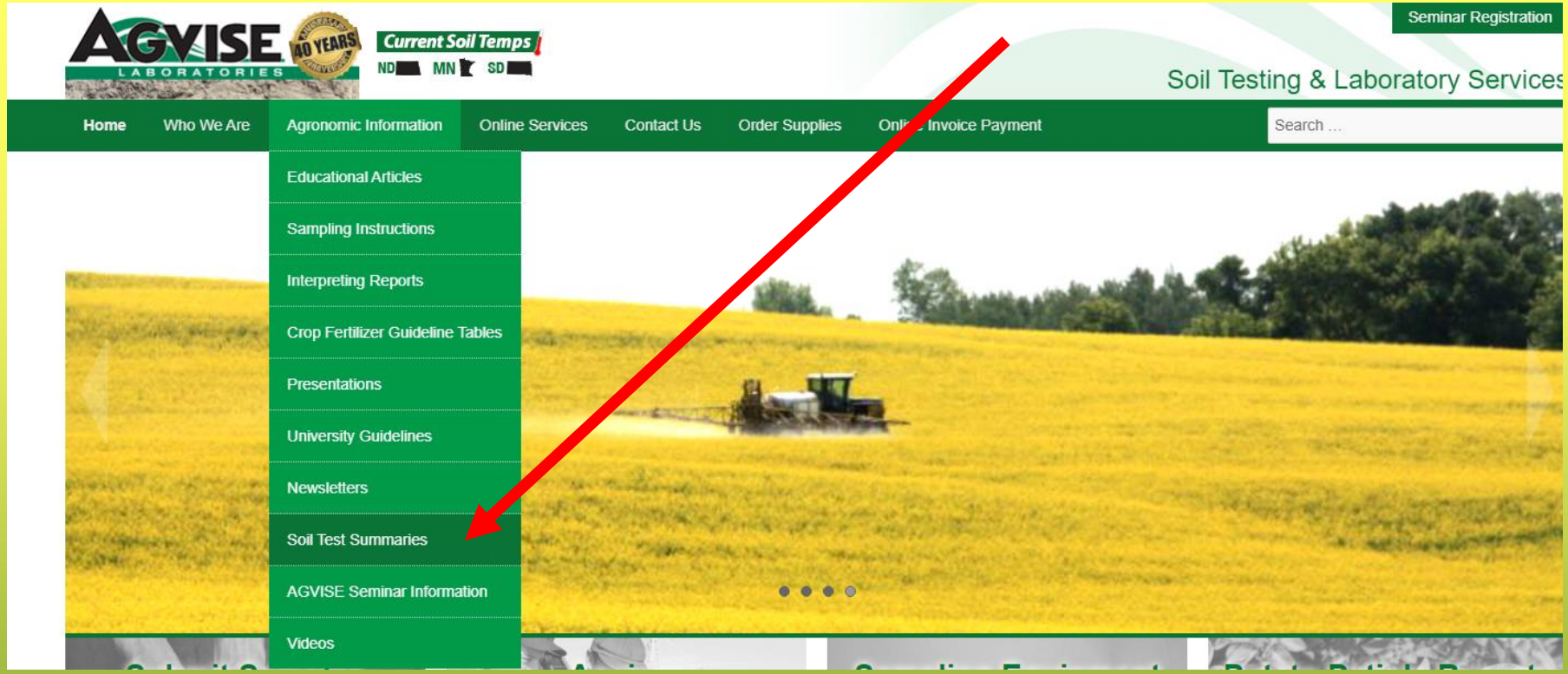
AGVISE Project Update

- *SCN – Changes in Season/Resistance*
- *Tile/Salinity Tracking Project*
- *Saline-Sodic – Soil amendment Project*
- *Soil Sampling Lubricant Evaluation*



Annual SCN Summary for 2019

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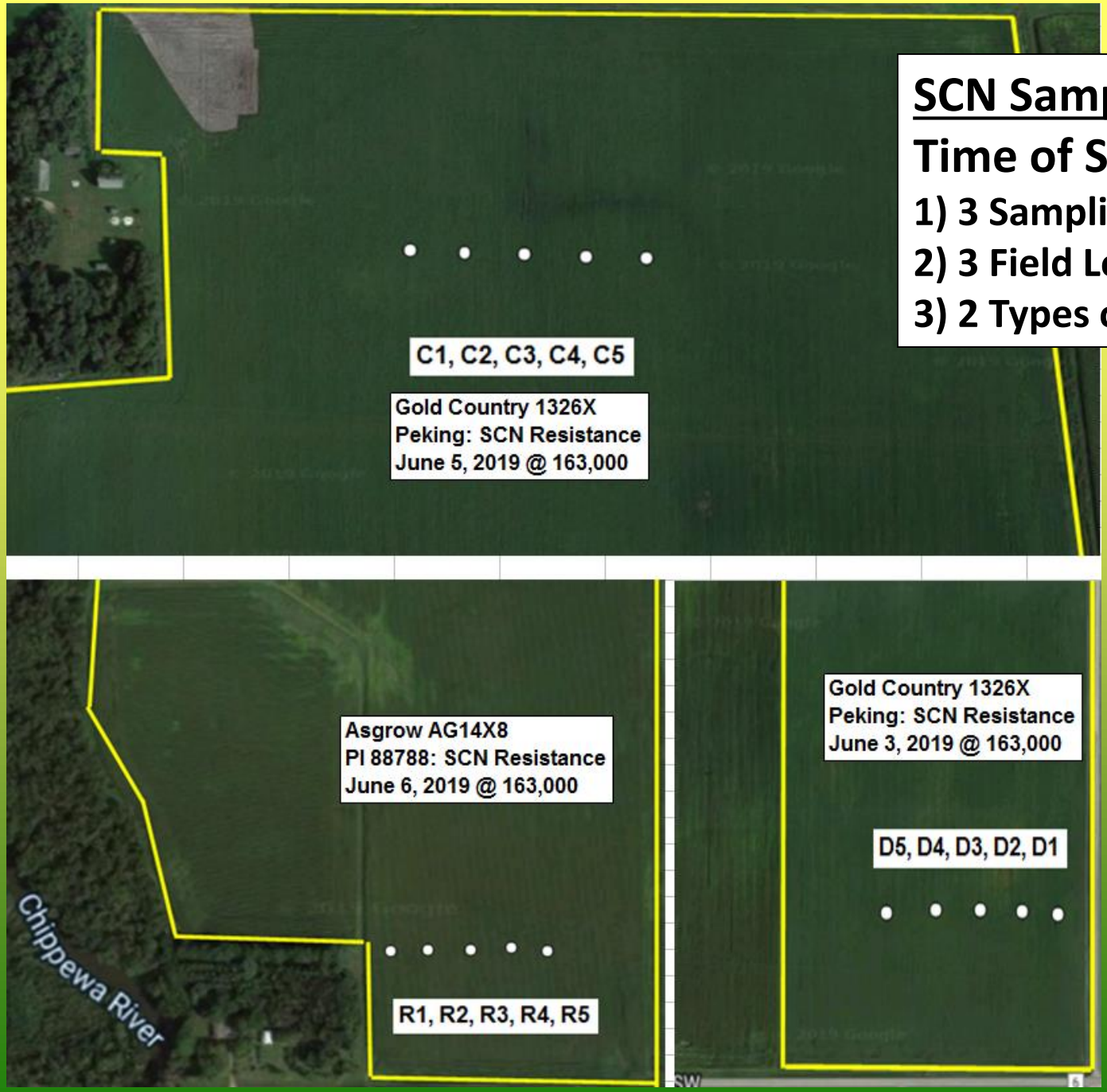

SCN Sampling Project

Time of Sampling

1) 3 Sampling Dates
2) 3 Field Locations
3) 2 Types of SCN resistance

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SCN Sampling Project

Time of Sampling

		SCN Sample Date		
Location ID	SCN Type	June 13	July 23	Sept 25
C1	Peking	750	250	50
C2	Peking	0	0	50
C3	Peking	100	50	50
C4	Peking	50	150	0
C5	Peking	150	350	0
C: Ave	Peking	**210**	**160**	**30**
D1	Peking	2,150	700	100
D2	Peking	3,050	1,850	750
D3	Peking	2,450	550	1,300
D4	Peking	1,250	900	250
D5	Peking	3,650	500	2,800
D: Ave	Peking	**2,510**	**900**	**1,040**
R1	PI 88788	3,350	350	2,850
R2	PI 88788	1,900	200	1,950
R3	PI 88788	450	350	2,550
R4	PI 88788	1,100	1,000	2,050
R5	PI 88788	200	2,950	7,800
R: Ave	PI 88788	**1,400**	**970**	**3,440**

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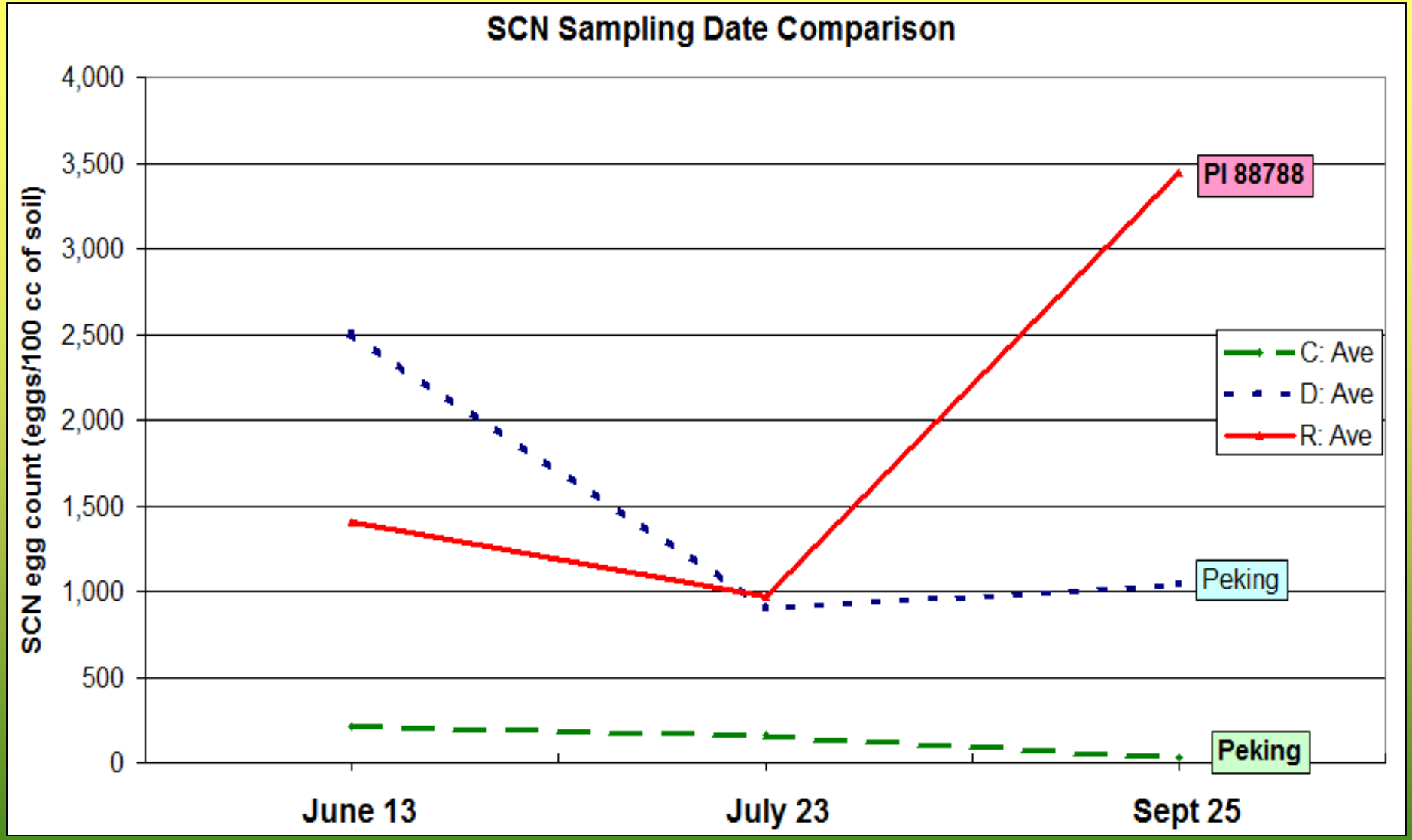
SCN Sampling Project: Time of Sampling



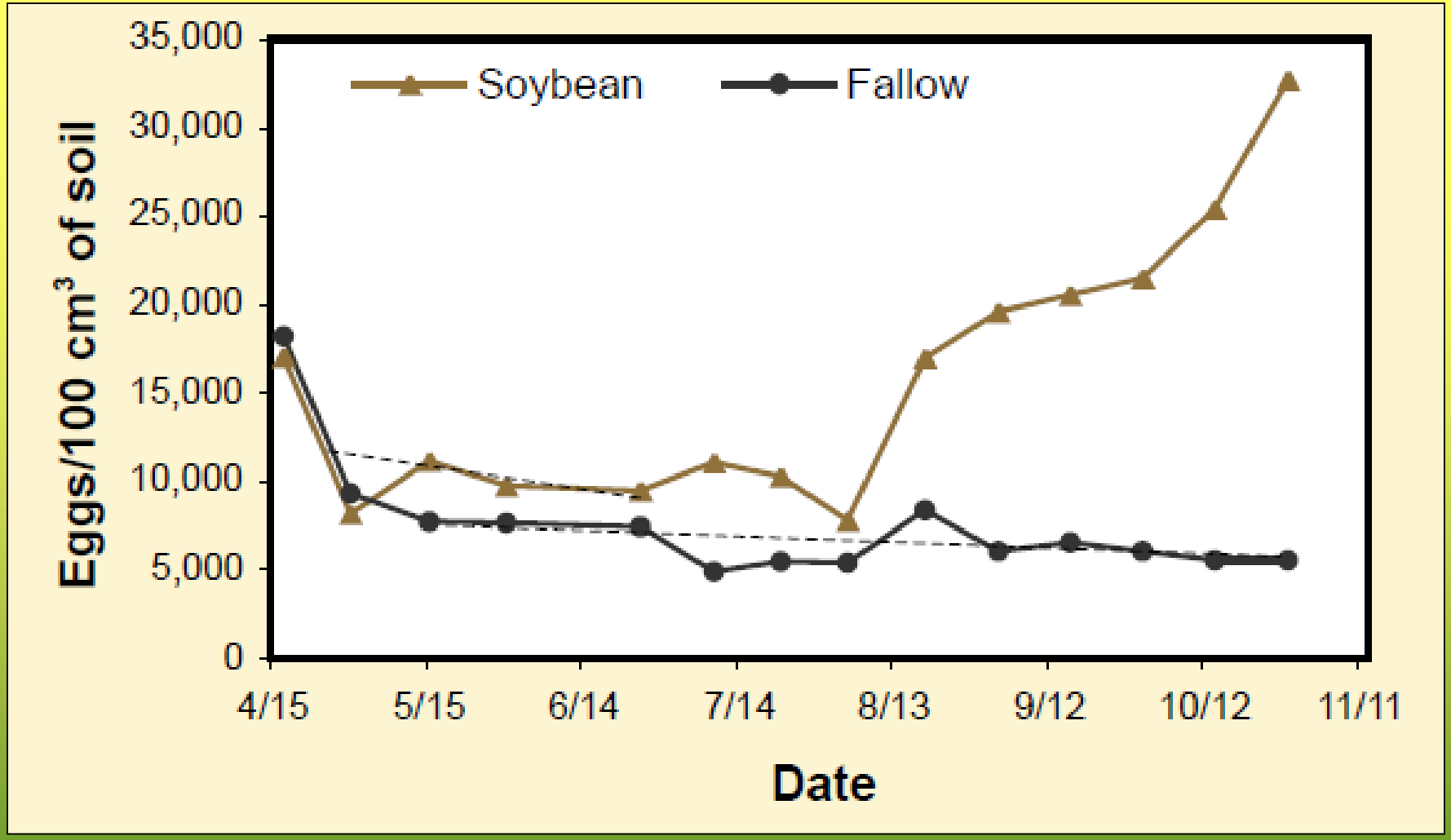


Fig. 6. Seasonal change of SCN egg population planted with susceptible soybean and in fallow in 2008.
Soybean Cyst Nematode Management Guide: U of MN Extension
https://extension.umn.edu/soybean-pest-management/soybean-cyst-nematode-management-guide

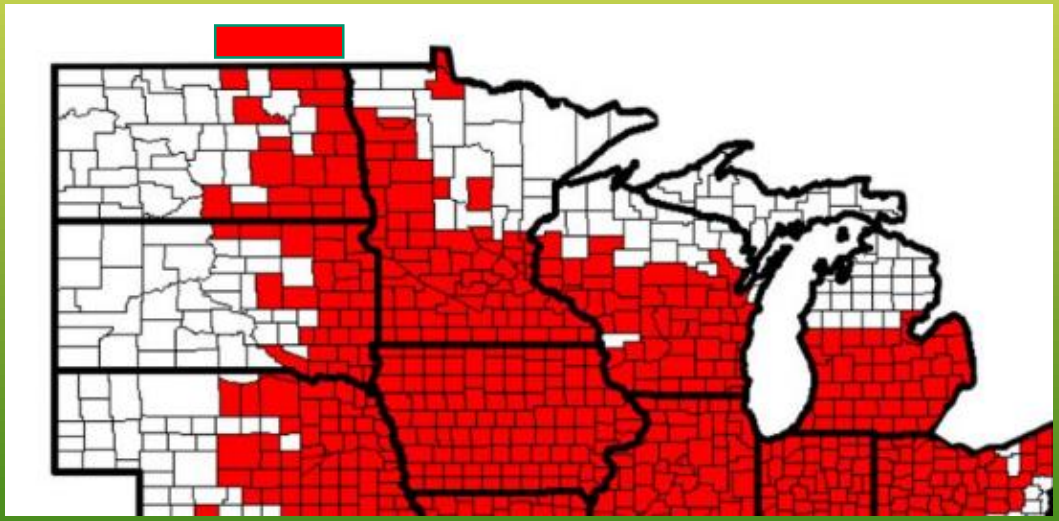
SCN Project: PI 88788 Resistance

Nearly all, > 95%, SCN resistant varieties use the PI 88788 trait.

PI 88788 has been the main source of resistance for over 20 years.

<u>Currently, SCN reproduction is common and widespread</u> in Iowa and many states of the Midwest <u>on PI88788 varieties</u>.

*Dr. Greg Tylka, ISU



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SCN Project: PI 88788 Resistance

HG Type testing:

Test of a SCN population, to see if it has overcome a SCN resistance trait.

It is a greenhouse grow-out test using various susceptible and non-susceptible soybean varieties.

	HG type classification							
Indicator lines	0	1	2	3	4	5	6	7
1. PI 548402 (Peking)		+						
2. PI 88788			+					
3. PI 90763				+				
4. PI 437654 CystX®					+			
5. PI 209332						+		
6. PI 89772							+	
7. PI 548316 (Cloud)								+

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SCN Sampling Project

Take Home Message

If **initial SCN testing** to see if SCN is a present in a field, then OK to sample throughout growing season.

If **monitoring SCN populations**, then best to sample later in season when SCN are at their highest levels.

If areas with **long history of SCN**, then the PI88788 is probably losing its' effectiveness.

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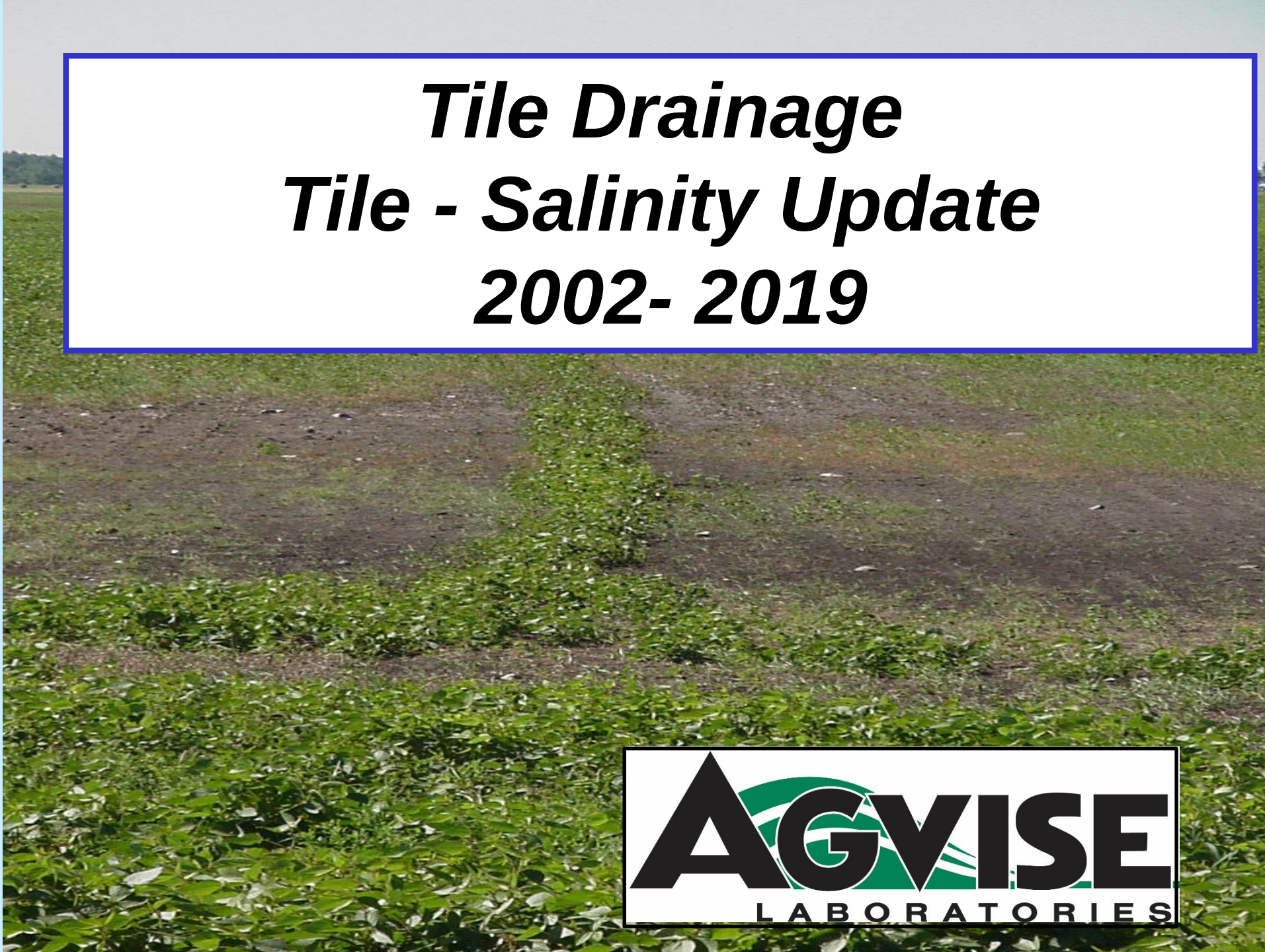
Wintex 1000

Richard Jenny
Agronomist, CCA
richardj@agvise.com
Benson, MN

Tile Drainage
Tile - Salinity Update
2002- 2019



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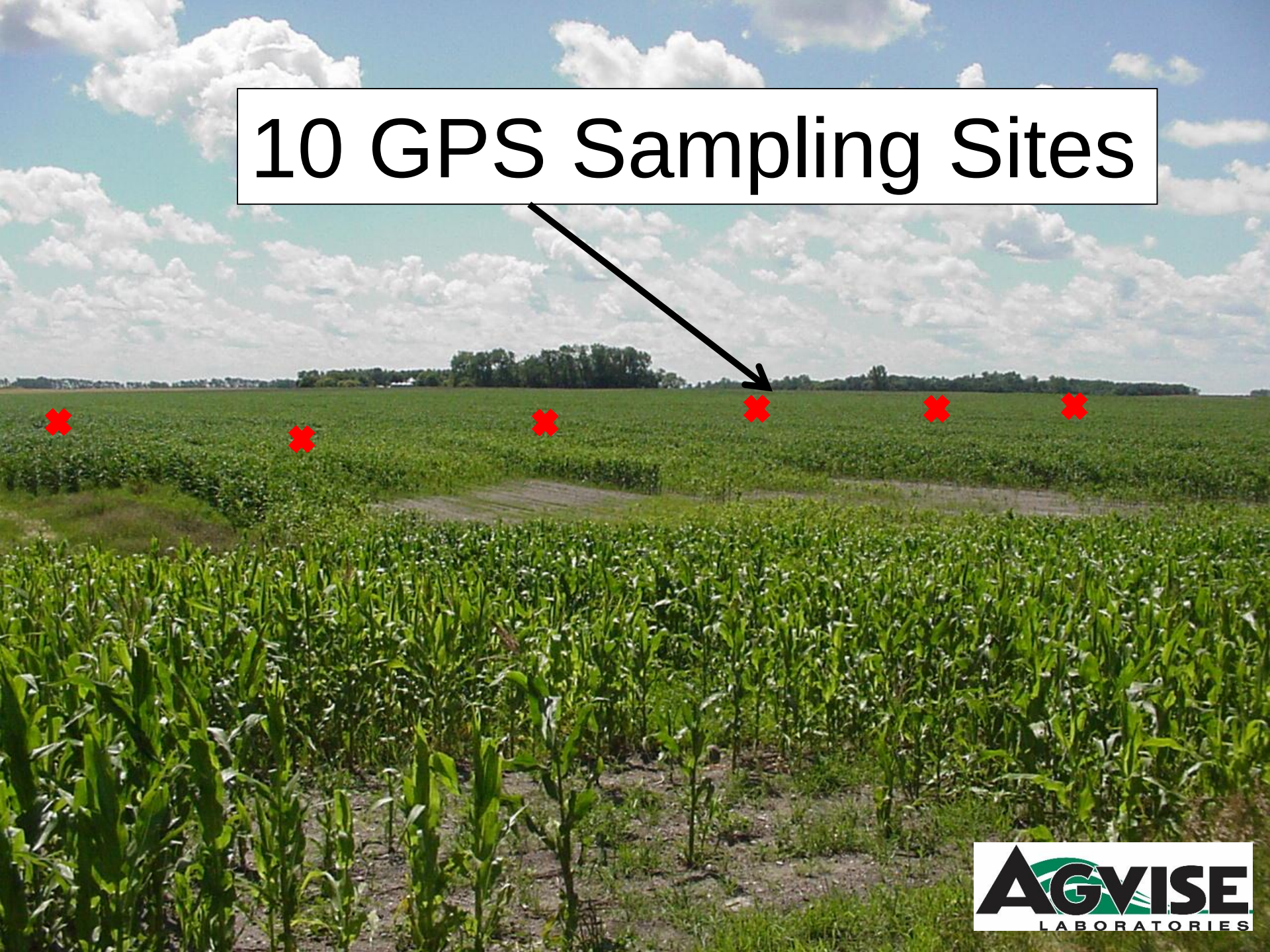
Location: 35 Miles SW Grand Forks, ND
Sandy loam to loam texture
pH 7.9-8.2
Carbonates 3-6%
%OM 4.0-5.5%

Soil Issues
High Salinity (>2.0)
High water table
Surface drainage needed work
Crop Issues
Soybeans, drybeans, (even corn)


10 GPS Sampling Sites
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2003 Soybeans


2004 Corn
AGVISE
LABORATORIES


2007 Soybeans


2008 Corn
2008 – Very good yield One of Grady's best fields!
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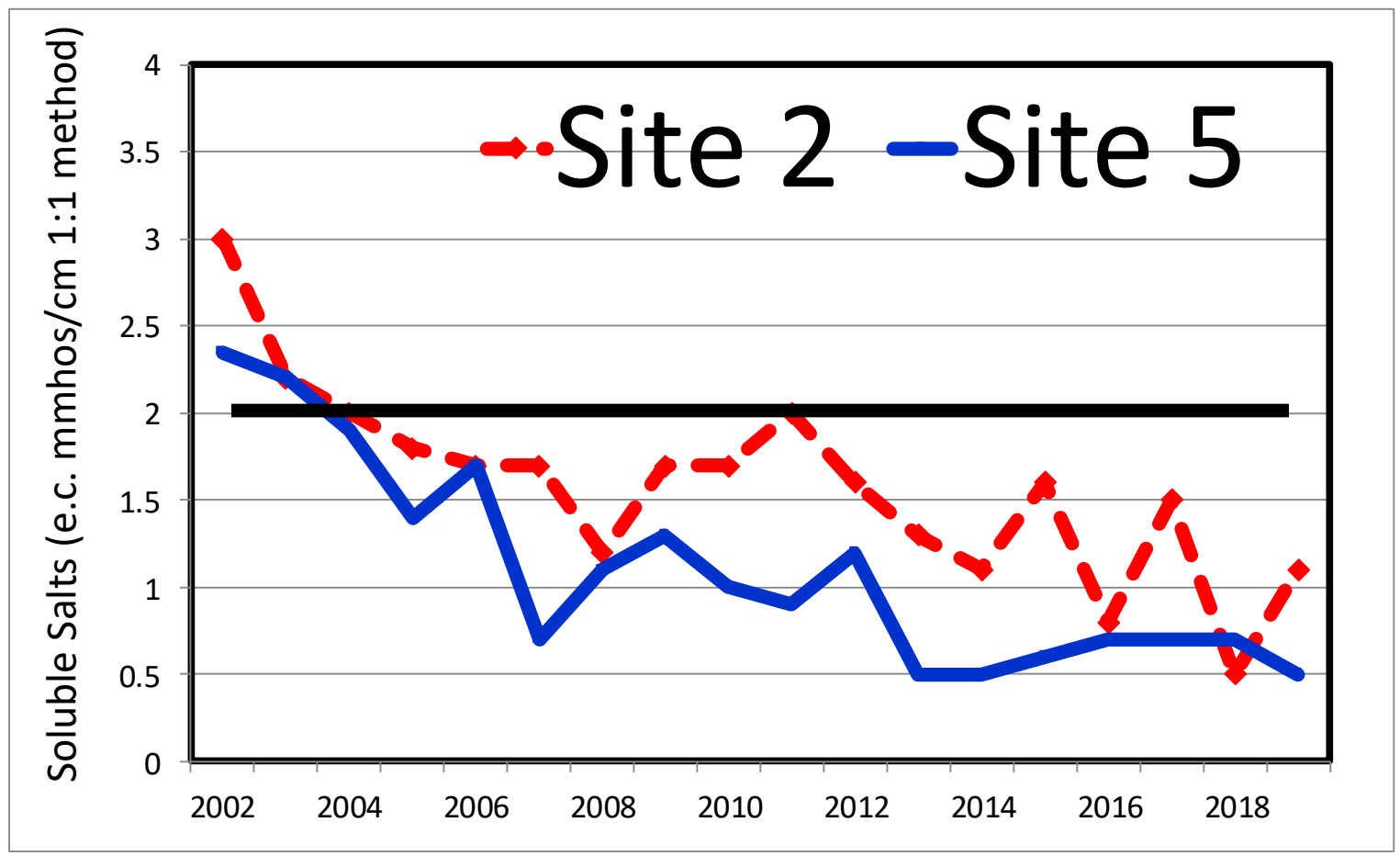
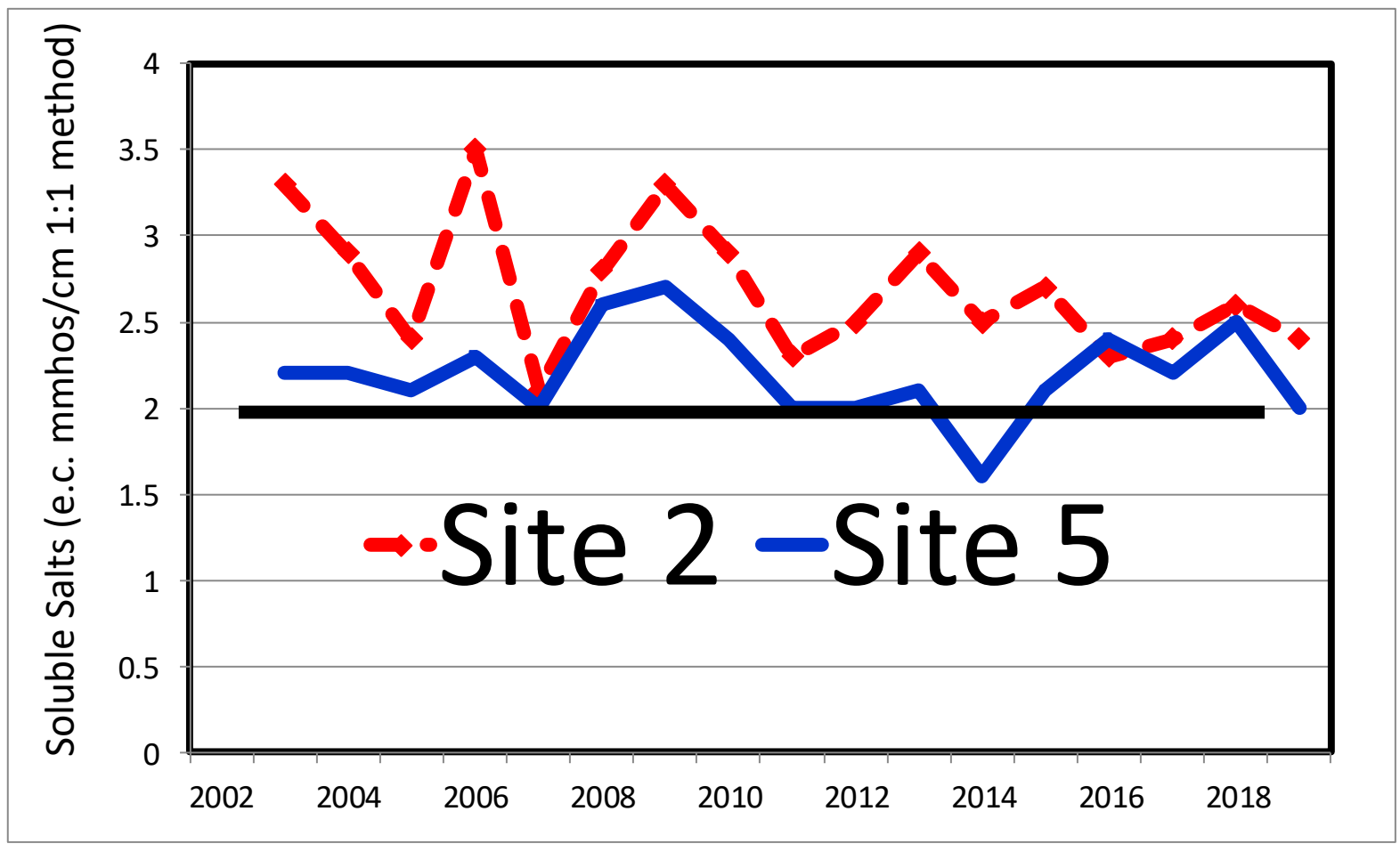
LABORATORIES

Top Soil Salinity
Tile Drained Feld (2002 – 2019)



Subsoil Salinity

Tile Drained Feld (2002 – 2019)



Monthly Rainfall (Grand Forks)
2002 – 2018 April -October

	5 year Ave	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	2019
April	1.0	.2	.4	.9	.6	.5	1.3	1.0	2.9	1.2	.7	2.6	.5	1.4	.8	.8	1.4
May	2.7	4.4	2.8	2.4	5.1	.9	2.1	4.8	3.0	1.6	4.5	2.0	3.7	3.8	.8	1.7	1.7
Jun	3.5	.8	7.0	.6	4.5	3.0	3.8	3.5	3.0	3.0	3.1	6.0	2.4	3.1	6.9	5.1	2.5
July	3.2	2.2	.7	.9	1.7	3.6	1.8	2.1	3.7	3.1	.9	1.8	3.2	5.2	1.0	2.9	4.2
Aug	2.9	2.9	5.0	5.4	2.8	3.0	2.7	1.7	2.2	2.2	1.1	3.7	2.5	3.6	.7	1.3	4.4
Sep	2.0	3.3	1.4	2.8	1.0	3.8	1.3	5.7	1.2	.1	2.5	1.5	.4	5.3	4.2	2.5	9.0
Oct	2.0	2.1	2.5	1.2	3.0	3.9	3.5	2.1	.5	2.9	2.8	.5	1.2	1.7	.1	2.9	3.6
Total	17.2	15.9	19.9	14.1	18.9	18.7	16.6	20.7	16.3	13.9	15.5	18.1	13.9	24.1	14.5	17.2	26.8

Red number indicates a month or year with rainfall higher than 5 year average

Tile Drainage – Salinity Results Sandy Loam – Loam Soil

- *Topsoil salt levels decreased in years with high rainfall (April, May, September, October)*
- *Topsoil salts actually increased in dry years*
- *Subsoil salinity levels are decreasing very slowly*
- *Surface drainage was critical along with tile*
- *Salinity improvement was pretty fast due to lighter soil texture (sandy loam)*
- *Most crops now produce good yields*

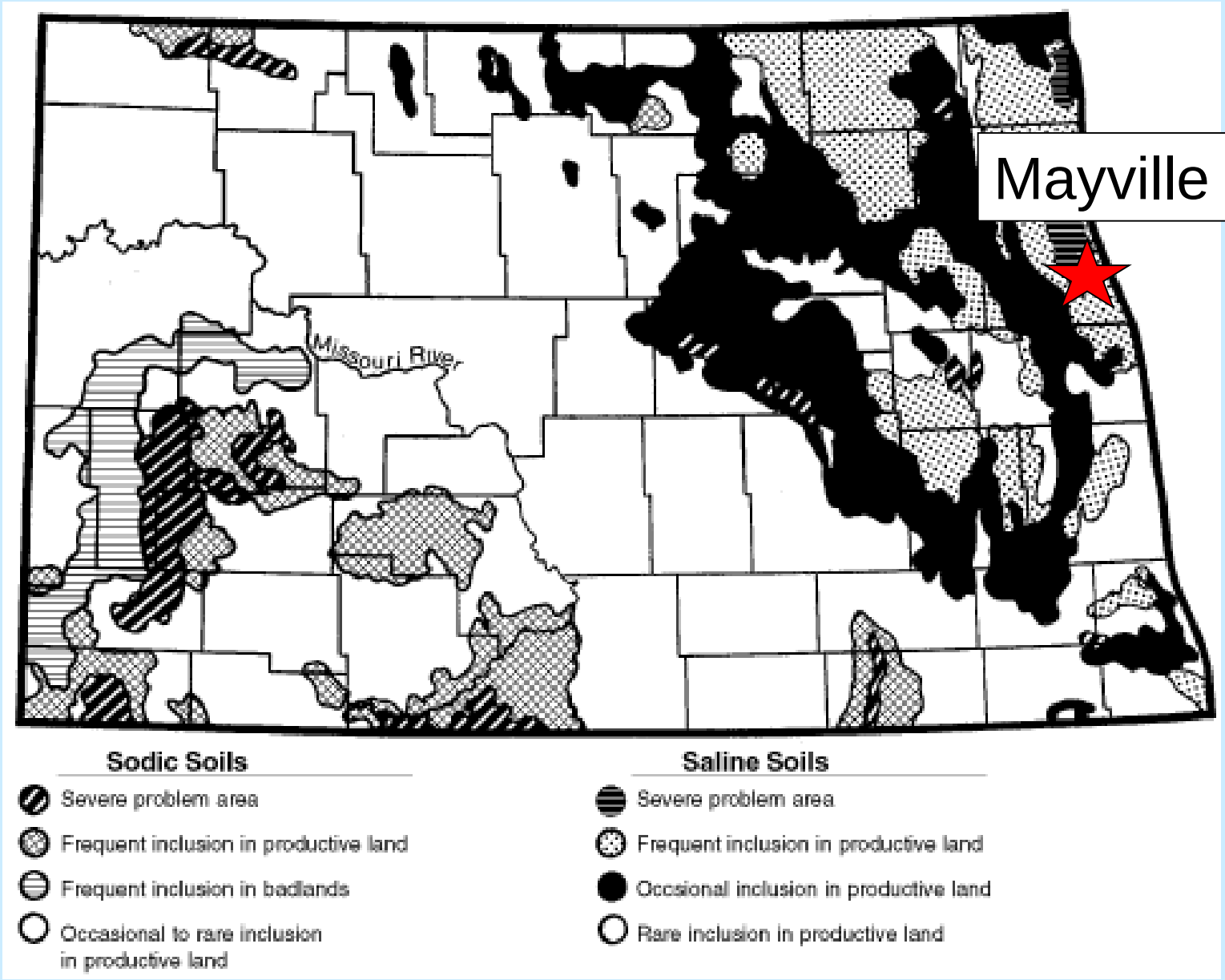
What should you expect for salinity changes on Heavier Clay Loam Soils?

- *Topsoil salt levels will decrease, but it will take a lot longer (maybe decades?)*
- *Many benefits happen faster than changes in salinity*
  - *Lower water table*
  - *Earlier planting date (more plant water use)*
  - *Better trafficability (less compaction)*
  - *Lower N losses*
  - *Many other benefits!!!*

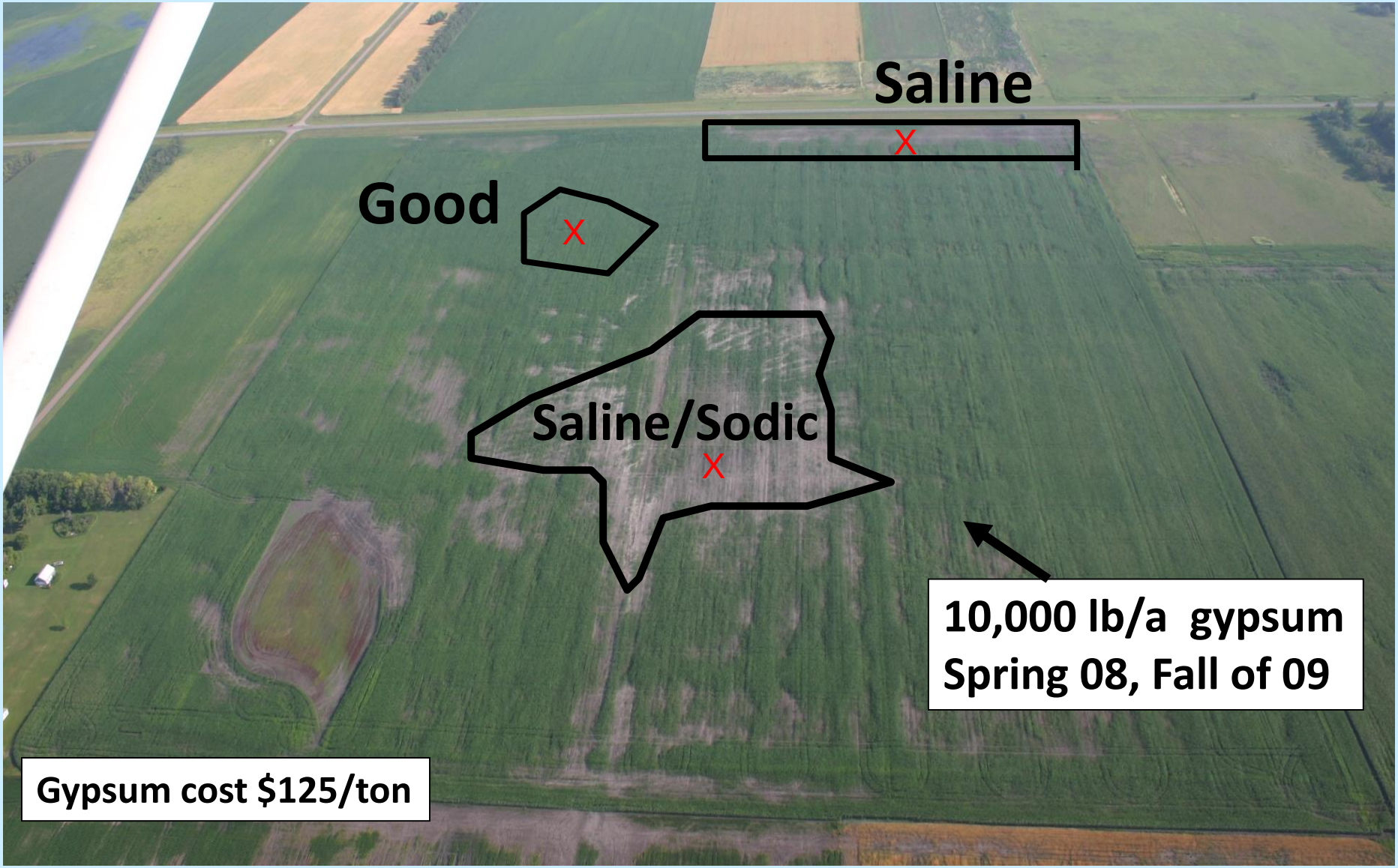
Saline/Sodic Soil Soil Amendment Project 2009 – 2019

- *Tile Drained - 2007*
  - *Most Acres : Low salt and low sodium*
  - *Some acres: Saline (High salt) and low sodium*
  - *Some acres: Saline (High salts) and Sodic (High sodium)*

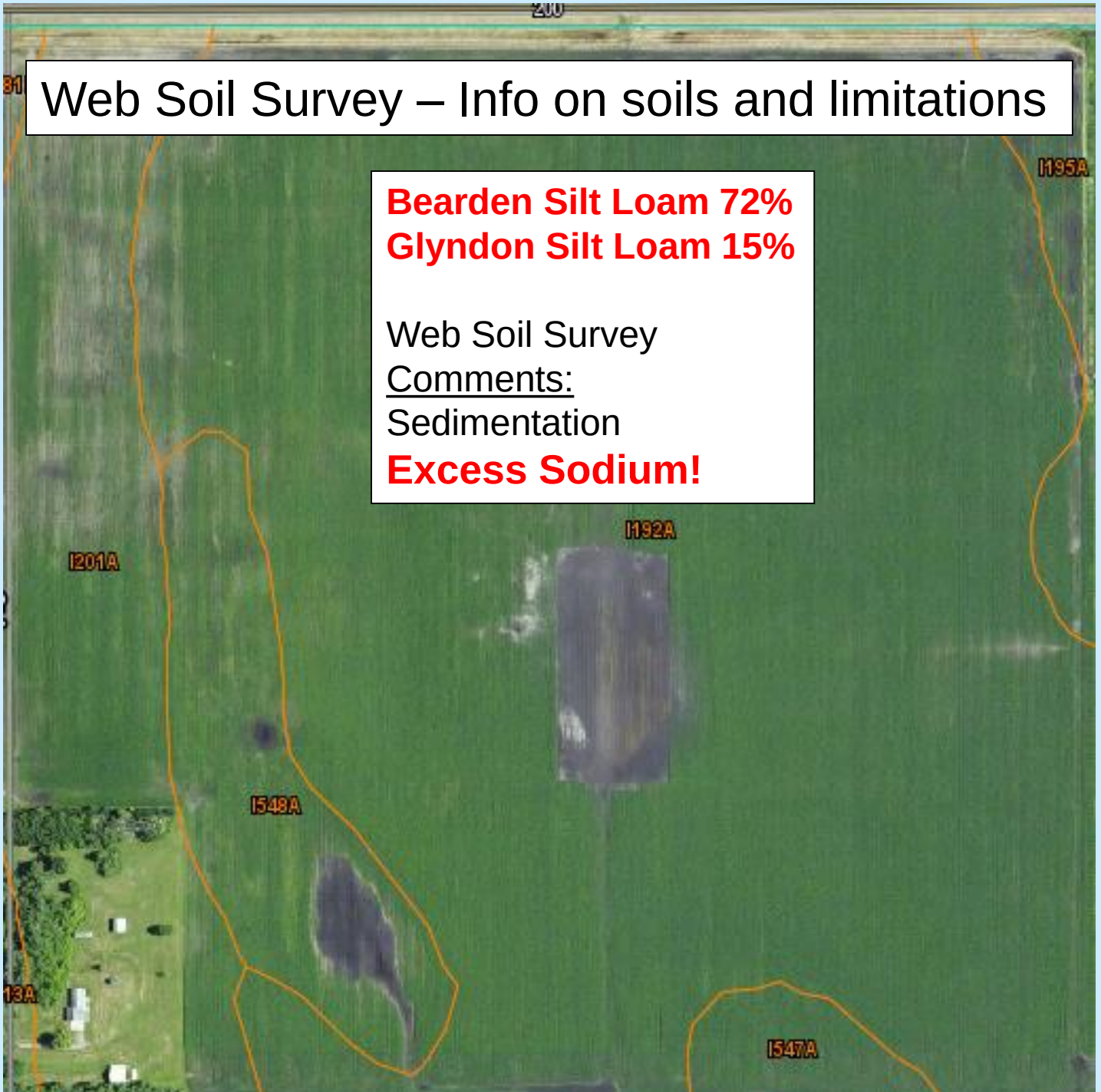
Saline and Sodic Soils in North Dakota



Greg Riedman – Consultant Mike Kozojed – Farmer



Web Soil Survey – Info on soils and limitations



Bearden Silt Loam 72%
Glyndon Silt Loam 15%

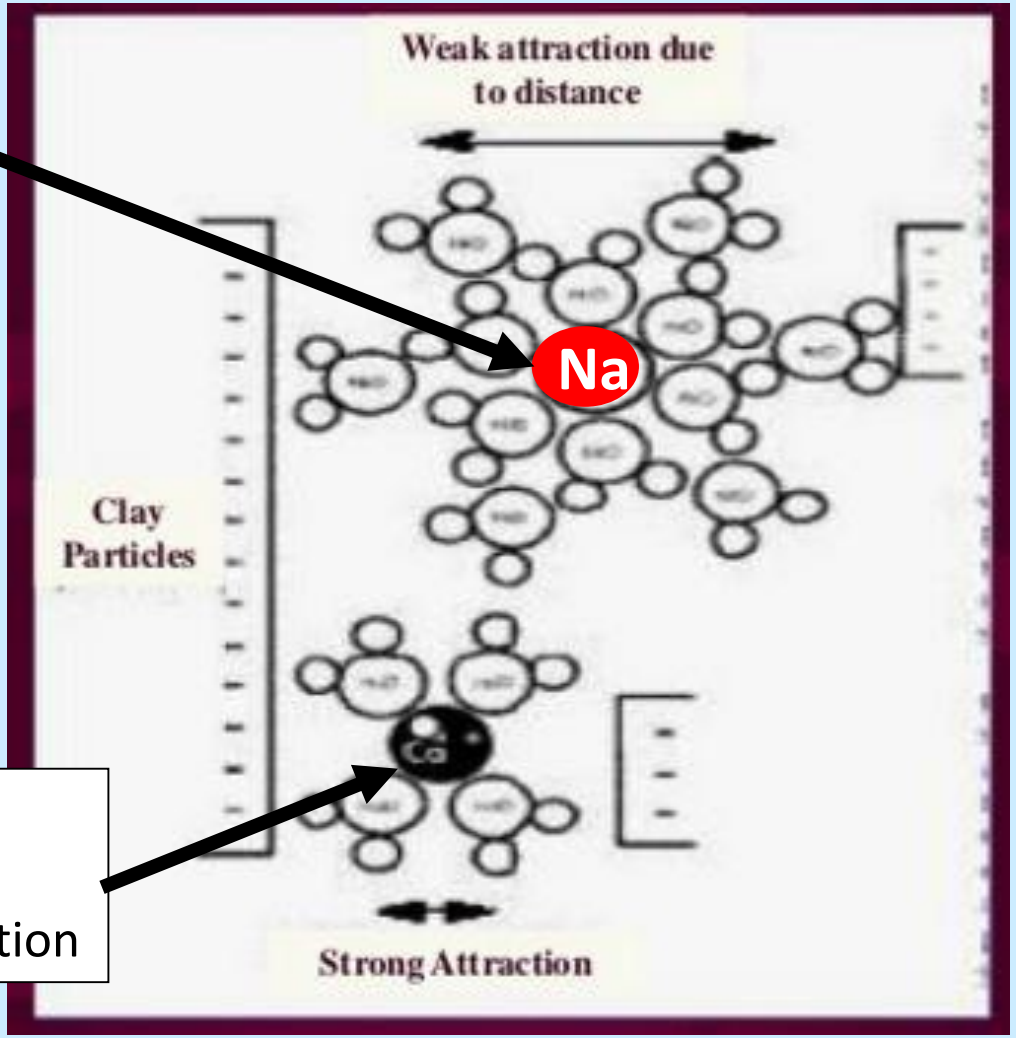
Web Soil Survey
Comments:
Sedimentation
Excess Sodium!

Saline and Sodic Soil
Salinity >2.0 & Sodium >13%

- *Soils with high salts and high sodium have good structure (feel soft and crumbly)*
- *Tile can leach salts away over many years on this heavy soil (wet years required)*
- *Gypsum (CaSO4) needs to be applied prevent sodium from destroying soil structure (Calcium replaces sodium on soil exchange sites)*
- *If salinity falls below 1.0, and sodium remains high, the sodium may cause swelling and dispersion (Water flow is greatly reduced).*

Sodium forces clay particles apart (weaker attraction)

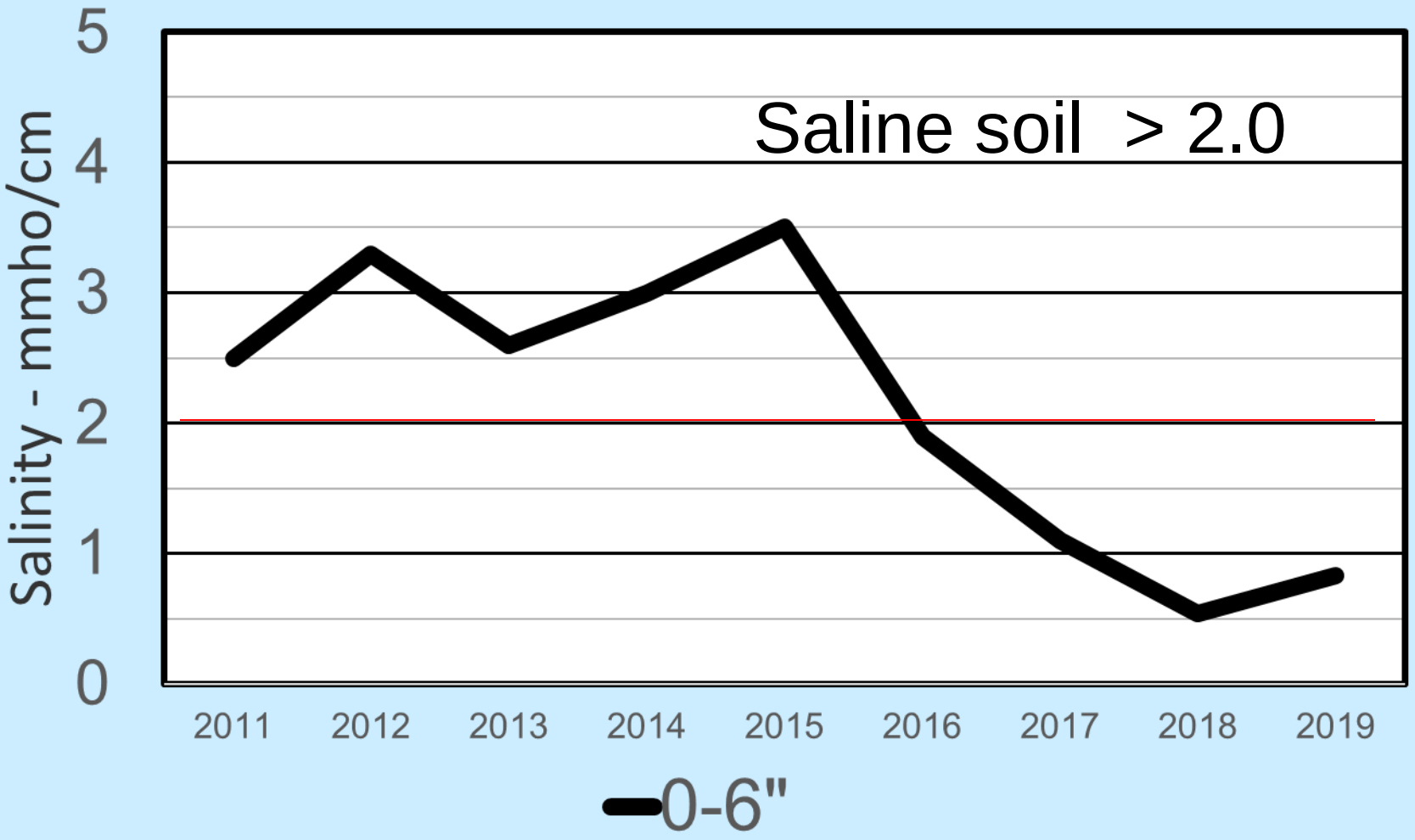
Hydrated Sodium pushes the clay particles Further apart resulting in weaker attraction



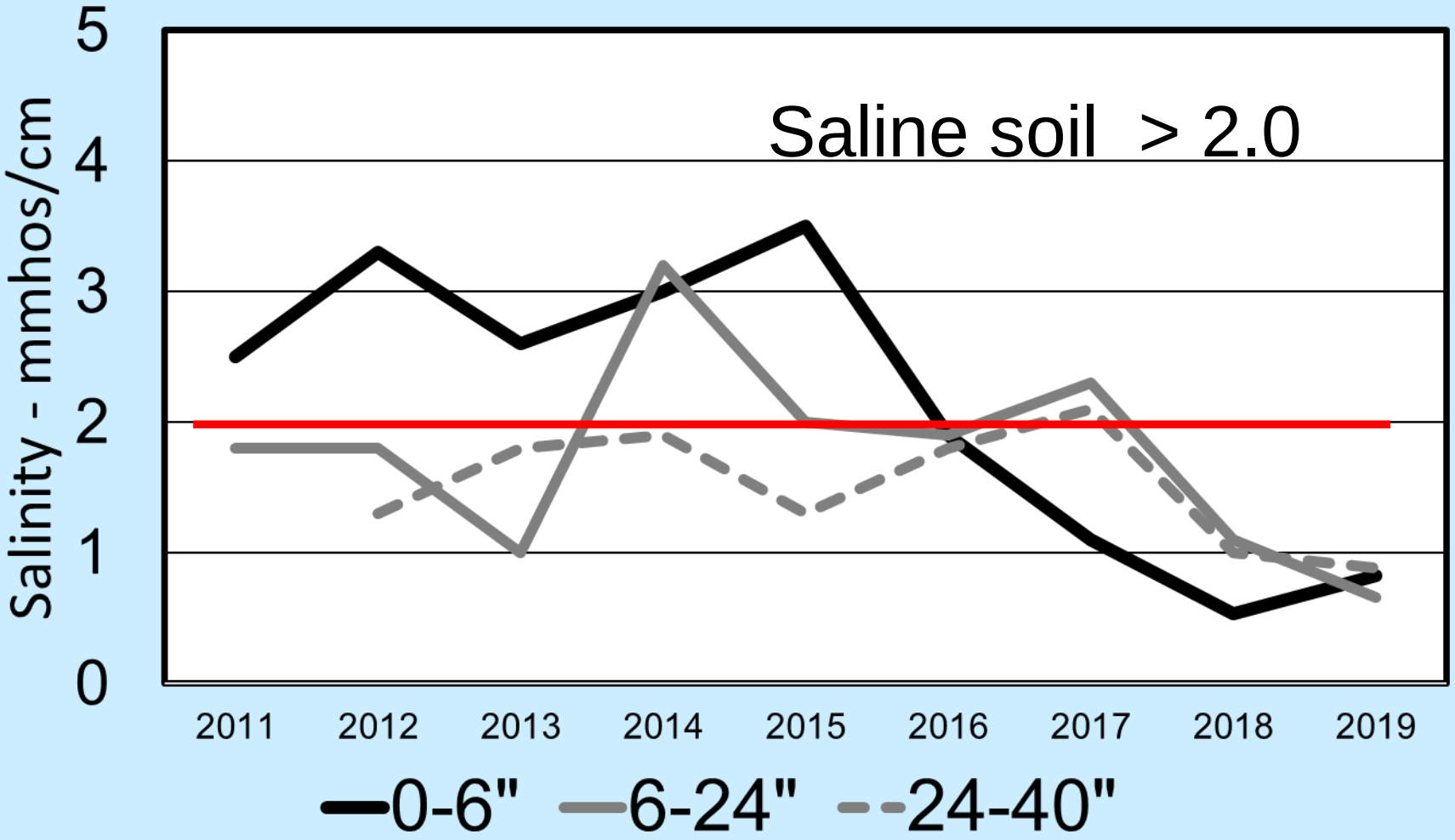
Calcium is smaller with two charges and Allows clay particles to be closer resulting in Stronger attraction

Salinity (e.c.) - Topsoil

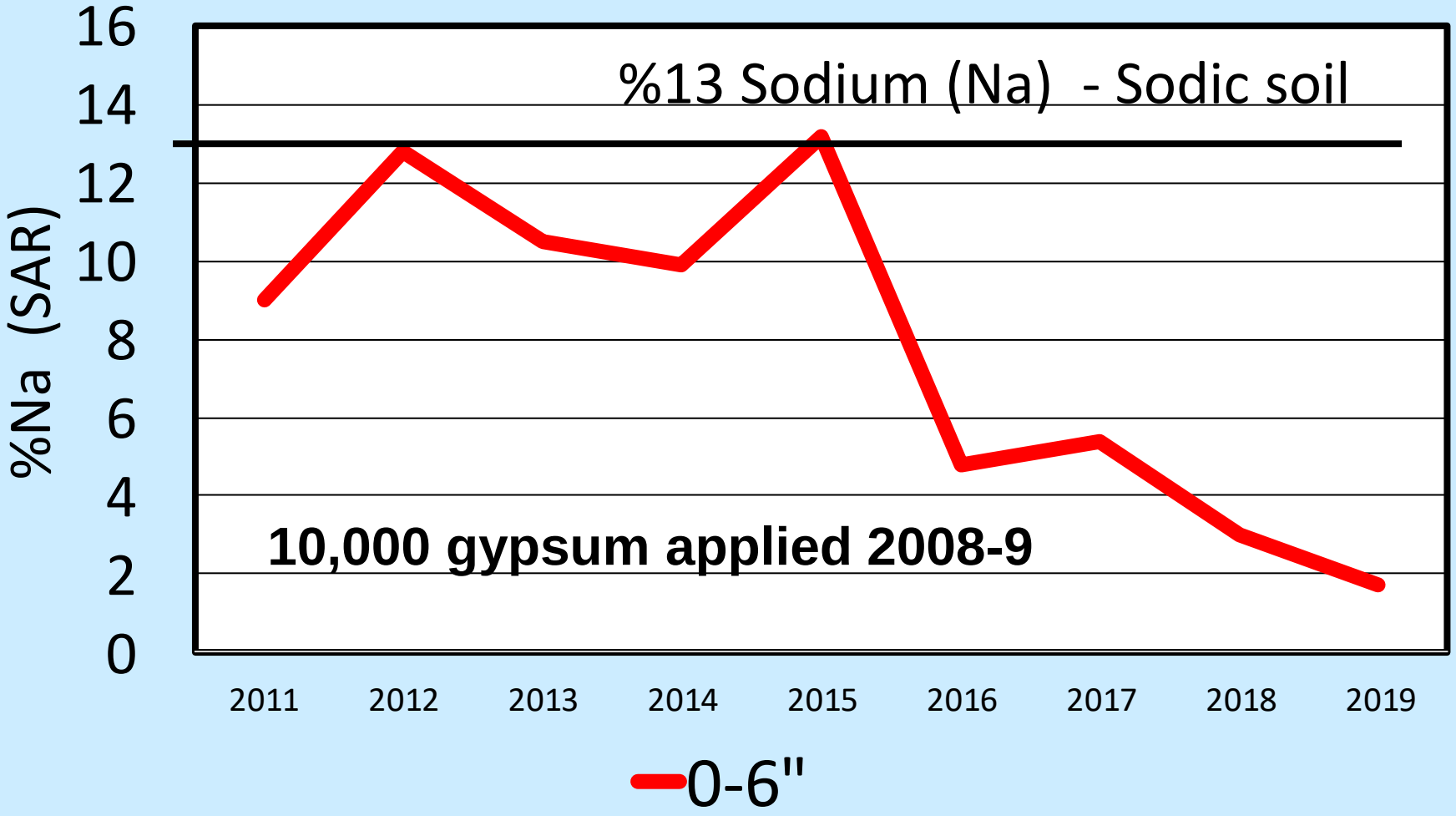
2011-2019



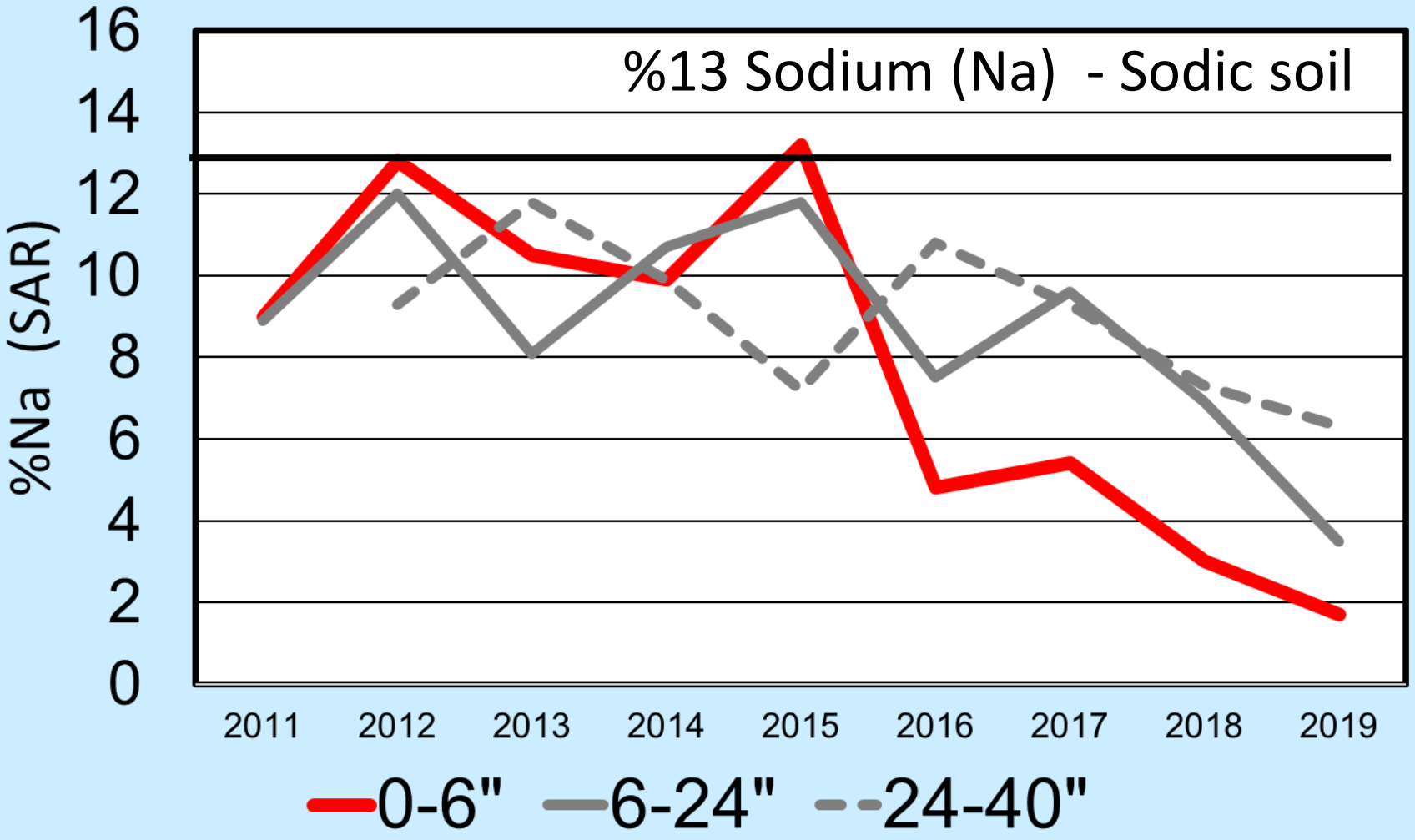
Salinity – Top and subsoil
2011-2019



Sodium (%Na) - Topsoil



Sodium (%Na)
Topsoil and Subsoil depths



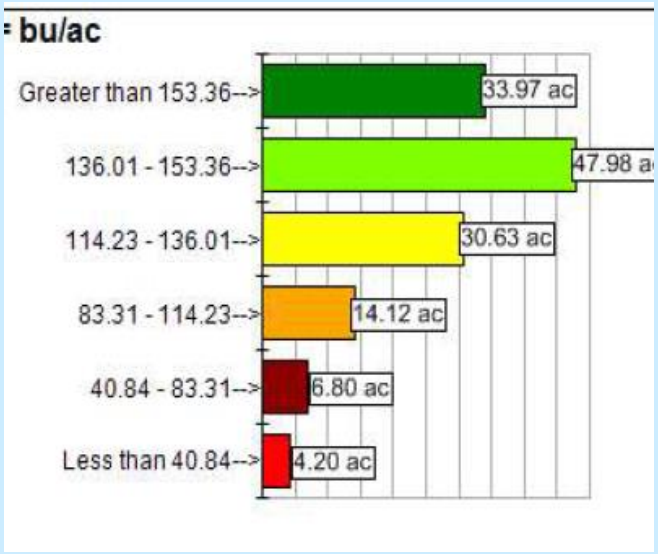
Monthly Rainfall (Hillsboro)
2002 – 2019 April –October (NDAWN)

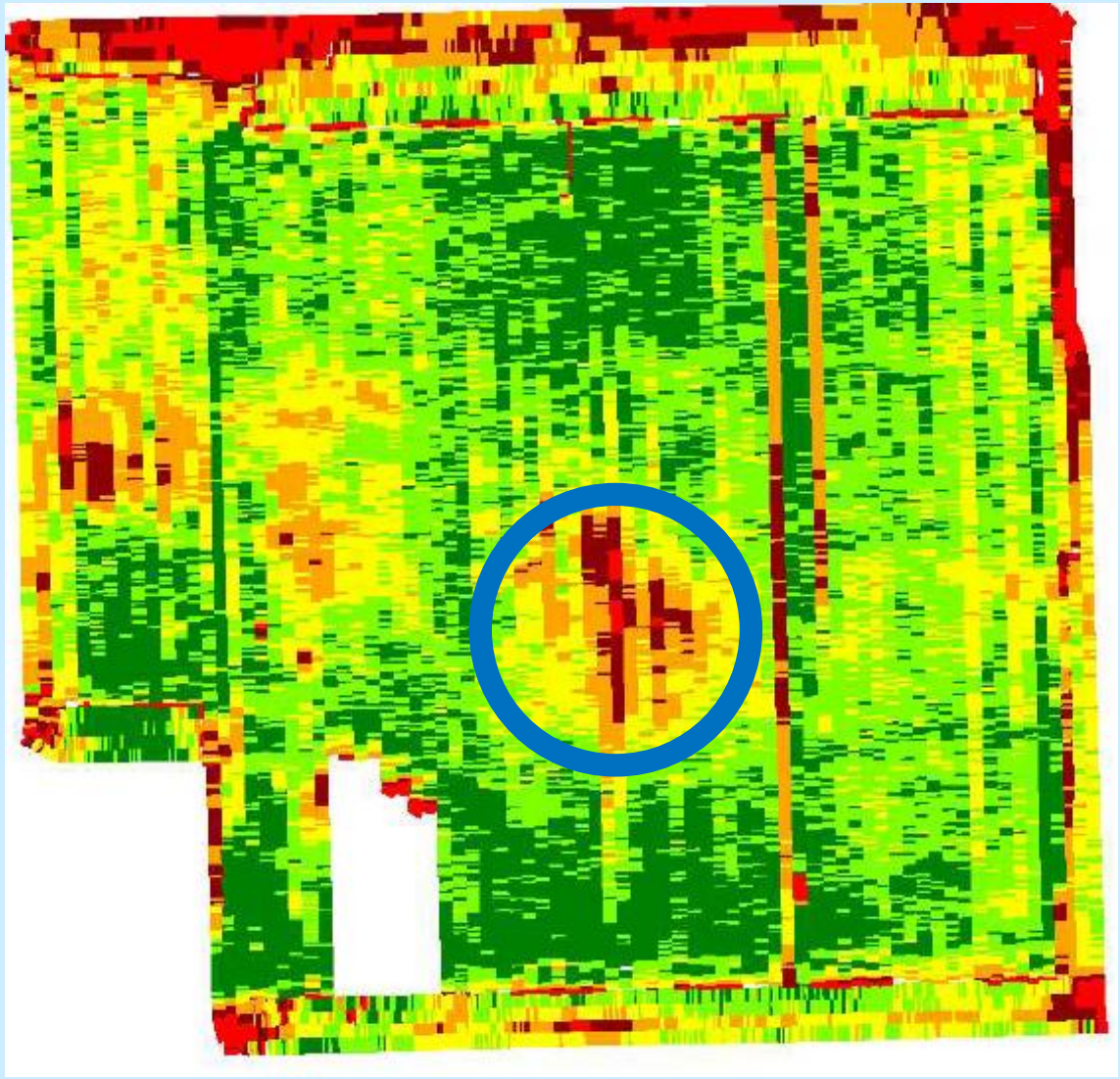
	5 year Ave	07	08	09	10	11	12	13	14	15	16	17	18	19
April	1.4	1.3	0.8	0.9	1.2	1.9	1.2	1.1	2.8	0.6	1.5	0.9	0.2	1.2
May	2.7	3.9	1.1	1.8	2.8	2.8	1.0	1.6	1.6	3.9	3.2	0.9	1.7	1.8
June	3.6	5.2	4.5	3.2	1.7	4.2	3.1	5.9	5.9	4.3	1.3	2.9	4.2	2.3
July	3.3	1.7	4.7	1.7	2.6	3.2	0.7	2.0	2.0	2.6	4.0	1.6	2.9	4.5
Aug	2.5	1.1	1.5	3.1	2.9	5.3	2.5	2.8	2.8	1.2	5.2	0.6	2.7	4.2
Sep	2.2	2.6	4.8	2.2	6.1	0.6	0.2	1.6	1.6	0.7	2.8	6.3	2.6	7.7
Oct	2.2	1.7	3.8	5.0	2.1	0.6	2.5	0.5	0.5	1.4	2.0	0.1	3.5	3.5
Total	17.9	17.5	21.2	17.9	19.4	18.6	11.2	17.2	17.2	14.7	20.0	13.3	17.8	25.2

Red number indicates a month or year with rainfall higher than 5 year average

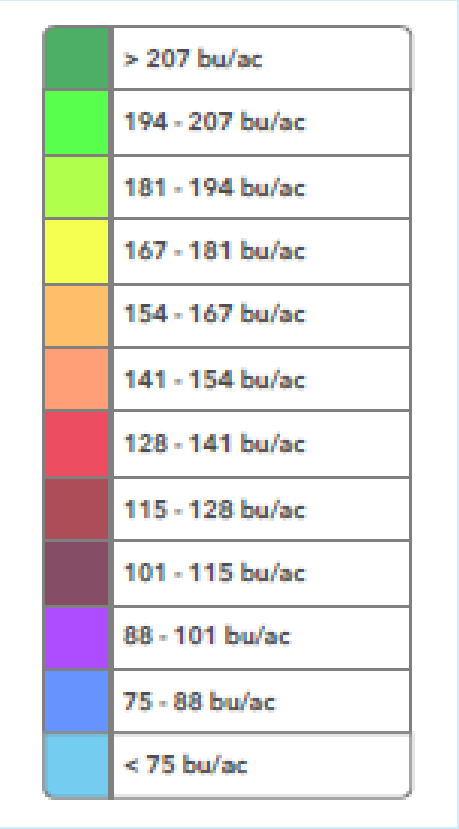
Corn Yield 2014

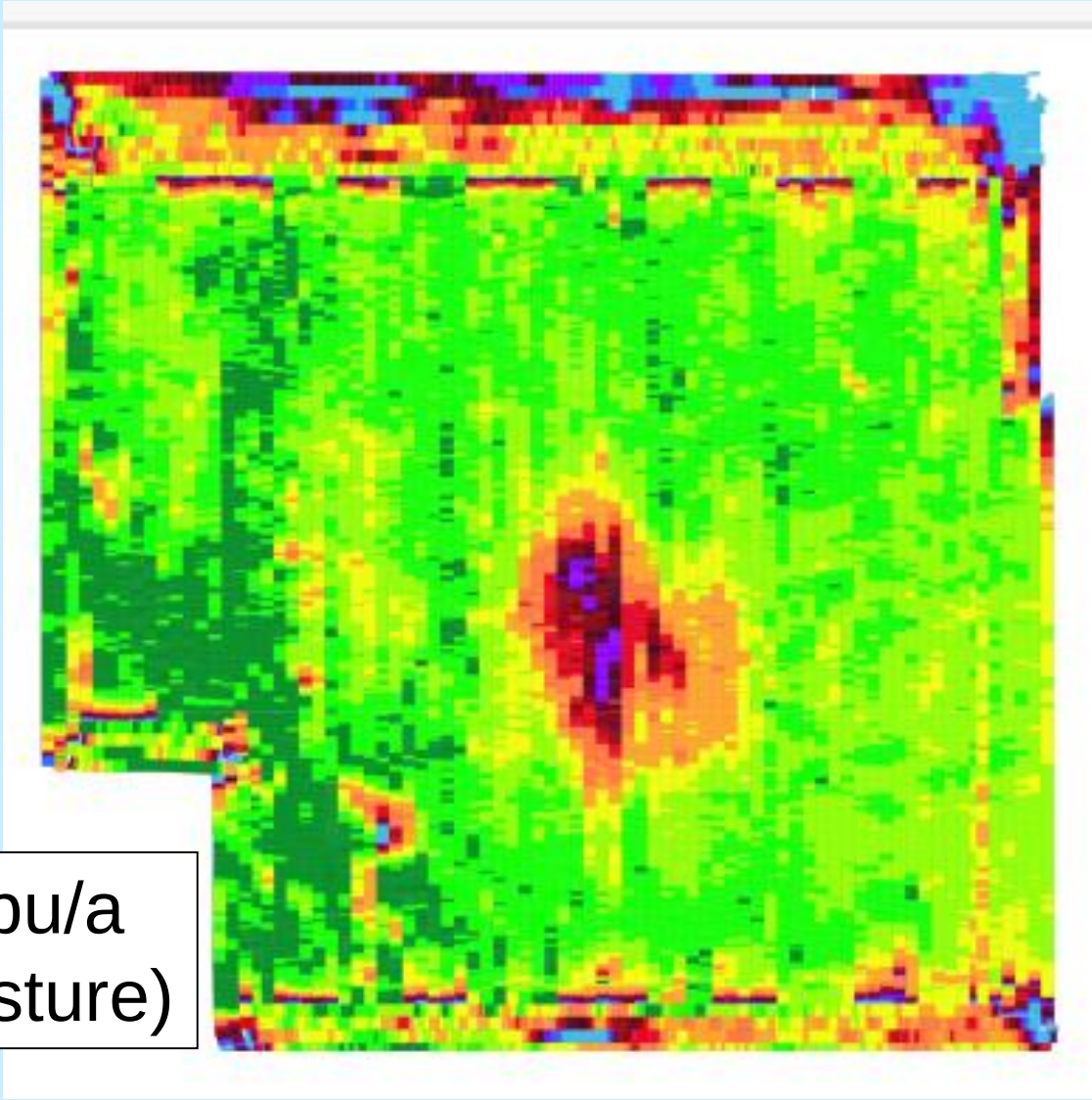
Averaged 133 bu/a
Dry corn





Corn Yield 2016





Averaged 184 bu/a
Corn (17.9% moisture)

Saline & Sodic Soil

- *Salinity has decreased in topsoil (didn't decrease until 2016)*
- *Gypsum application has prevented sodium from causing issues with topsoil. No dispersion has been observed which would limit water infiltration.*
- *Sodium lower in the profile may cause swelling and dispersion when salts get below 1.0 (no issues observed yet)*

What should I expect when tiling fine texture soil with High salinity and High sodium?

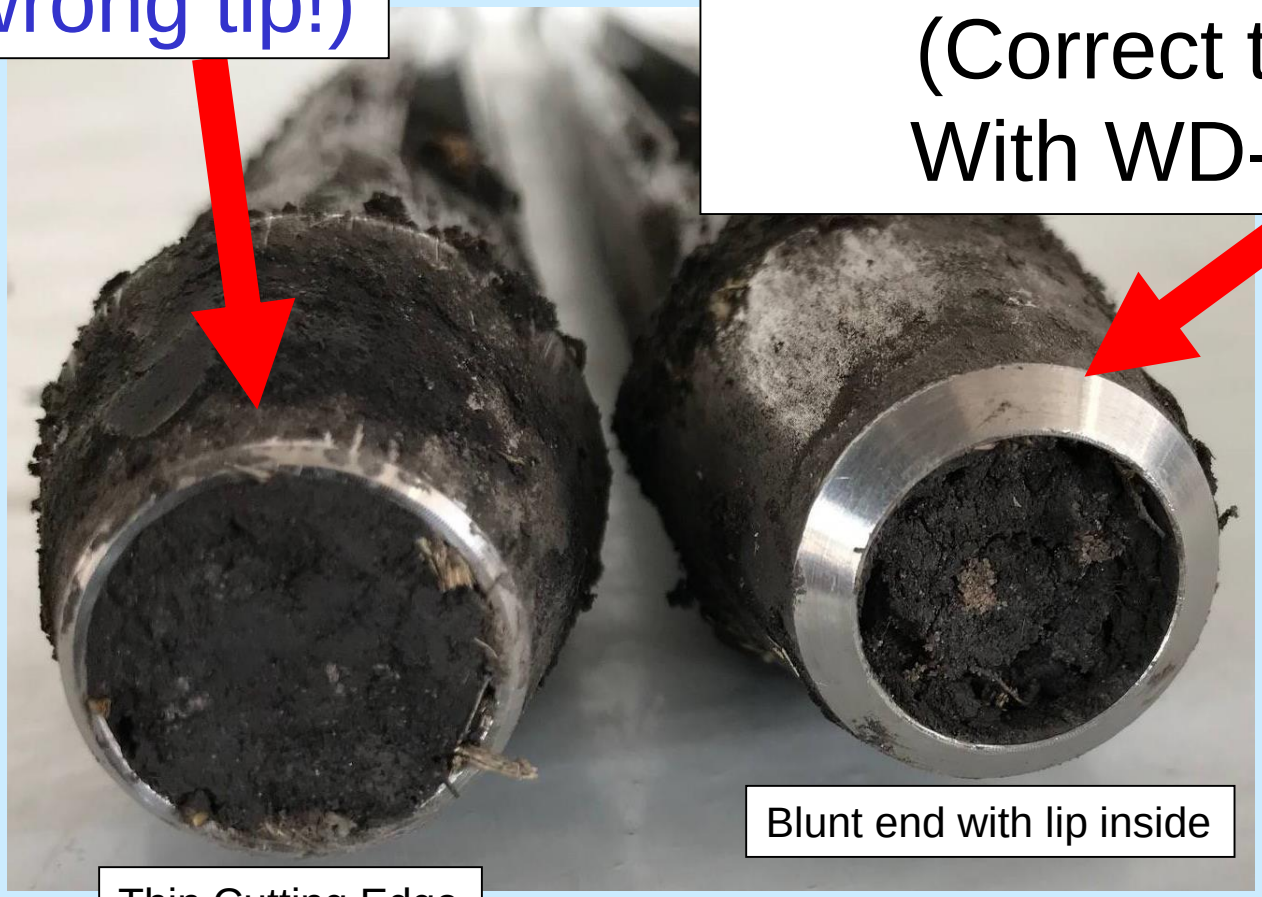
- *Tile drainage will keep affected area from getting larger*
- *Salts will decrease very slowly in the topsoil over many years (fine text soils take much longer)*
- *Soils with sodium issues require gypsum to avoid issues with dispersion once salts leave (expense)*
- *Tiling fields with coarse/ medium texture and moderate salinity and sodium issues will be better investment (They will respond quicker)*
- *Pick your fights wisely!*

Why Lubricants For Soil Sampling?

Wet Sticky Soil Conditions

Plugged
Dry Tip
(wrong tip!)

Wet tip with recessed
Lip - Not plugged
(Correct tip)
With WD-40



Blunt end with lip inside

Thin Cutting Edge

Why WD-40?

- *Previous Testing showed low contaminants*
- *Lubrication has been proven*
- *Evaporates away quickly (others lubricants remain on the probe)*
- *Can penetrate the surface of the metal to keep lubricating*

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Soil Sampling Lubricants

University of Wyoming 1995

(WD-40 Recommended)

Lubricant	Nitrate Lb/a	P ppm	K ppm	Fe ppm	Mn ppm	Zn ppm	Cu ppm
Control	14	11	218	15.0	1.5	0.8	1.1
PAM	16	11	227	14.6	**4.0**	0.8	1.1
WD-40	**14**	**10**	**221**	**13.9**	**1.6**	**0.8**	**1.0**
LSD(0.05)	ns	ns	ns	ns	0.3	ns	ns

Retesting WD-40 (22 years later)

- *Evaluate current WD-40 (changes in formula?)*
- *Included PAM vegetable oil*
- *Included Bleach*
  - *Interest in using a lubricant that also kills microbes (bio security)*

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Soil Lubricant Contamination

Lubricant	Phosphorus	Potassium	Sulfur	pH
	ppm	ppm	lb/acre	
Control	6.4	302	21.0	7.7
WD-40	6.3	297	19.9	7.7
PAM	6.6	303	21.2	7.7
Bleach	6.7	310	21.0	7.7
LSD(0.05)	0.3	ns	ns	ns

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Soil Lubricant Contamination

Lubricant	Zinc	Iron	Copper	Manganese
	ppm	ppm	ppm	ppm
Control	1.46	14.5	0.81	4.13
WD-40	1.47	14.3	0.81	4.32
PAM	1.49	14.4	0.83	4.90
Bleach	1.48	15.0	0.82	4.69
LSD(0.05)	ns	ns	ns	ns

AGVISE LABORATORIES

Soil Lubricant Contamination

Lubricant	B	Ca	Mg	Sodium	Chloride
	ppm	ppm	ppm	ppm	lb/acre
Control	1.07	3890	360	21.85	2.60
WD-40	1.07	3900	360	20.80	2.75
PAM	1.09	3920	360	19.75	2.90
Bleach	1.08	3970	370	**28.25**	**25.55**
LSD(0.05)	ns	ns	ns	4.12	4.04

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WD-40
Still lubricant of choice!

Education Projects 2020

- *Handling samples for Nitrate*
  - *Warm, refrigerator, freezer*
  - *With and without WD-40*
- *Changing %K on Base Saturation*
  - *1000 lb/a KCl (0-0-60) wasn't enough*
  - *2000 lb/a? (Go big or go home!)*


Thank You
Questions?
CEU sign out!
Ideas for topics and Speakers
Travel Safe!