

Subsurface Drip Irrigation

Taylor Zeltwanger



Taylor Zeltwanger



MN,SD,ND,WI

Sales
Service
Support
Agronomy





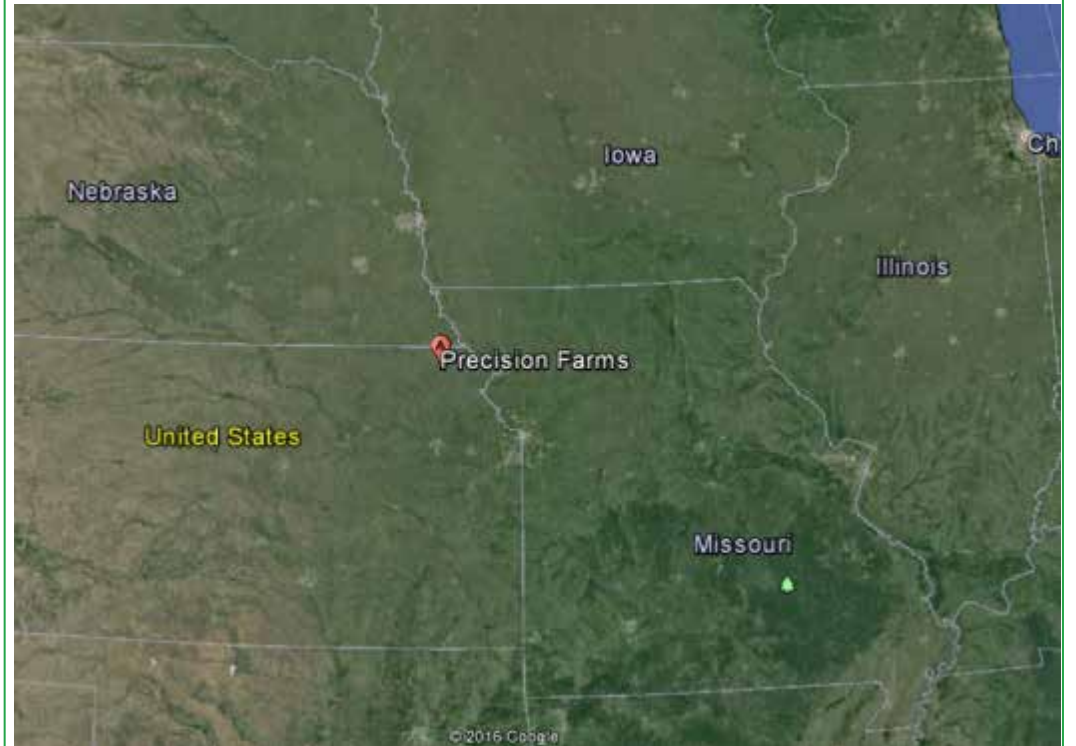
F a m i l y H i s t o r y

- 1983 moved off dairy to crop/livestock farm
- 1993 greenhouses for hydroponic tomatoes
- 1997 first center pivot in our region
- 2012 first subsurface drip irrigation (SDI) system in our region
- 2018 Joined NutraDrip
- 2019 first SDI system with manure

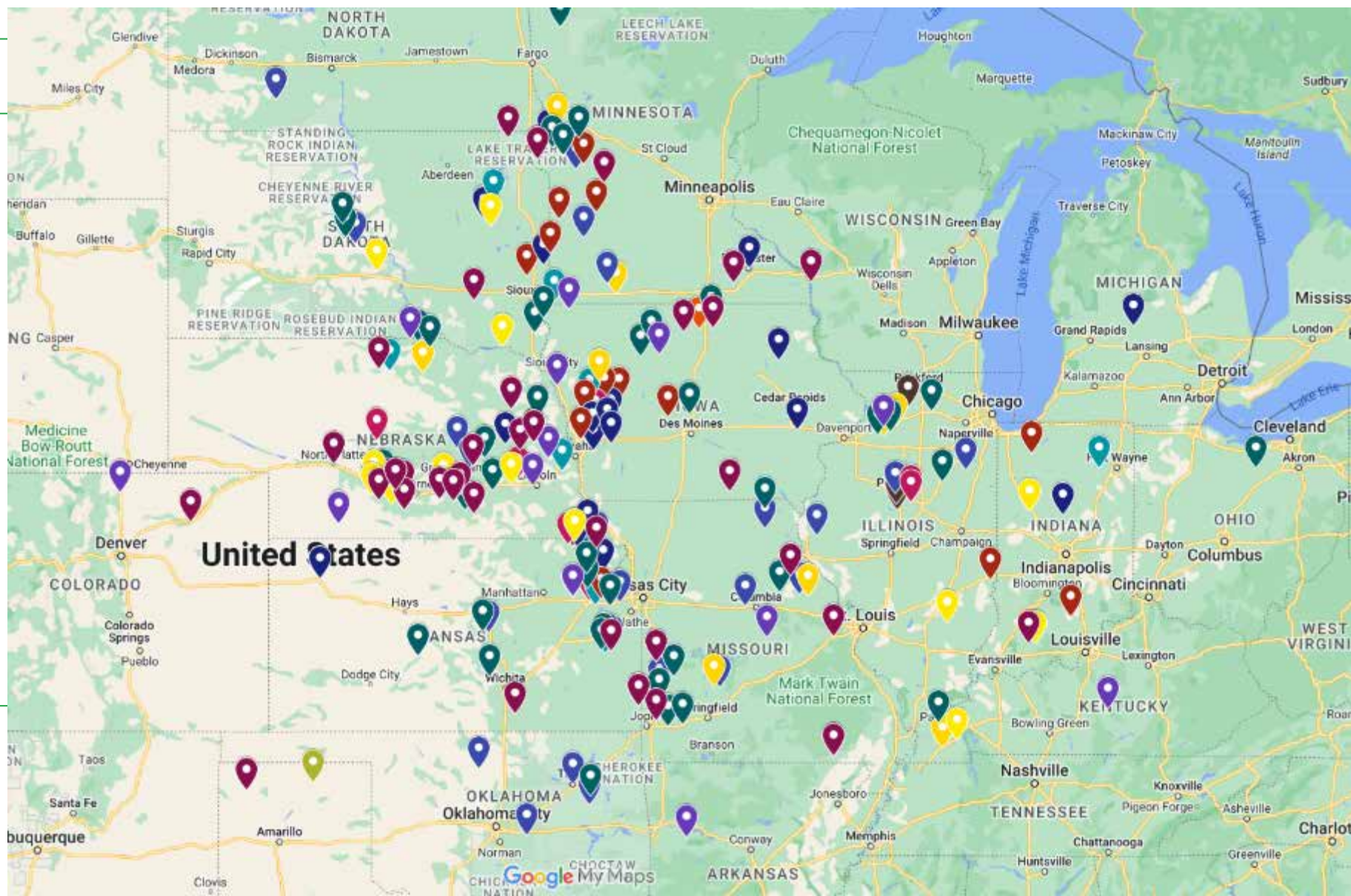


O u r F a r m

- Family Operation -
- 4000 acres NE KS and SE NE
- Corn, Soybeans
- 1540 acres irrigated
- 450 acres subsurface drip
- Netafim Drip irrigation dealer
- Garden Center and Landscape



Installed systems



Our Team

Meet the Team



KURT GRIMM



TED GRIMM



HANNAH GRIMM



NICHELE ROOFT



TAMI MINGOT



DEBORAH EDELMAN



HOLLY EDELMAN



NATHAN HENICKE



DEREK NIELSEN



DOUG GRIMM



KRISTLAND BEYER



WYATT BEYER



BRENT STRAHL



TREVOR HALMAIER



TRAVIS RORAY



TAYLOR ZELTWANGER



JASON NASCHHOFF



MILES PETERSON



JOEL SCHESSER



BRETT DICK-WOLFE



ANTHONY KOEHL



MARISSA GRIMM



LOGAN METZGER



KEVIN BENNETT



BRANDON WETTSTEIN



PIERRE JOKDAAN



SETH MILLER



JOYL KORYEN



MARGARITO DICHA SALINAS



CARLOS LOZANO MARTINEZ



MANUEL VEGA



ALEXIS HRKANDEZ



EDGAR DAVILA GARCIA



LUPITA LOPEZ MARTINEZ



MARCELLO SALAS TAMAYO



JOSE FRANCISCO GOMEZ DIAZ



JOSUE SARMASCO DIAZ



SILVESTRE ANGELME CORTES



EDGAR MUNOZ



KERI ALBERTO JESUS MARTINEZ



JOSE EDUARDO RESURREN LORENZO



EDGAR NOURIQUEL



DANIEL NORA GARCIA



GABRIEL GASPAR MONTALVO

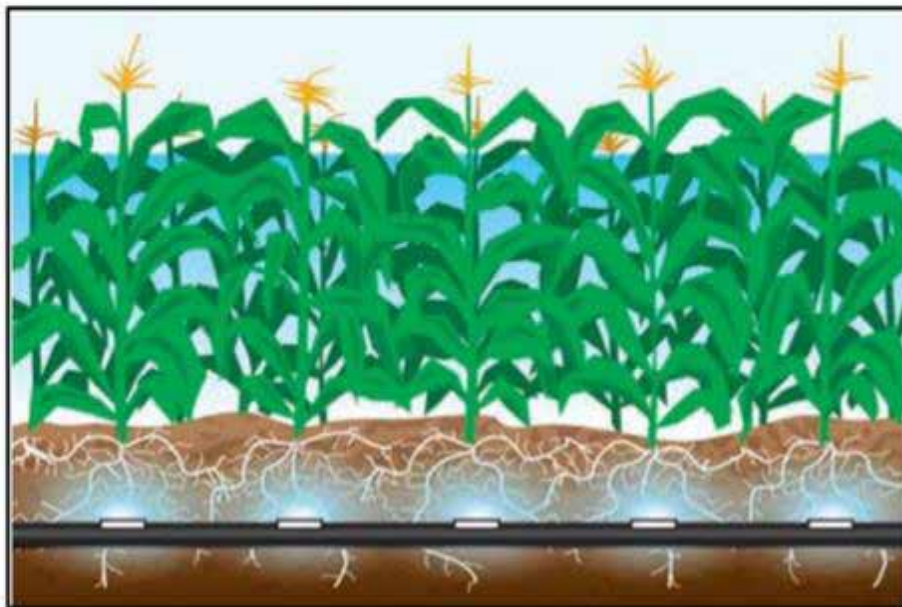






BENEFITS OF SDI

Chemical Application Efficiency



With SDI, fertilizer and other chemicals are directly placed into the root zone where they are needed.

Help



Outline References

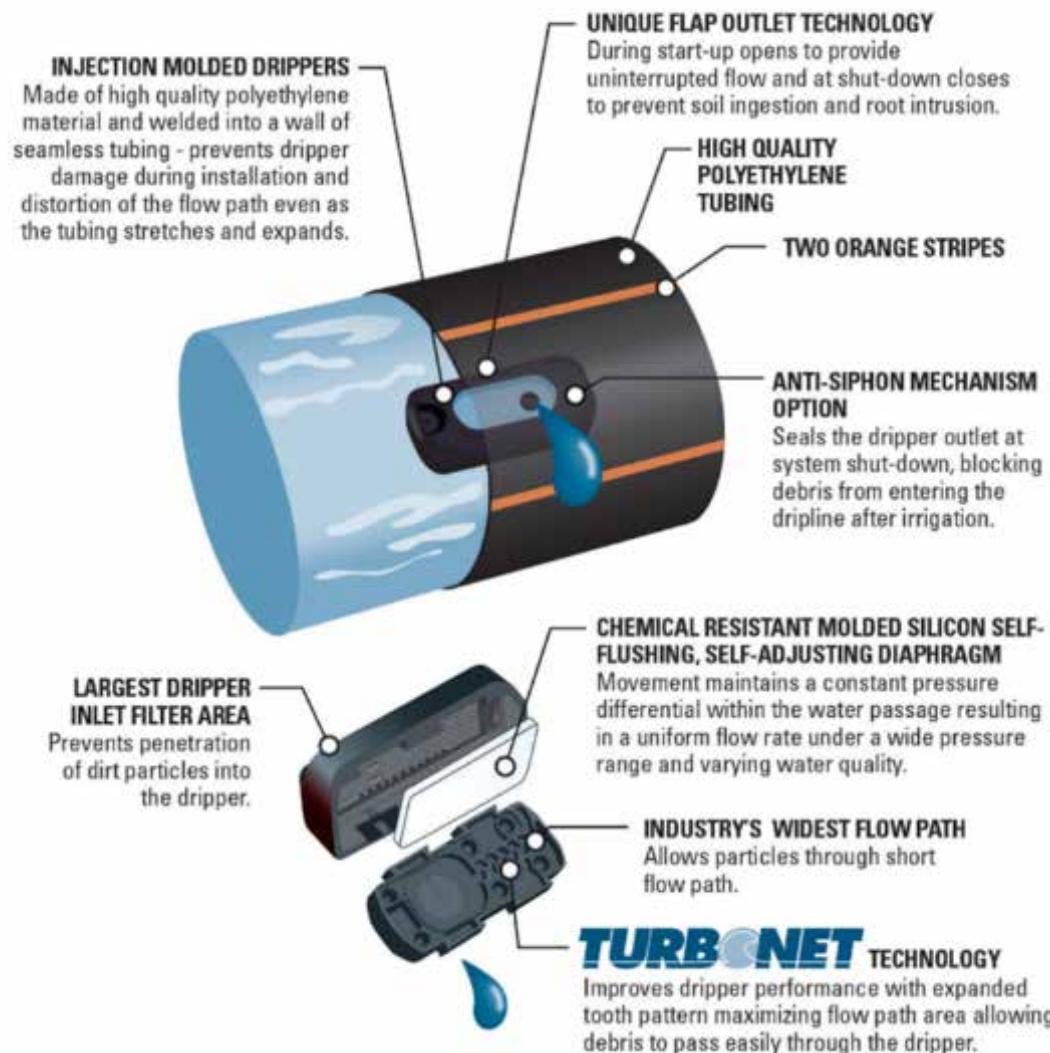
▼ SDI Benefits

- [Welcome](#)
- [Introduction](#)
- [Application Rate](#)
- [Uniformity](#)

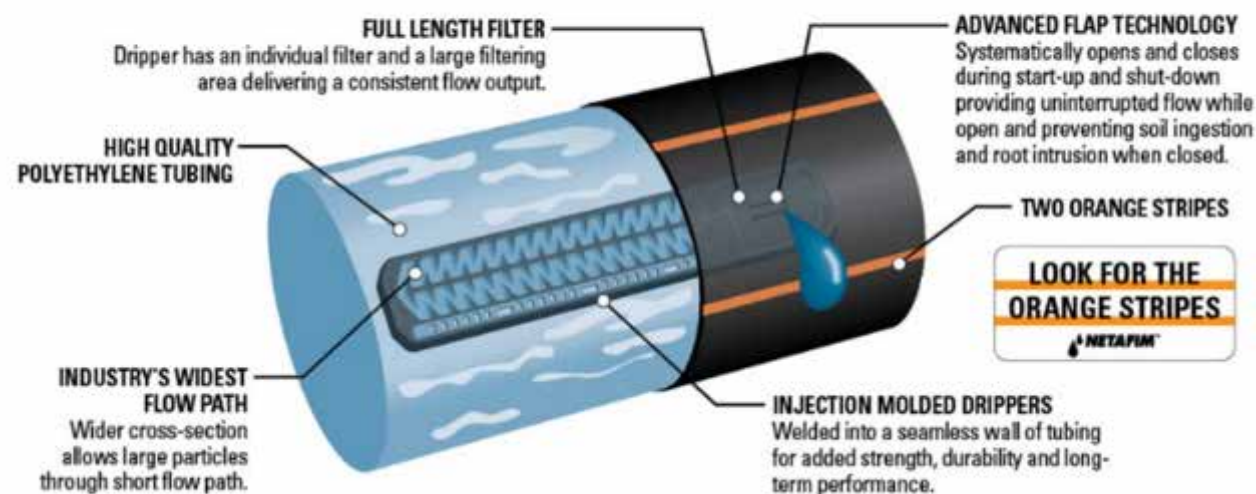
Chemical Application

- [Water Placement](#)
- [Typical Challenges](#)
- [Typical Challenges](#)
- [Conservation Benefits](#)
- [Increases](#)
- [Summary](#)
- [Close](#)

DripNet PC™ Technical



Aries™ Technical









Topf Farms Project	
Acres:	181.46
GPM:	890
Zones:	12
Date:	4/8/2022

SYSTEM SPECIFICATIONS

Crop: Corn

Netfilm Non-PC .11GPH @ 27"

Lateral spacing: 3.33' (40")

Designer: John Maxwell CID CAIS

Phone: 913-704-8555

 Zone control valve
 Flush valve assembly
 2in PVC
 3in PVC
 4in PVC
 6in PVC
 8in PVC

 Mainline
 Water Supply
 Contour Intervals = 2.31ft = 1PSI



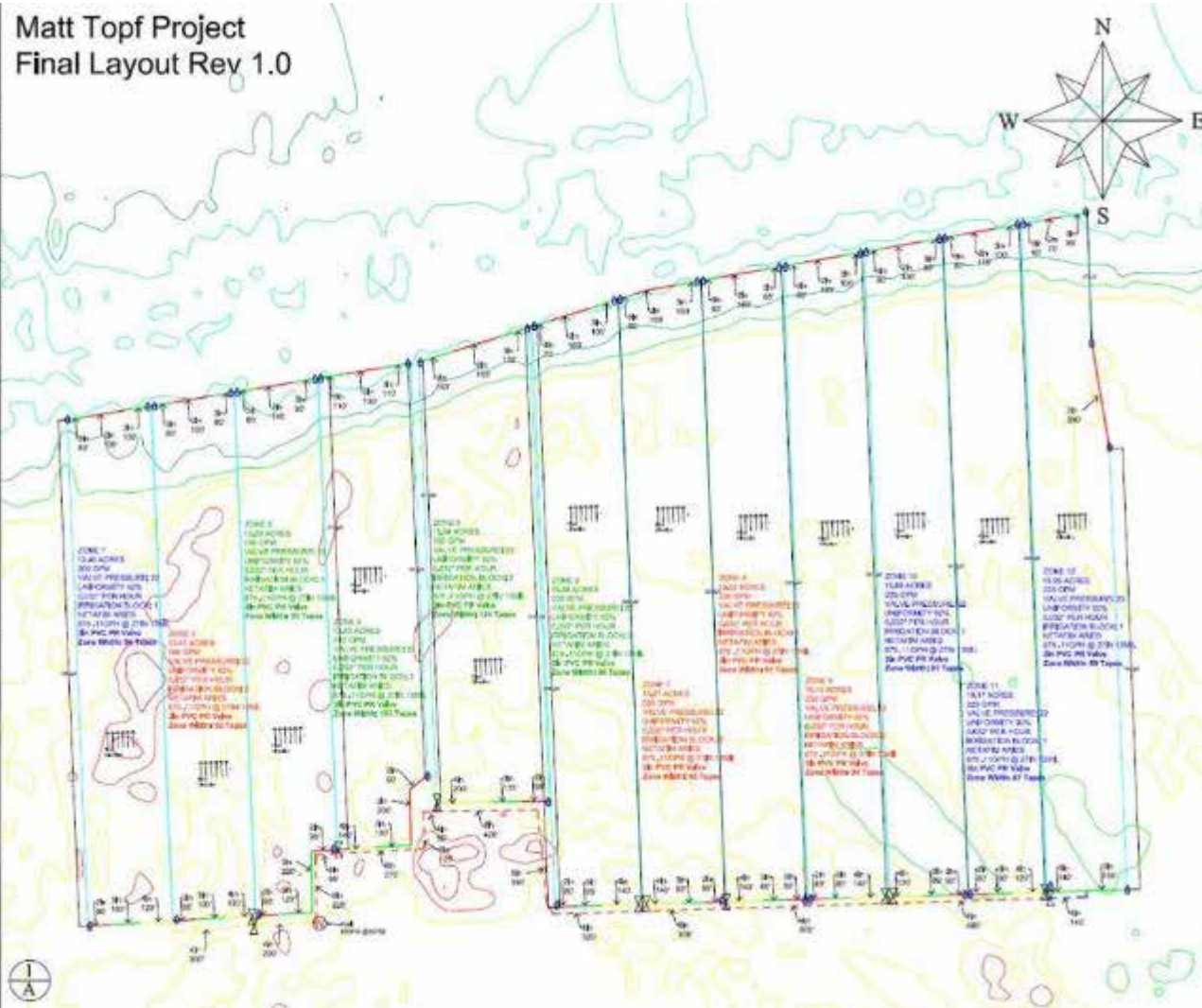
The information and materials for this design contain no warranties, express or implied. Some information and materials were prepared by the hands of third party consultants and other sources, which are subject to the accuracy, integrity, and quality of the information and materials provided by the third party.

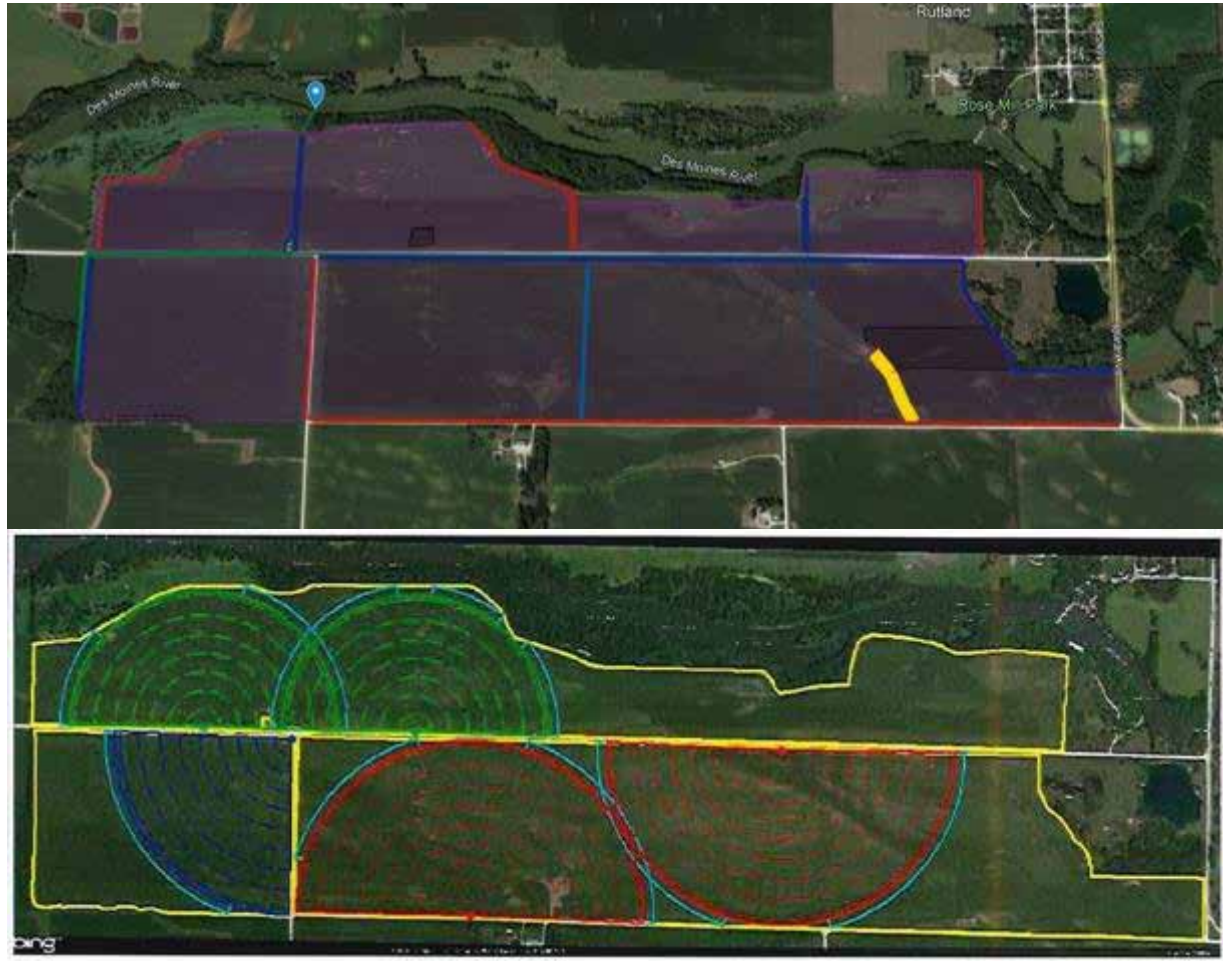
It is the client's responsibility to ensure the accuracy, integrity, and quality of the information and materials provided by the third party. Maxwell Irrigation is not responsible for any errors or omissions in the information and materials provided by the third party.

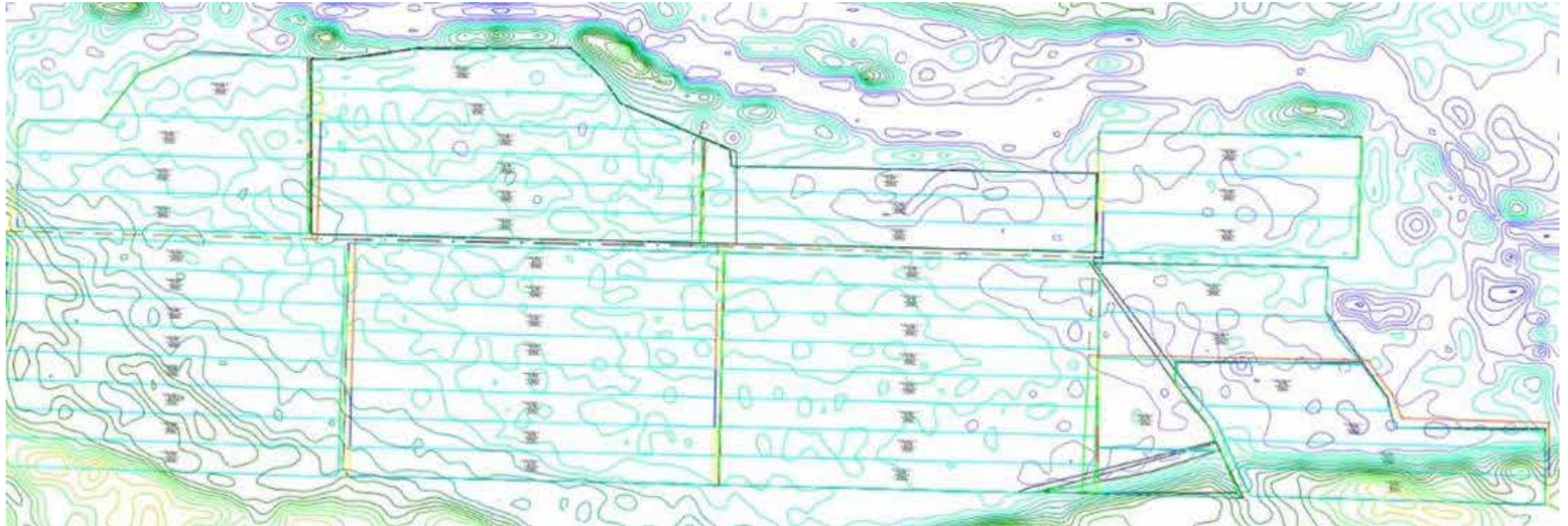
The design and construction of the irrigation system shall be in accordance with the standards and specifications of the National Irrigation Association (NIA) and the National Fire Protection Association (NFPA).

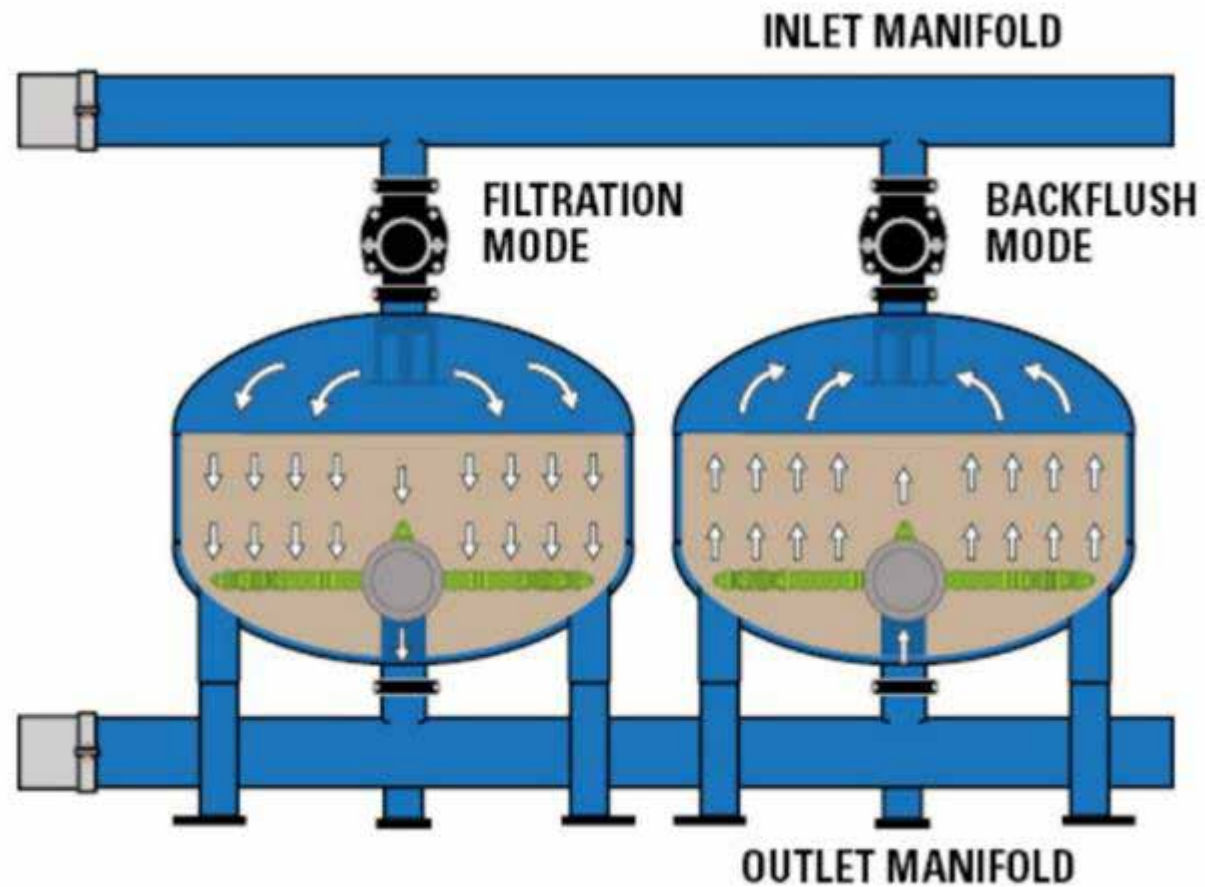
Maxwell Irrigation is an independent design company. We take pride in developing a plan that fits your needs. Our goal is to design a system that gets your irrigation water to its destination quickly, efficiently, and in an economic manner. Your best interest is our business.

Matt Topf Project Final Layout Rev 1.0









FAQ's



Depth of Dripline: 10 to 16" deep

Spacing between dripline: 30, 40 or 60"

How much fresh water do I need: 1 to 5 gpm per acre.

How long does it last: 25+ years

Cost per acre: 2200 – 3500 per acre depending on shape/size of field, topography and water quality.

Cost share available: REAP or EQIP, Climate

FAQ's



How much maintenance is required: Spring startup, winterize, acid treatment

How long does it last: 25+ years

What can go wrong?

1. Rodents
2. Water quality (Iron and Mg)
3. Maintenance, training and support

Efficiency difference compared to pivot or flood irrigation?

20-50% water savings

MEASURE BEFORE WE MANAGE

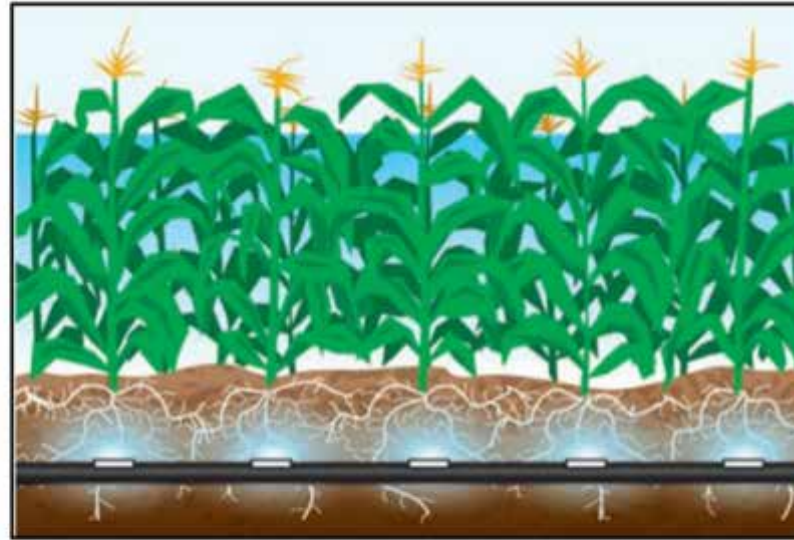


Tissue testing

In season soil analysis

Timing, form and placement is key

Chemical Application Efficiency



With SDI, fertilizer and other chemicals are directly placed into the root zone where they are needed.

Help



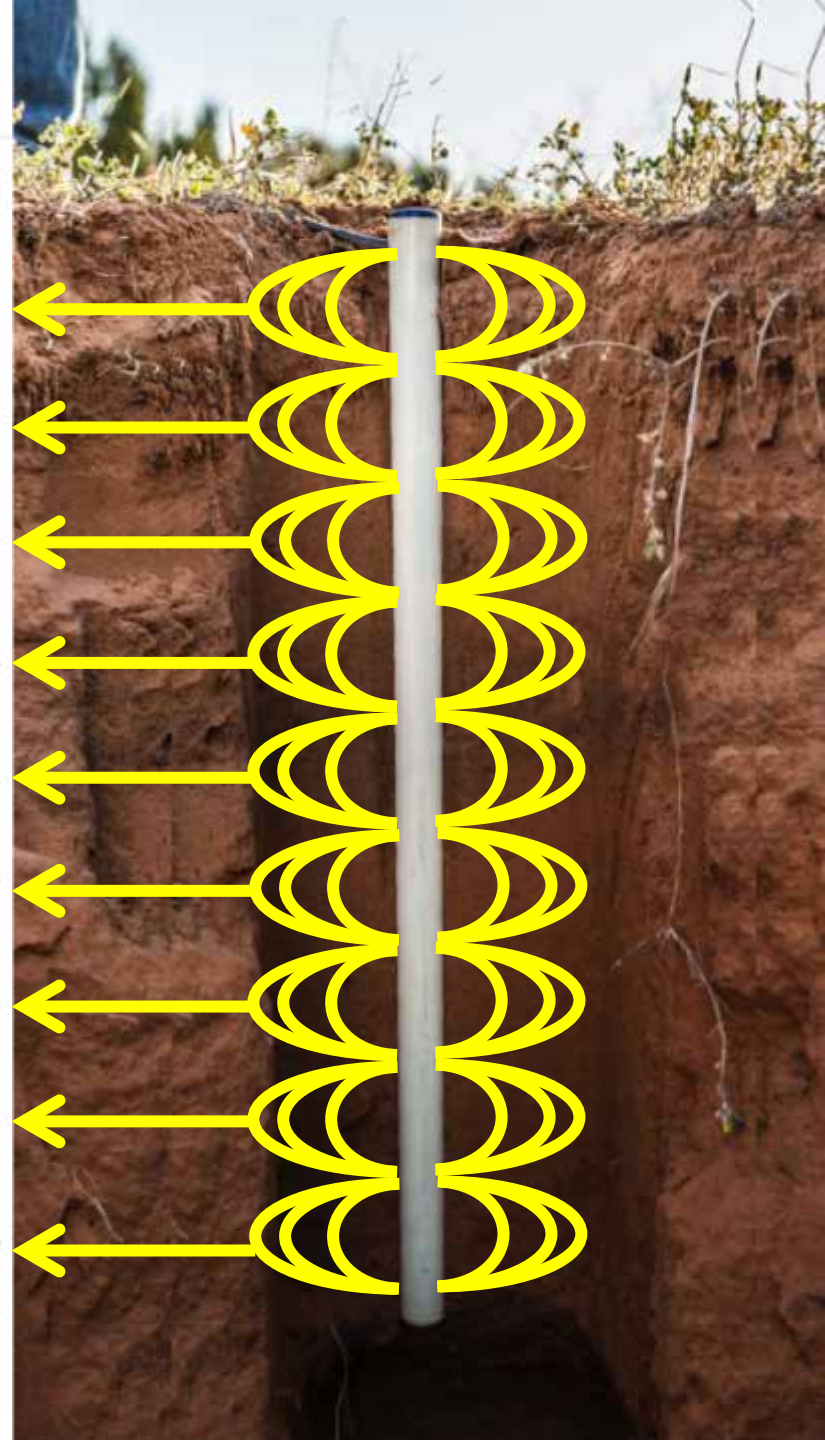
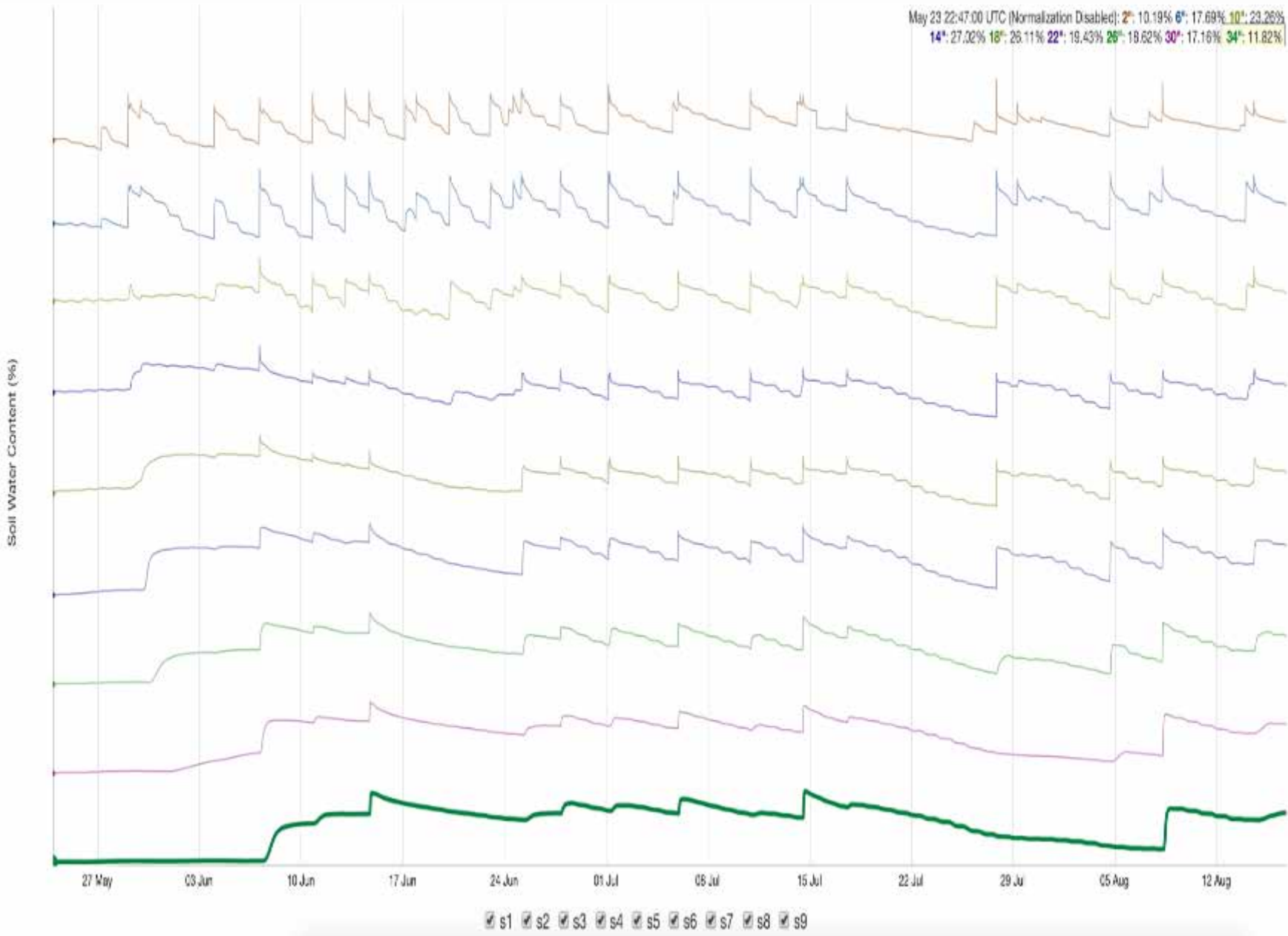
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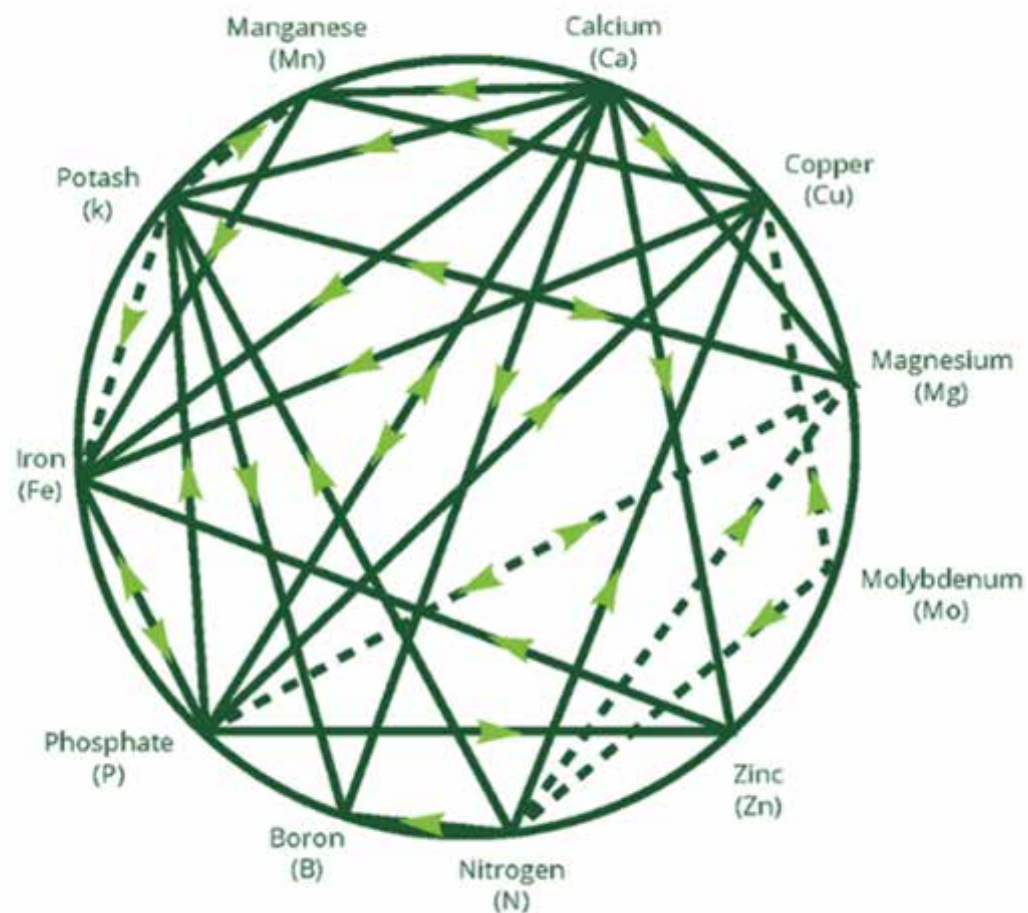
▼ SDI Benefits

- Welcome
- Introduction
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Chemical Application

- Water Placement
- Typical Challenges
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- Conservation Benefits
- Increases
- Summary
- Close



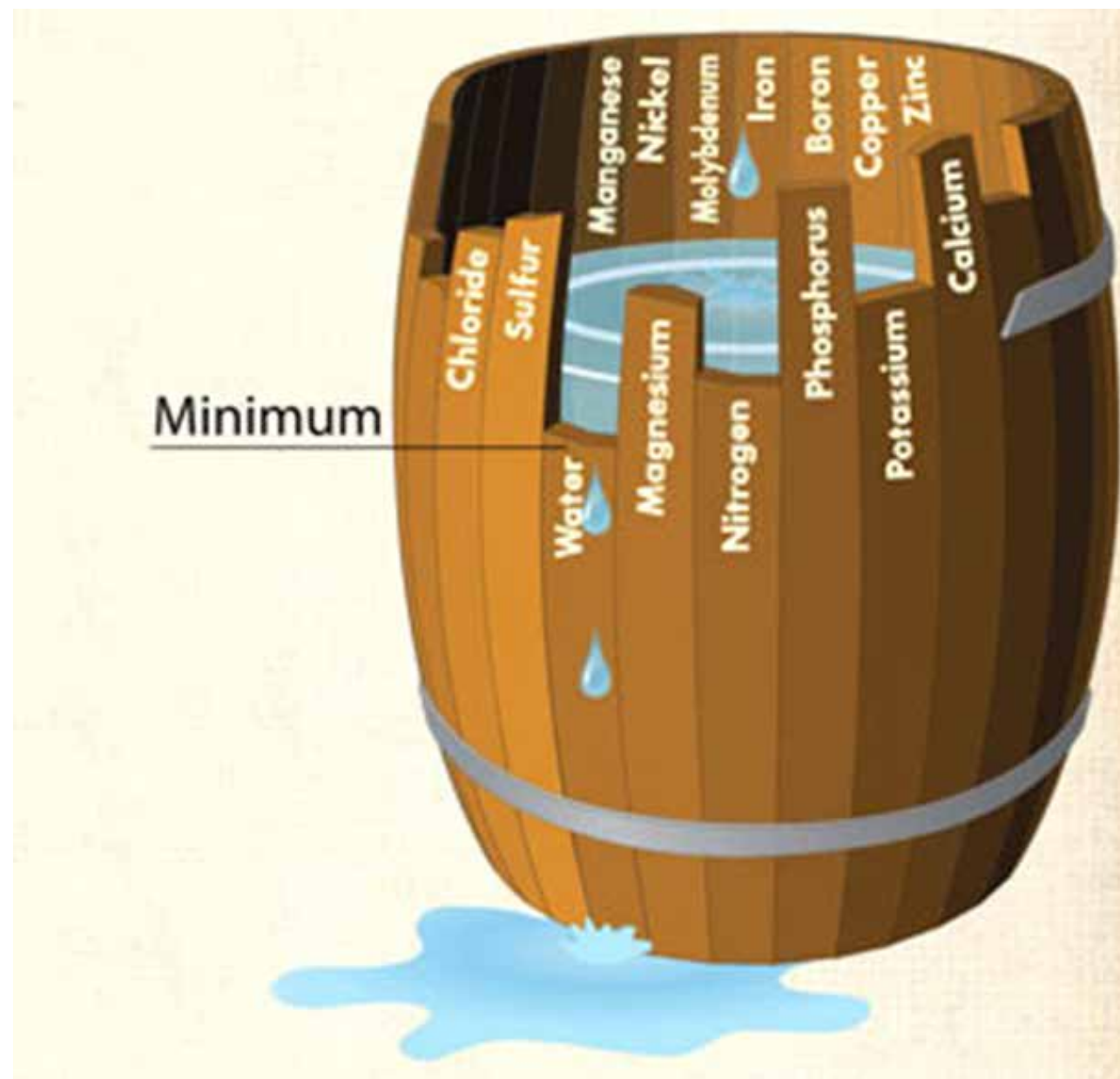


ANTAGONISM —————

Decrease in availability to the plant of a nutrient by the action of another nutrient (see direction of arrow).

STIMULATION - - - - -

An increase in the need for a nutrient by the plant because of the increase in the level of another nutrient.





400 BUSHEL ATTEMPT

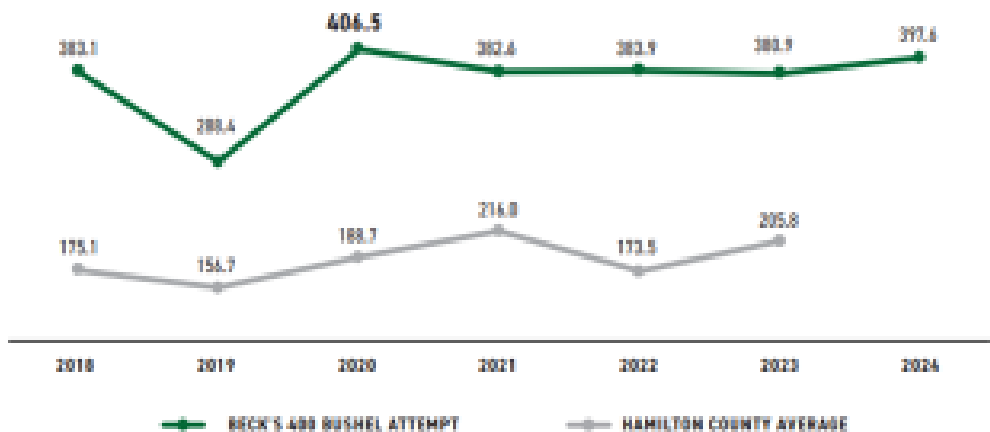
PURPOSE

To raise 400 Bu./A. corn by utilizing various intensive management strategies.

2024 RESULTS

SEED	PERCENT MOISTURE	BU./A.
62807CV2P	28.8	397.6
660PV2P	30.0	361.9
6574TCV2P	29.6	341.2
These results are based on the disclosed study parameters and participating sites.		

BECK'S 400 BUSHEL ATTEMPT VS. HAMILTON COUNTY AVERAGE (BU./A.)



STUDY INFORMATION | Planted 5/2/2024 | Harvested 9/20/2024 | Population 45,000 Seeds/A. | Row Width 15 in. | Previous Crop Soybeans | Tillage Fall: Disk-Rip, Spring: Field Cultivation | Herbicides Pre: 10 oz. Verdict®, 32 oz. Atrazine, 30 oz. Roundup PowerMAX® 3 Post: 32 oz. Roundup PowerMAX® 3, 16 oz. Atrazine, 80 oz. Acuron® | Insecticides Escalate® | Total Nitrogen 455 units as UAN | Soil Type Shoals (Silt Loam) | Soil Test Values pH 6.5, O.M. % 3.2, CEC 10.9 | Percent Base Saturation Ca 71.2, Mg 11.9, K 5.8, H 11 | Parts Per Million P 73, K 248, S 7, Zn 2.8, Mn 40, B 0.6



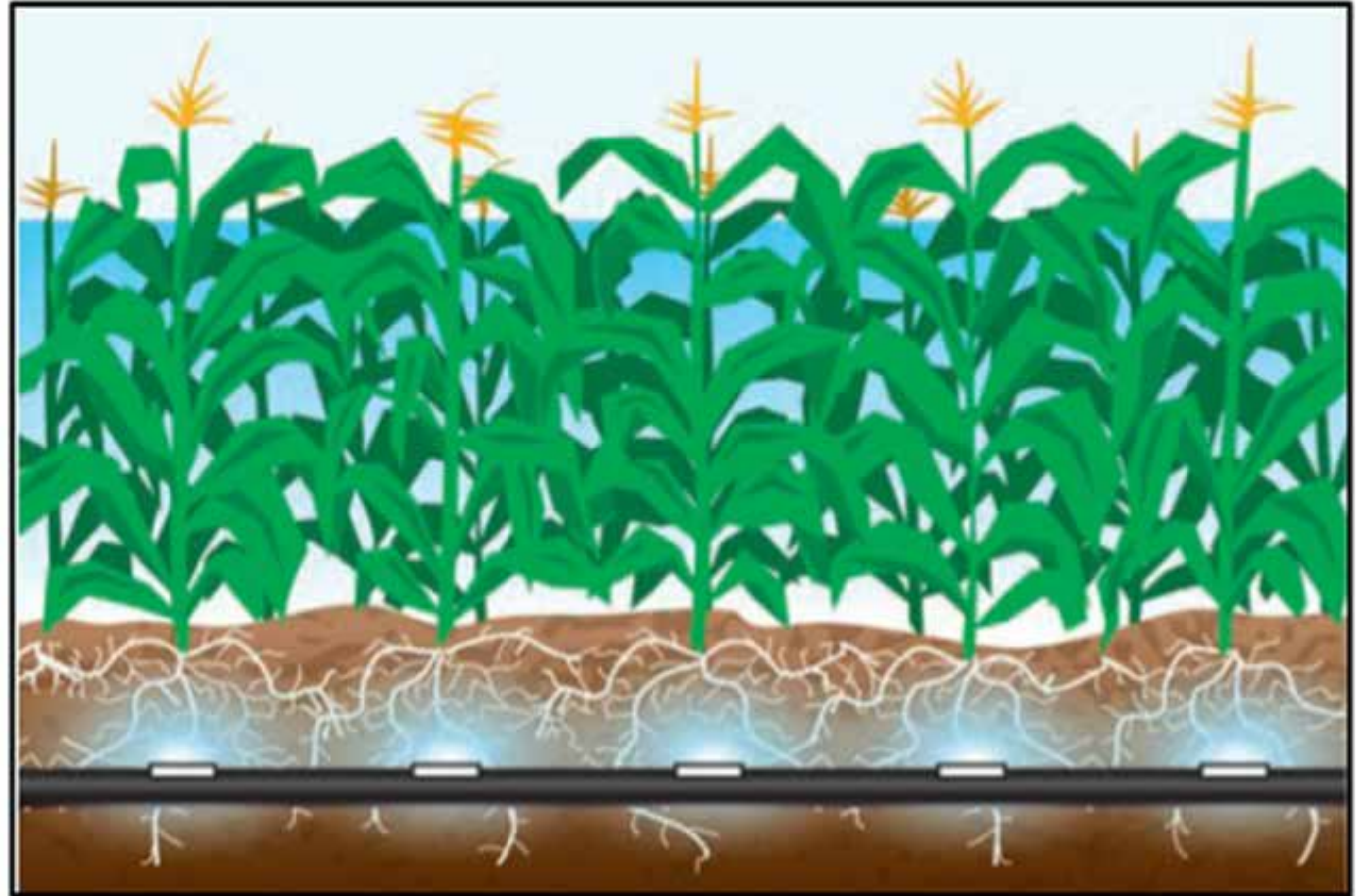
2024 PTI Results

Top and Bottom 10 Return on Investment Performance

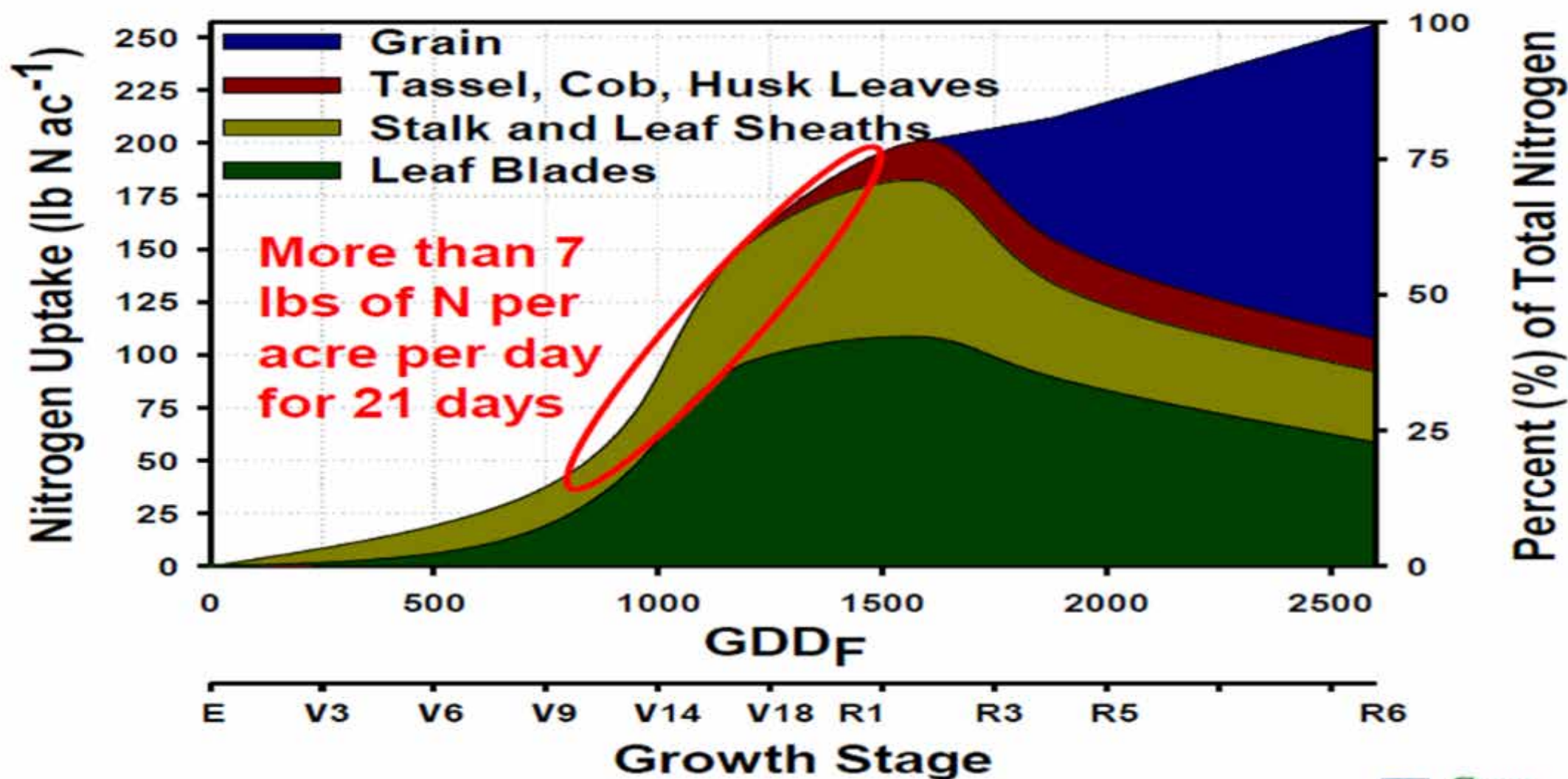
Top 10	ROI \$/A.
1. NETAFIM™ Drip Irrigation	\$317.46/A.
2. Corn High Management	\$91.11/A.
3. Corn/Soybean Band vs. Broadcast Fertilizer Rate	\$89.16/A.
4. High Management Soybeans	\$73.38/A.
5. Phantom Yield Loss	\$72.85/A.
6. Soybean Fungicide/Insecticide	\$68.15/A.
7. FurrowForce® Closing System Pressure	\$66.91/A.
8. Corn Multi-Genetic Planting	\$61.61/A.
9. FurrowJet® Xyway® LFR® In-Furrow Fungicide	\$60.30/A.
10. Corn Smart Hydrogel Soil Moisture Retainer	\$59.09/A.

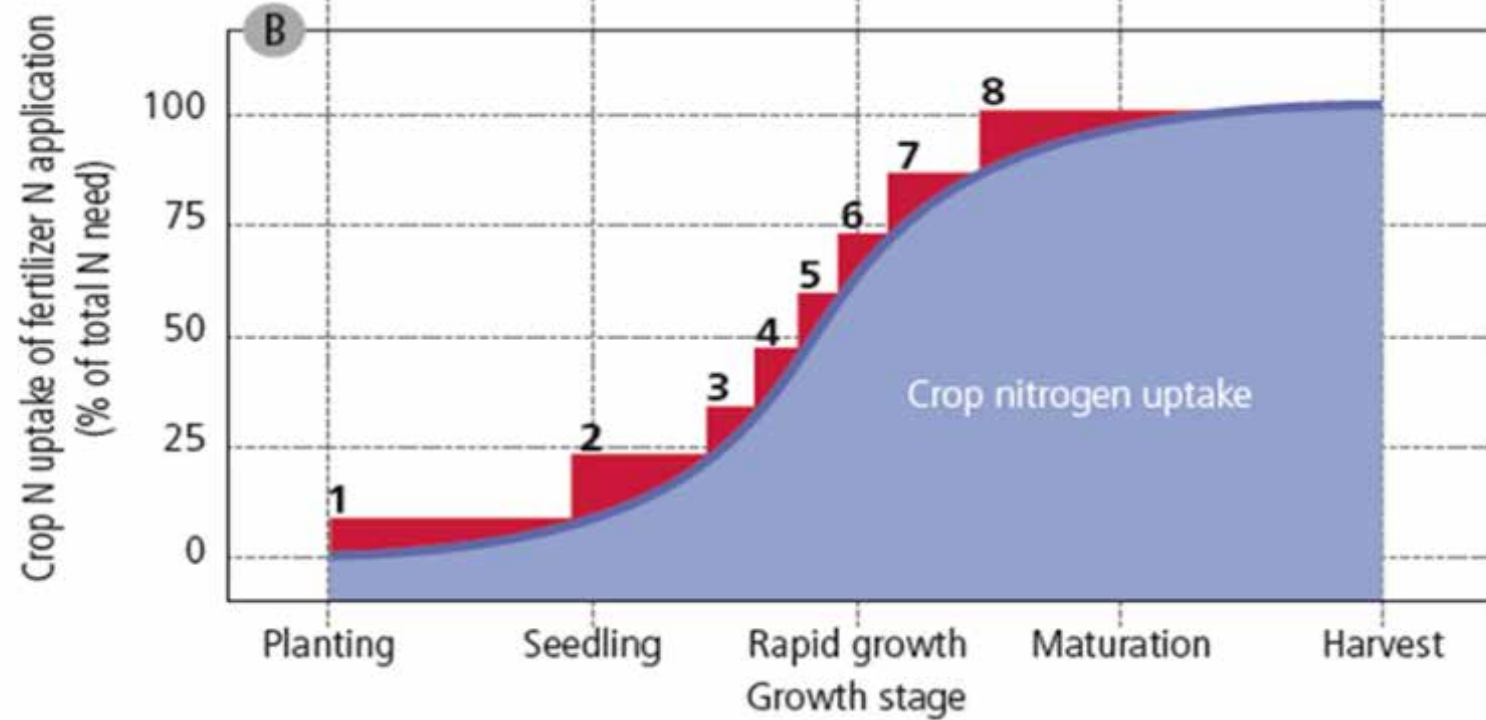
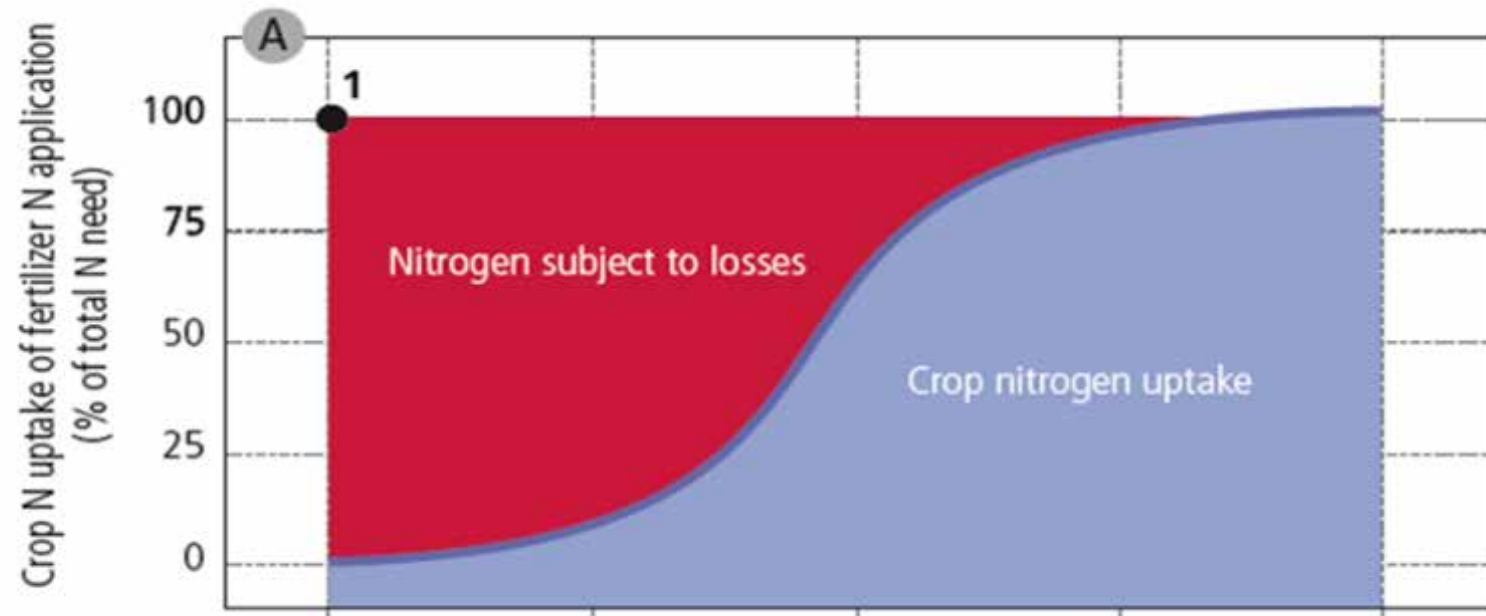
4 R's of Nutrient management

- Right time
- Right placement
- Right amount
- Right source

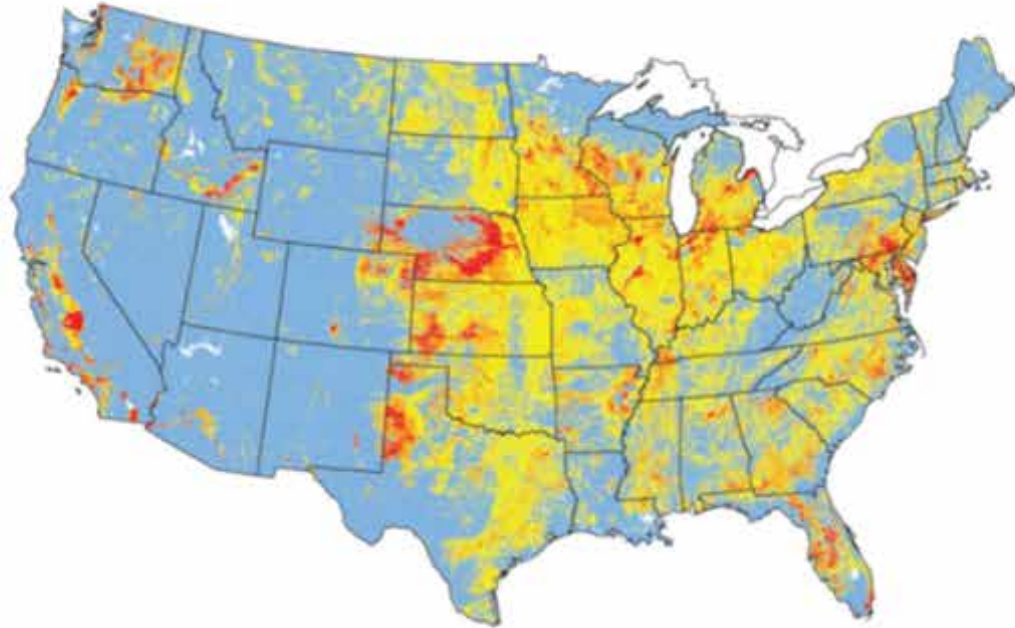


N Uptake & Partitioning for 230 Bushel Corn

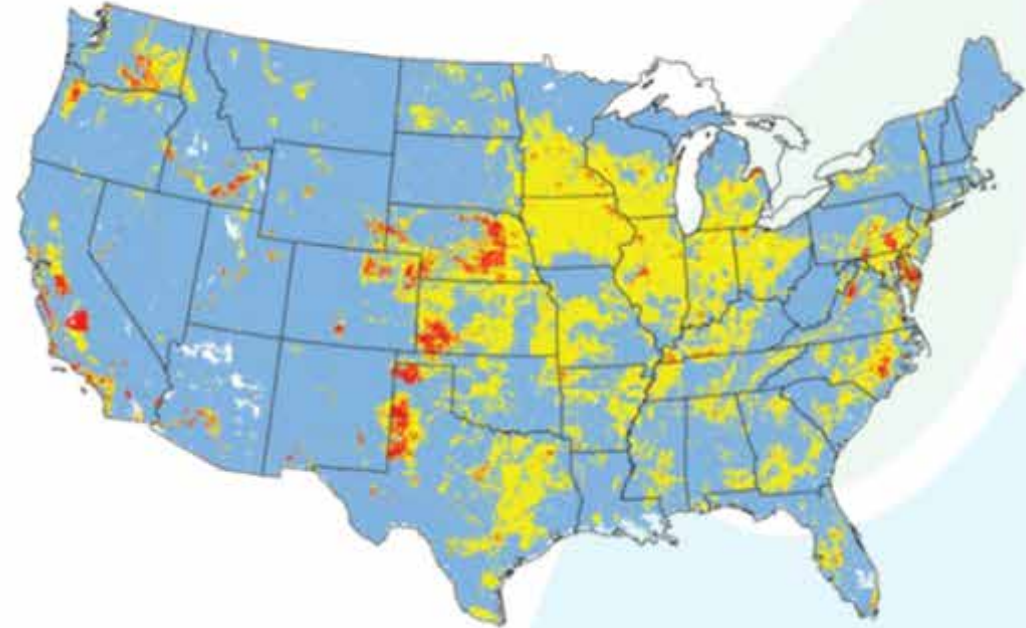




Predicted nitrate in shallow, recently recharged groundwater



Predicted nitrate in deeper groundwater used for drinking water



EXPLANATION

**Predicted nitrogen concentration,
in milligrams per liter as N**

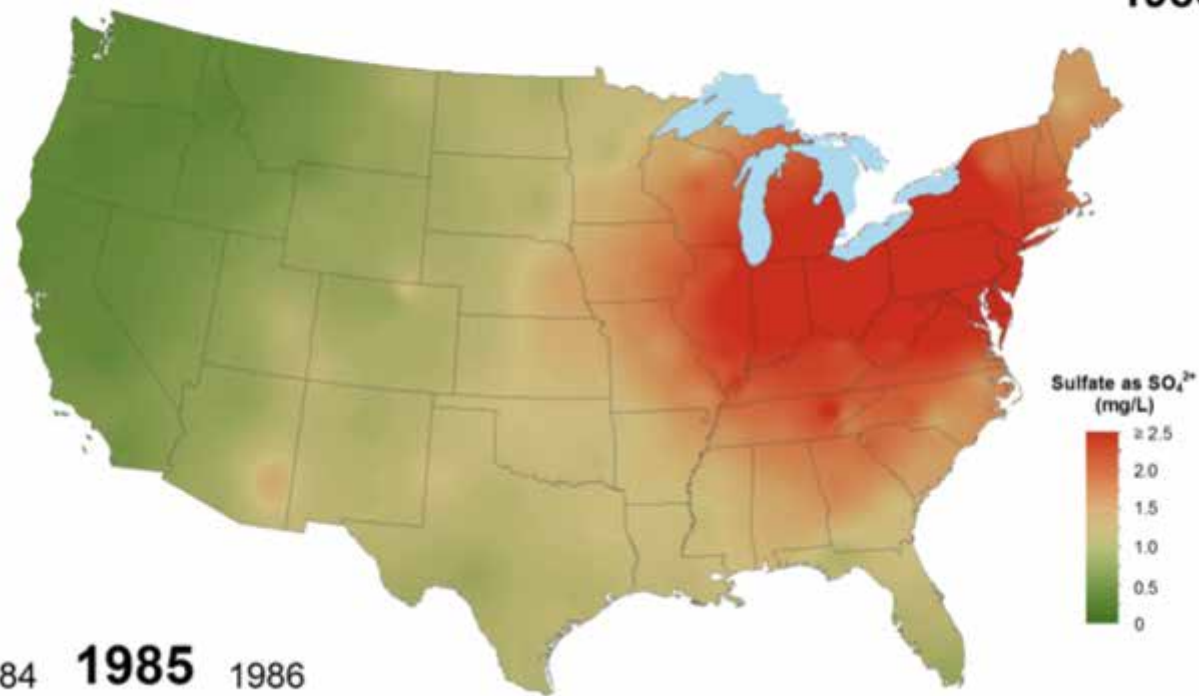


pH	7.9
Sodium Adsorption Ratio (SAR)	5.4
Adjusted SAR	7.6
Total Dissolved Solids (TDS) Est, ppm	1350
Electrical Conductivity, mmho/cm	2.25
Cations / Anions, me/L	26.0 / 26.7

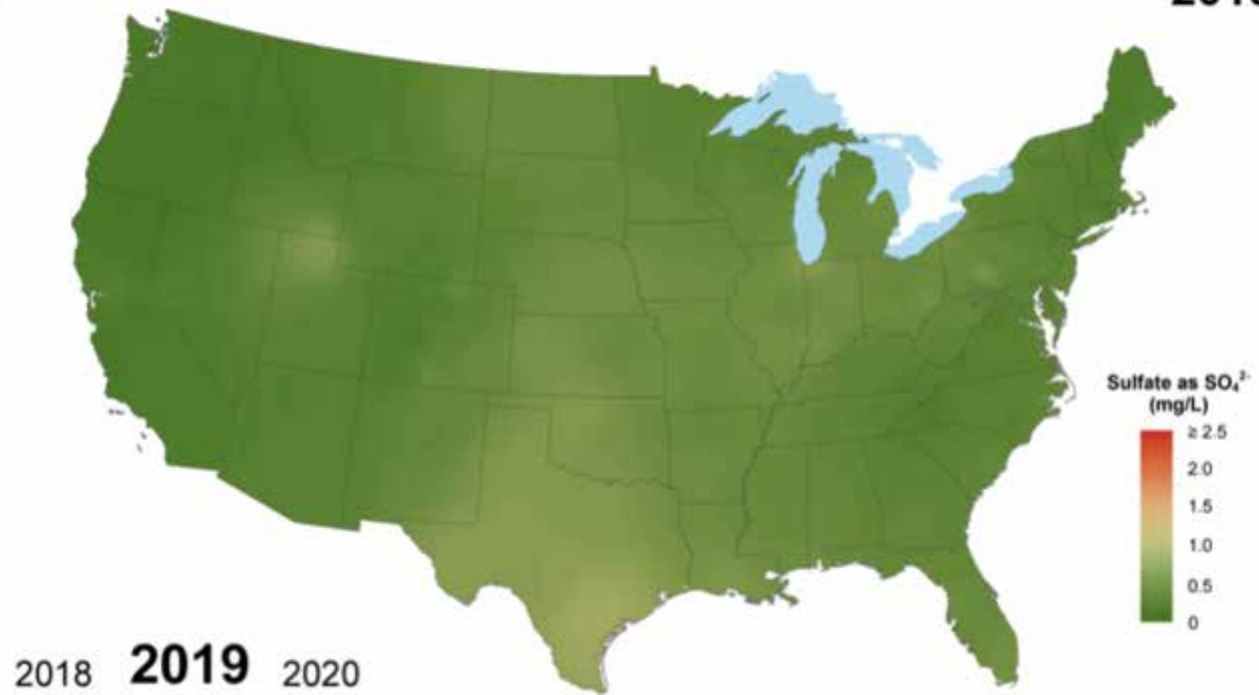
	ppm	lbs / Acre 9 inch
Sodium, Na	303	606
Potassium, K	40	80
Calcium, Ca	153.6	308
Magnesium, Mg	50	100
Total Hardness, CaCO ₃	593	1186
Nitrate, NO ₃ -N	7.2	14.4
Sulfate, SO ₄ -S	236	472
Chloride, Cl	51	102
Carbonate, CO ₃	< 1.0	< 2
Bicarbonate, HCO ₃	610	1220
Total Alkalinity, CaCO ₃	504	1000
Boron, B	0.28	0.56

"<" - Not Detected / Below Detection Limit

Sulfate ion concentration
1985



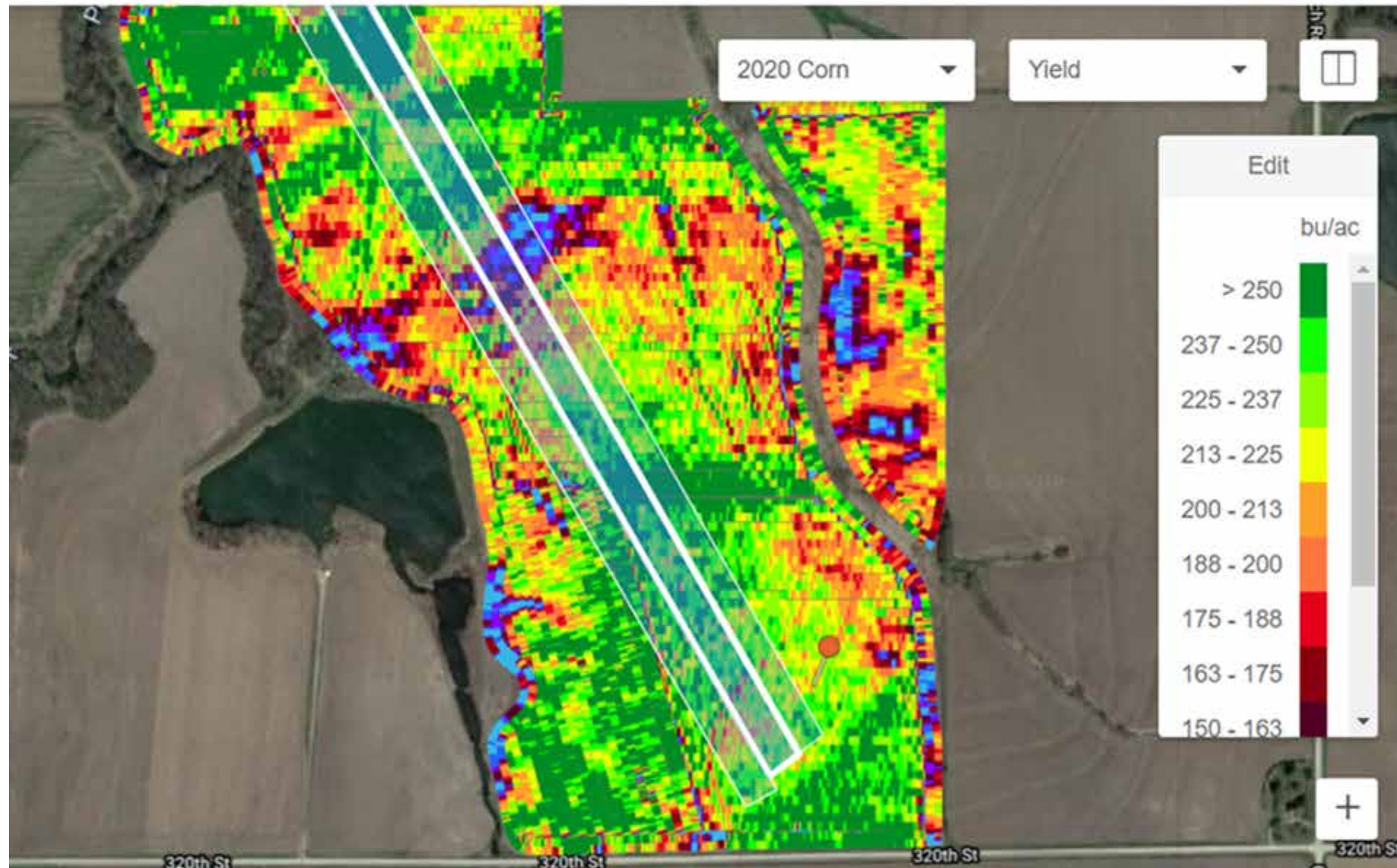
Sulfate ion concentration
2019



Notifications 5

Precision Farms ▾

Buy





Potassium			
Ammonium Acetate	ppm	264.2	Very High
Calcium			
Ammonium Acetate	ppm	2915.9	High
Magnesium	ppm	318.7	Very High
Zinc	ppm	4.7	High
Manganese	ppm	4.8	Low
Iron	ppm	42.5	Very High
Copper	ppm	0.8	Medium
Boron	ppm	0.3	Low
Sulfur	ppm	7.6	Low

Total Est N-Release	lbs	41.1	
Phosphorus			
Total P H3A	ppm	3.9	Very Low
P H3A (Inorganic)	ppm	3.8	
P H3A (Organic)	ppm	0.1	
Available P2O5	lbs	8.8	
P Saturation	%	4.3	Medium
Potassium			
H3A	ppm	53.3	Medium
Calcium			
H3A	ppm	433.4	Low
Calcium Saturation	%	4.8	

Potassium			
Ammonium Acetate	ppm	260.7	High
Calcium			
Ammonium Acetate	ppm	2997.7	Medium
Magnesium	ppm	427.5	Very High
Zinc	ppm	1.2	Medium
Manganese	ppm	8.6	Medium
Iron	ppm	67.4	Very High
Copper	ppm	1.0	Medium
Boron	ppm	0.3	Low

Total Est N-Release	lbs	52.7	
Phosphorus			
Total P H3A	ppm	4.1	Very Low
P H3A (Inorganic)	ppm	3.2	
P H3A (Organic)	ppm	0.9	
Available P2O5	lbs	7.8	
P Saturation	%	3.9	Medium
Potassium			
H3A	ppm	51.1	Medium
Calcium			
H3A	ppm	337.6	Very Low



\$0.60 per head per day of value

How is manure valued on your farm?

Is it an asset or liability?

Questions to assess this:

1. Do you look at the lagoon and think of the cost to empty?
2. Or do you think how much revenue could you produce?
3. Is the question how many gallons per acre you can apply?
4. Or how few of gallons and how many acres you can stretch it to?

MANURE THROUGH DRIP



Riverscreen: 120 mesh screen

Works on most lagoons with solids less than 2%



MICROFILTER – Demo trailer





Microfilter

Second stage separation

25 micron screen

15 hp – low operating cost

Liquid from here to drip irrigation



THE RELATIVE SIZE OF PARTICLES

From the COVID-19 pandemic to the U.S. West Coast wildfires, some of the biggest threats now are also the most microscopic.

A particle needs to be 10 microns (μm) or less before it can be inhaled into your respiratory tract. But just how small are these specks?

Here's a look at the relative sizes of some familiar particles >

HUMAN HAIR 50-180 μm >
FOR SCALE

FINE BEACH SAND 90 μm >

GRAIN OF SALT 60 μm >

WHITE BLOOD CELL 25 μm >

GRAIN OF POLLEN 15 μm >

DUST PARTICLE (PM₁₀) <10 μm >

RED BLOOD CELL 7-8 μm >

RESPIRATORY DROPLETS 5-10 μm >

DUST PARTICLE (PM_{2.5}) 2.5 μm >

BACTERIUM 1-3 μm >

WILDFIRE SMOKE 0.4-0.7 μm >

CORONAVIRUS 0.1-0.5 μm >

T4 BACTERIOPHAGE 0.225 μm >

ZIKA VIRUS 0.045 μm >



Pollen can trigger allergic reactions and hay fever—which 1 in 5 Americans experience every year.

Source: Harvard Health

The visibility limits for what the naked eye can see hovers around 10-40 μm .

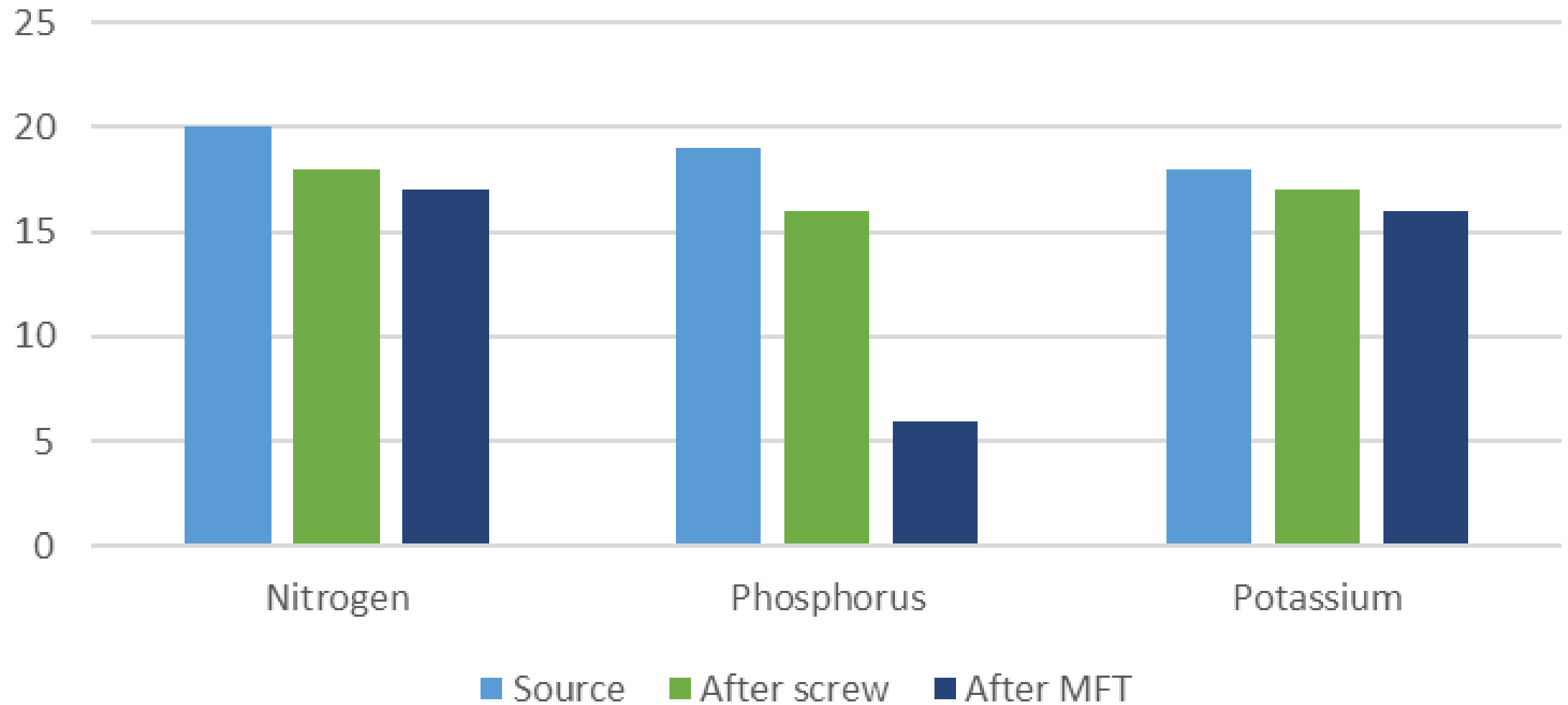


Respiratory droplets have the potential to carry smaller particles within them, such as dust or coronavirus.

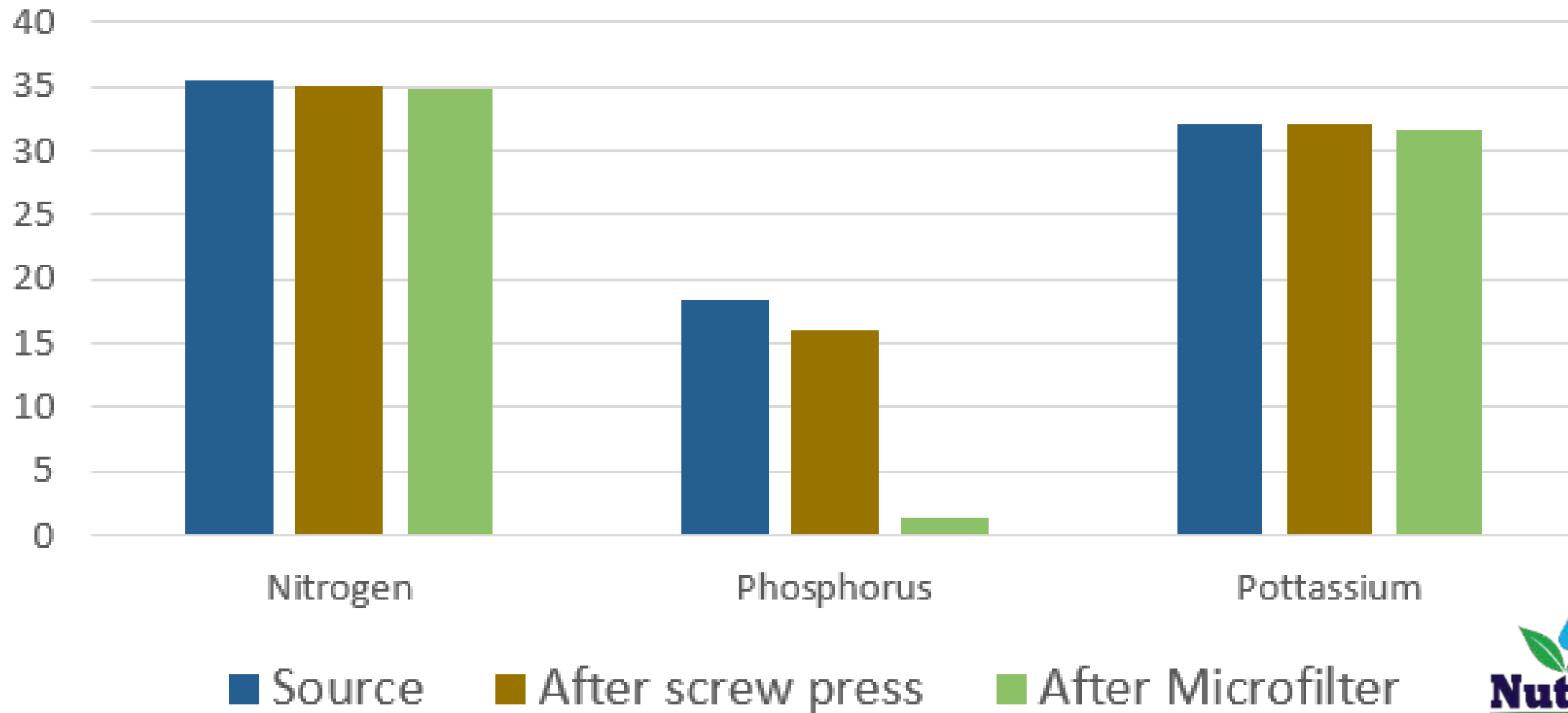


Wildfire smoke can persist in the air for several days, and even months.

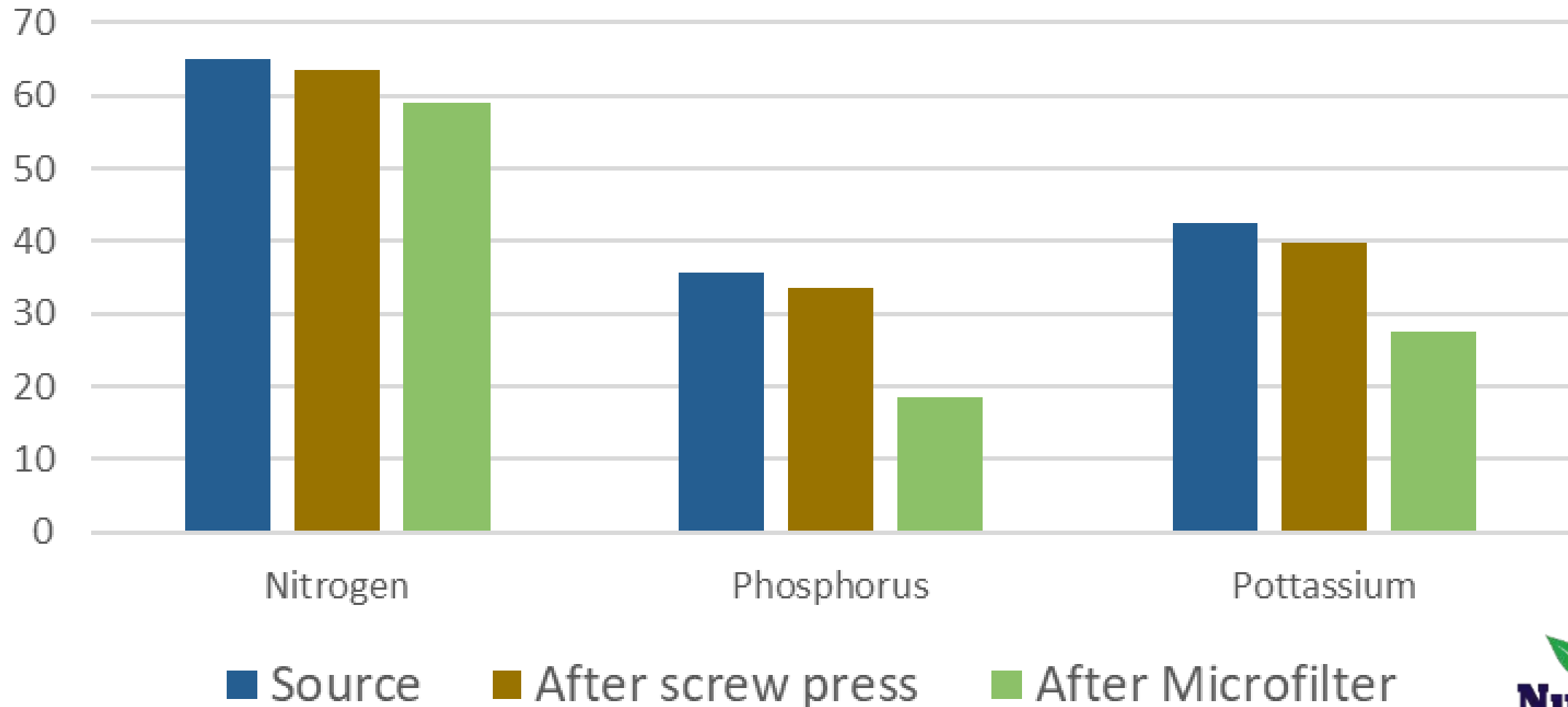
N, P, K from seperation
Lbs per 1000 gallons



N, P, K Lbs/1000 gallons Dairy farm



N, P, K Lbs/1000 gallons
Swine finishing maure KS



Adding value.....

What else can we use it for?

- Starter
- Biological
- Spray carrier
- Plant food
- Root stimulant
- Humic and Fulvic values





IAS Laboratories

2515 East University Drive
Phoenix, Arizona 85034
(602) 273-7248
Fax (602) 275-3836

Date Received: October 30, 2024

Work Order: 24J0480

Submitted By: Kurt Grimes

Report To: Nutradrip

Project: Swine Processed

Sample Results

Sample Name: Lagoon

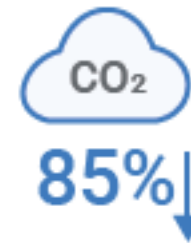
IAS Lab ID: 24J0480-01 (Fertilizer)

	Result	MRL	Units	Method
Organic Acids				
Fulvic Acid	0.86	<0.01	%	IHSS/Lamar/AOAC
Time Analyzed: 10/31/2024 9:12:00AM				
Humic Acid	0.15	<0.01	%	IHSS/Lamar/AOAC
Time Analyzed: 10/31/2024 9:12:00AM				
Elements and Compounds				
Sulfur (S)	0.0141	<0.0001	%	EPA 3050B
Time Analyzed: 11/1/2024 1:10:00PM				
Physical Properties				
Moisture	98.41	<0.01	%	AOAC 967.03
Time Analyzed: 10/31/2024 9:12:00AM				
Organic Matter	1.75	<0.01	%	AOAC 967.05
Time Analyzed: 10/31/2024 9:12:00AM				

Greenhouse Gas GHG

Methane, Nitrous Oxide, CO₂

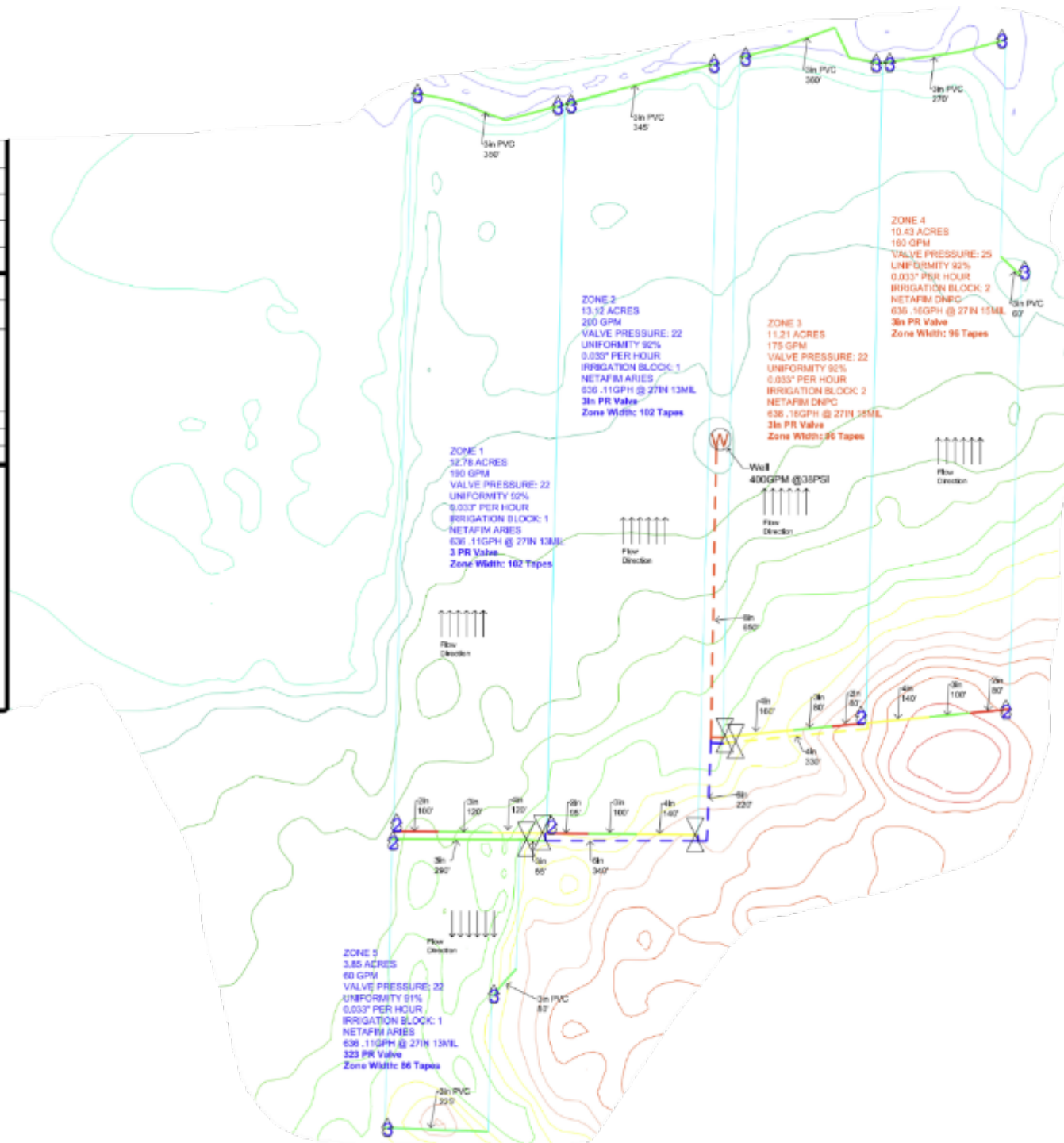
COP28



GREENHOUSE GAS EMISSIONS

In side by side studies in Madera County California by Marten Berger et al, UC Davis, approximately 70-90% fewer greenhouse gases were released, when dairy effluent water was applied through a SDI system.

Acres:	51.38
GPM:	400
Zones:	5
Date:	10/14/2022
SYSTEM SPECIFICATIONS	
Crop: Corn	
Netafim Non-PC 636 .11GPH @ 27"	
Netafim PC AS 636 .16GPH @ 27"	
Lateral spacing: 3.33' (40")	
Designer: John Maxwell CID CAIS	
Phone: 913-704-8555	
	Zone control valve
	Flush valve assembly
	2in PVC
	3in PVC
	4in PVC
	6in PVC
	8in PVC
	Mainline
	Water Supply
Contour Intervals = 2.31ft = 1PSI	



Year	Pivot_Yield_t/ac	Drip_Yield_t/ac	Feed_Value_\$/t	Pivot_Revenue_\$	Drip_Revenue_\$	ROI Per Year	ROI \$/ac	Pivot Gallons	Drip Gallons	Gallons Saved	Annual Precip Inches
2023	24	26	51.26	\$ 45,518.88	\$ 69,703.35	\$ 24,184.47	\$ 462.42	12,700,000	10,763,740	1,936,260	9.7
2024	19	20	46.78	\$ 32,886.34	\$ 48,931.88	\$ 16,045.54	\$ 306.80	-	3,190,200	-	14



Case Study; Sauk Center, MN

- Year 1

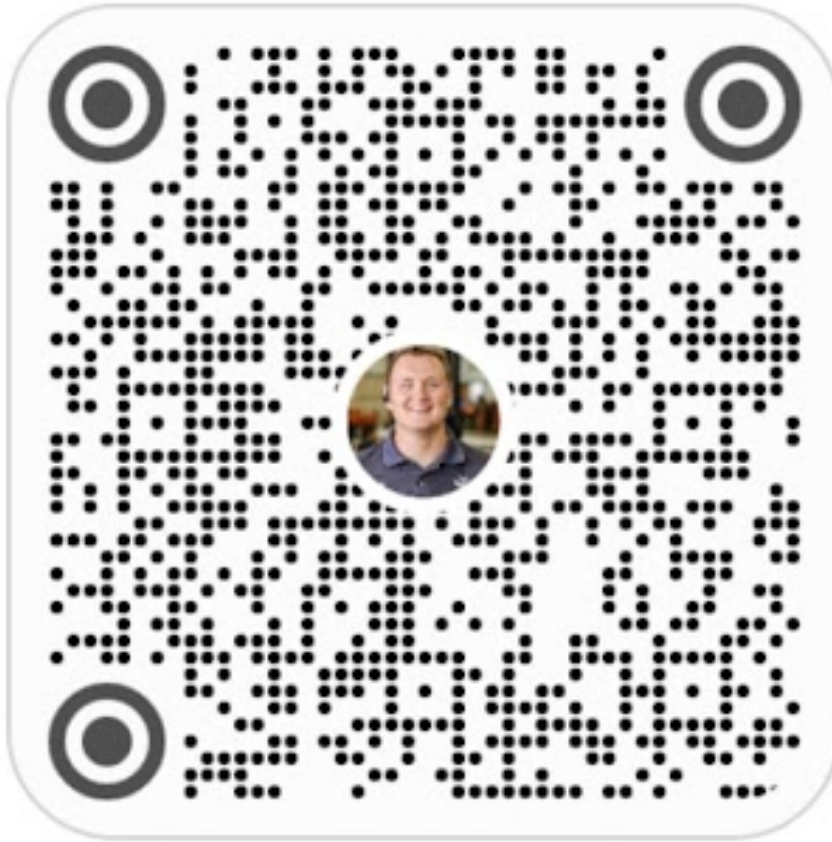
 - Saved 1.9 MG
 - Gained 15.3 Acres
 - Yield Increase 2 ton/ac
- Year 2

 - Irrigated 2.25"
 - Spoon-fed the crop
- Year 3

 - Utilize SAP and Rapid soil testing to address nutrient deficiencies in season.



Thank You and Questions



taylor@nutradrip.com

www.nutradrip.com

320-349-1301