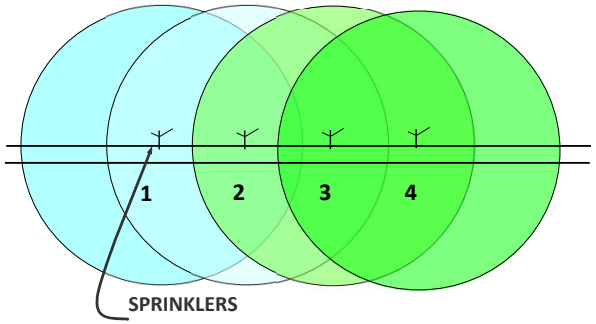
slido

Myth Busters: Don't irrigate in high wind conditions to reduce drift!

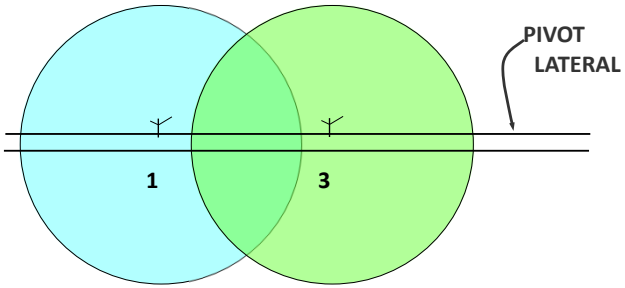
Start presenting to display the poll results on this slide.

Need Pattern Overlap To Be Uniform

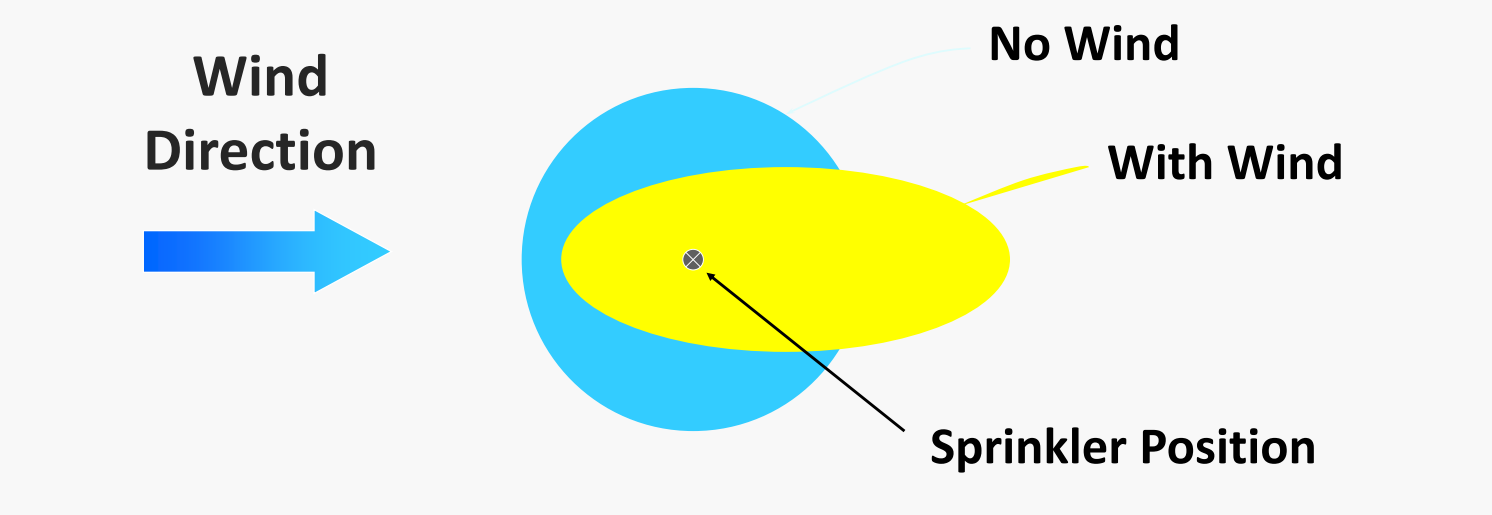
ADEQUATE SPRINKLER OVERLAP



SPACING TOO WIDE



Effect of Wind on Water Application Pattern



1. Shifts and elongates pattern parallel to wind
2. Narrows the pattern perpendicular to the wind

Reduce Wind Effect

- Stagger starting time of pivot
  - So same spot in field isn't always irrigated at 3:00 pm

slido

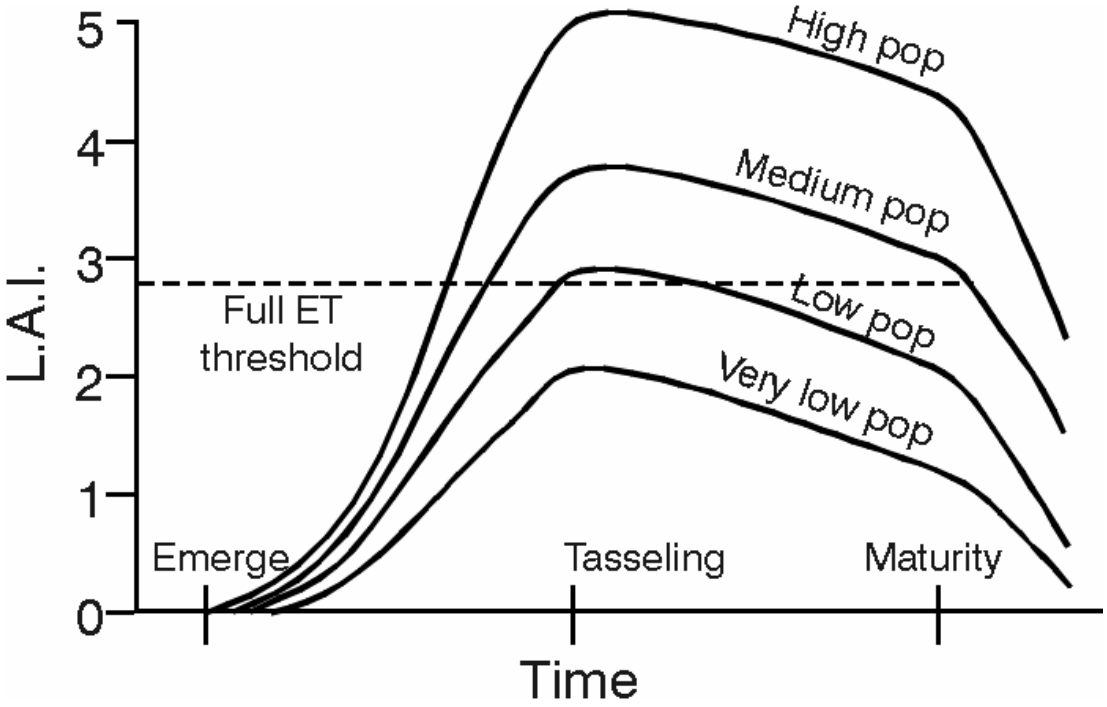
Myth Busters: I need to reduce my plant population to reduce ET!

Start presenting to display the poll results on this slide.

ET Function of LAI

- Leaf Area Index
  - ratio of leaf surface area (one side) to land surface area
- Once LAI reaches 2.7, ET is only a function of Atmospheric Conditions
- 2.7 is reached when the crop is five to six feet tall

Effect of Plant Population on LAI



Effect of Plant Population on LAI

- Small changes in plant population don't change LAI during the peak water use periods
- Small changes in LAI at beginning and end of season but water use is lower during these periods
- Need to drop below 14,000 to significantly reduce ET
- Substantial reduction in Et below 8,000-10,000
- Could grow shorter season variety…

Take home message

- Worth your time to calculate your gpm/ac
- Knowing your capacity dictates how aggressive you can be scheduling
- Wind drift and evaporation are usually overrated
- Frequent small applications are NOT recommended
- Reducing seeding rates NOT recommended unless very low capacity

- Chuck.burr@unl.edu