Update on the Mystery Malady

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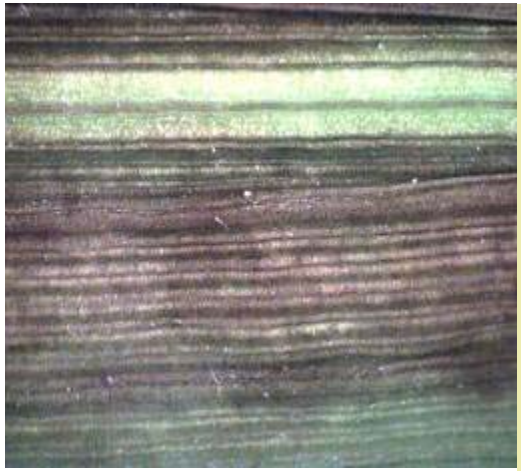
Mystery Malady

Disorder was detected in a number of fields in 2006

Three fields recovered

- Early detection
- Treatments??

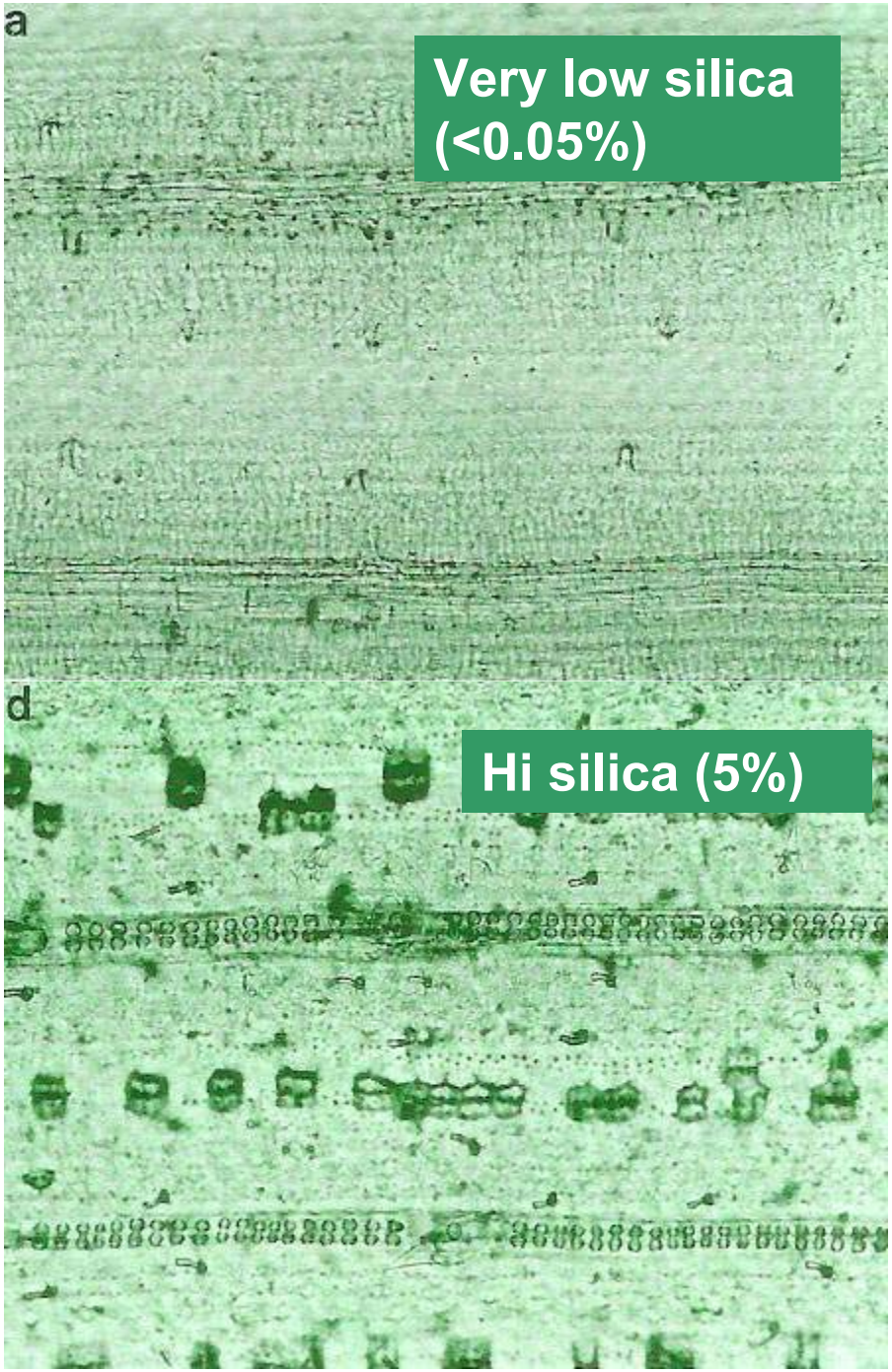
Mystery Malady Early Symptoms



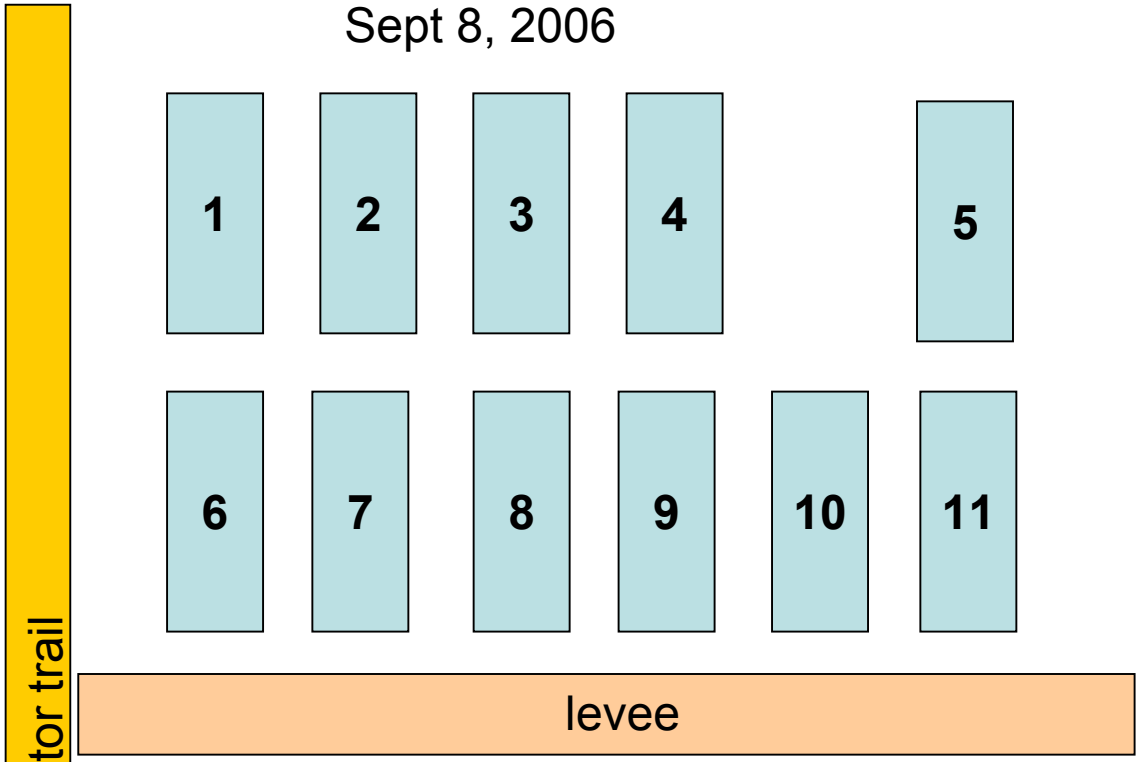
Magnified, spots appear as blotches of reddish brown below the surface of the leaf

Silica Deficiency?

- Low Si linked to a range of biotic and abiotic stresses
- Linked to excessive Fe & Al uptake



Sept 8, 2006



Unreplicated demo at Bubba Leonard's

1 $(NH_4)_2SO_4$
2 Cane Ash
3 Dia. Earth
4 Foliar (Mn, Zn, SO_4, Si)
5 Hull Ash
6 Hull ash + NH4Oac
7 K_2SO_4
8 Slag
9 Sulfur
10 $Zn+K_2SO_4$
11 $ZnSO_4$ $7H_2O$

Rice Hull Ash

Spoiled ash applied
3 yr previously

Response

Plts 16% taller

Stems 26%
greater in diam.

Straw Si 111%
higher

74% greater head
weight!

2007 Goals

- Trials to assess the ability of silica to **prevent 'malady'**
- **Survey silica status** of rice in all rice producing parishes
- Identify a suitable **soil test**

Impact of Rita's Storm Surge on Rice Land

Key Issues

- Do we have a problem?
- How do we measure salt?
- How much salt is too much?
- Will the salt persist?
- How do we remove salt?


Moss Bluff
Woodlawn
Westlake
Welsh
Jennings
Egan
Crowley
Duson
Lafayette
Lake Charles
Estherwood
Broadmoor
Broussa
Bell City
Morse
Maurice
Youngsvill
Andrew
Lake Arthur
Gueydan
Meaux
Kaplan
Abbeville
Calcasieu Lake
Grand Lake
Cameron
Creole
Grand Chenier
Intracoastal City
White Lake
Vermilion Bay
Gulf Of Mexico
10 mi

Classification Criteria

Class	Salts		SAR	Effects
None	<500	and	<4	Effects unlikely
Mild	500-1000	and	<5	Some yield reduction possible
Moderate	1000-2000	or	<6	Some yield reduction likely
Severe	2000-5000	or	<13	Substantial yield reductions likely
V. severe	>5000	or	>13	Catastrophic crop failure

Large Survey Findings

	0-3”	3-6”	6-12”	0-6"	0-12"
None	31%	41%	47%	35%	41%
Mild	11%	20%	19%	19%	15%
Moderate	7%	13%	16%	10%	16%
Severe	32%	23%	15%	30%	25%
Very severe	17%	3%	3%	6%	3%

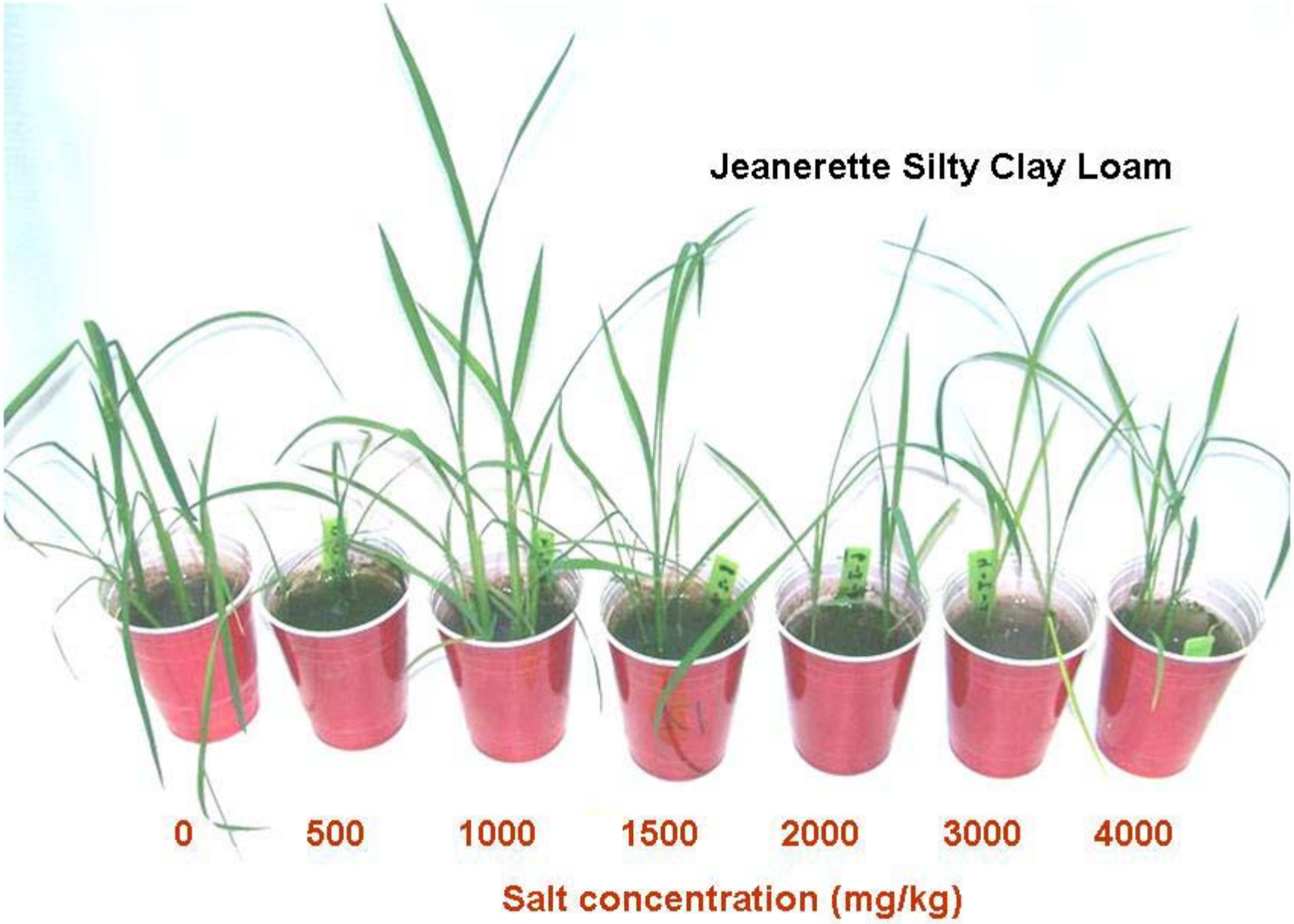
Winter rains in 2005-2006 were light and salt levels did not decrease substantially prior to planting time.

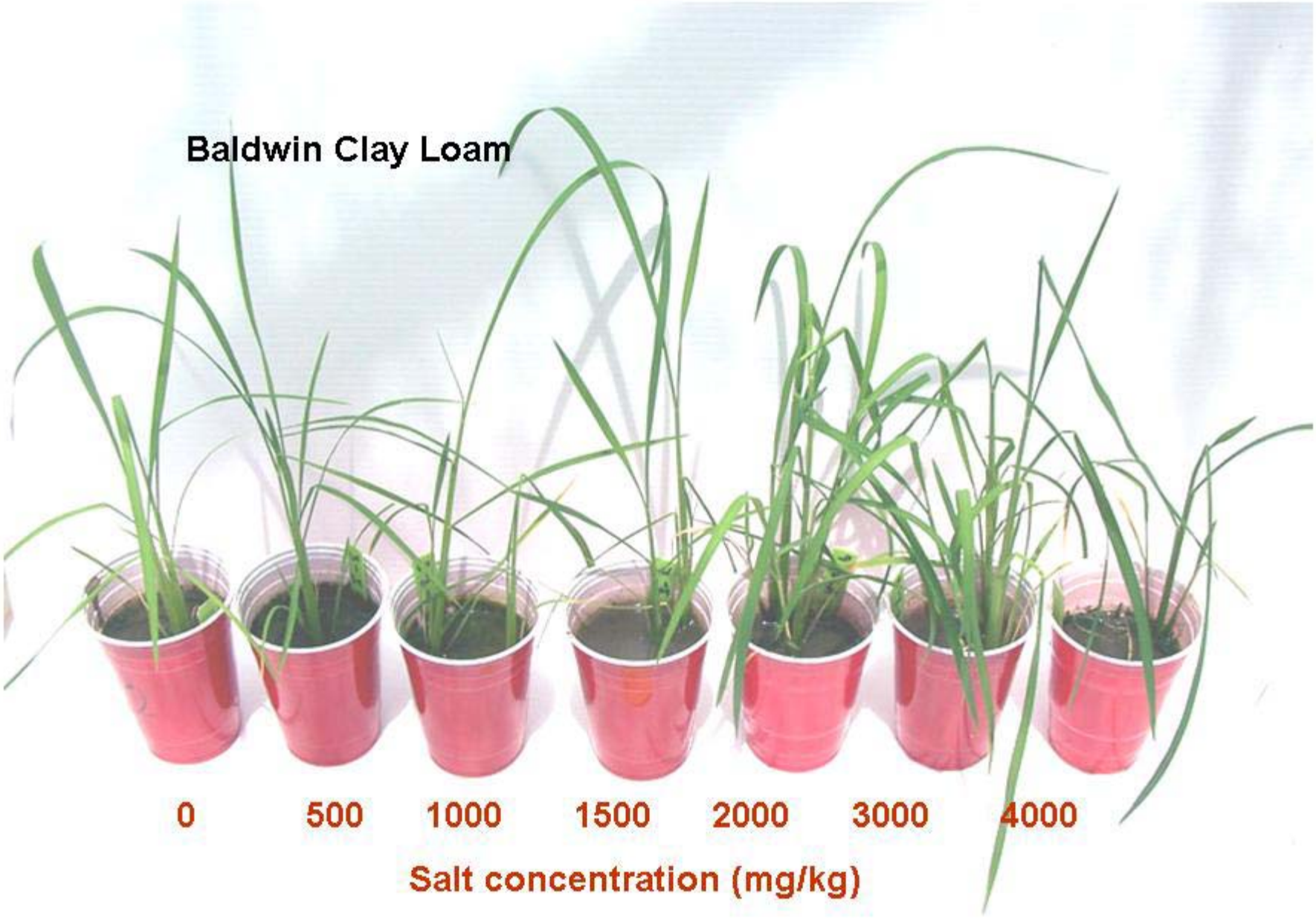
Even after a year, many fields contained high levels of salts

Crowley Silt Loam

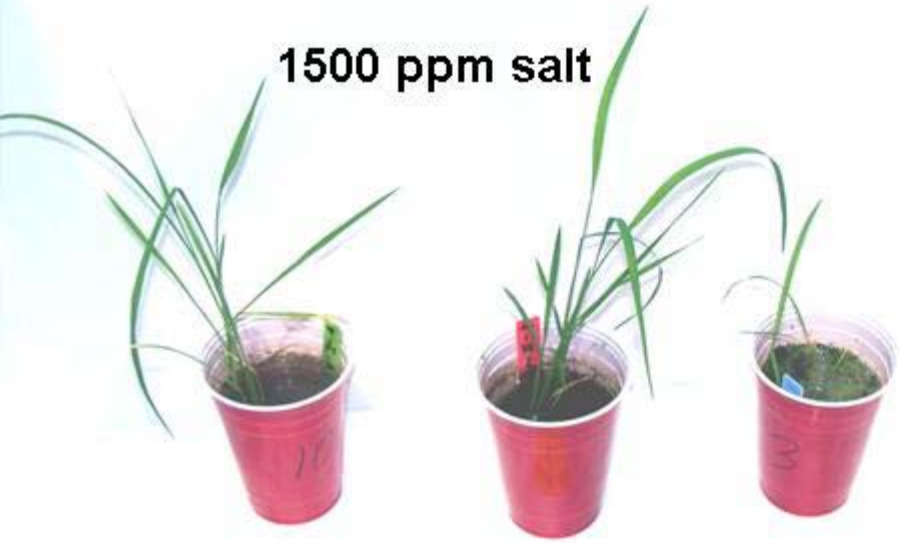
0 500 1000 1500 2000 3000 4000

Salt concentration (mg/kg)


Jeanerette Silty Clay Loam
0
500
1000
1500
2000
3000
4000
Salt concentration (mg/kg)

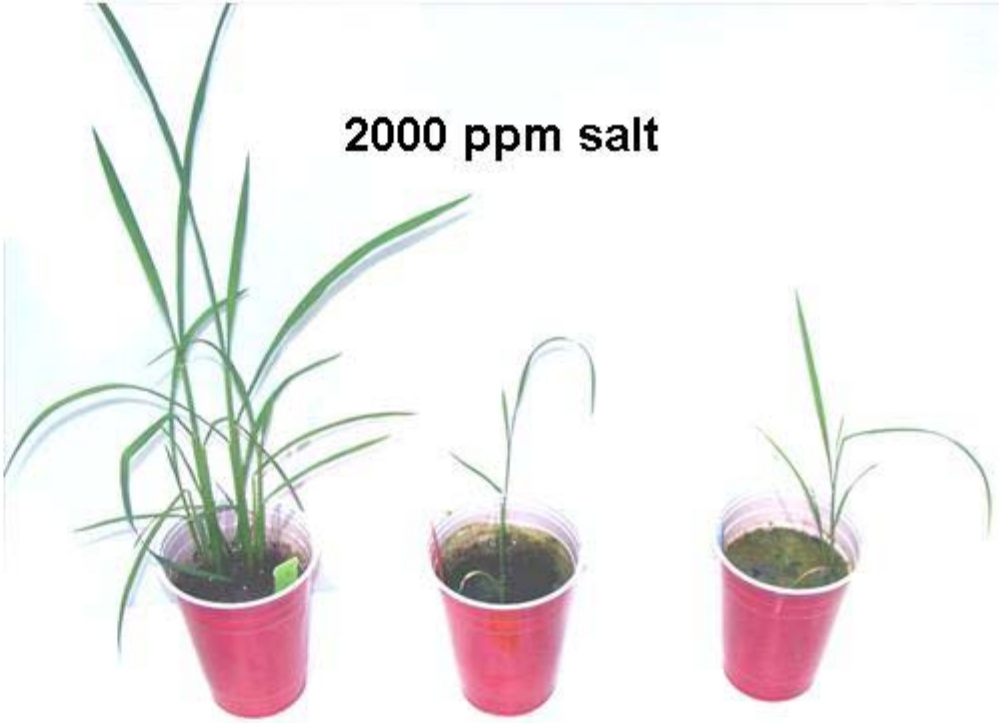

Baldwin Clay Loam
0
500
1000
1500
2000
3000
4000
Salt concentration (mg/kg)

1500 ppm salt



CL SCL SL

2000 ppm salt



CL SCL SL

- CL = Baldwin clay loam
- SCL = Jeanerette silty clay loam
- SL = Crowley silt loam

Greenhouse Findings

- Pronounced Soil x Treatment interactions

In general:

- Salts over 1500 ppm reduced germination
- Wet and dry seeding similar
- Jupiter more tolerant than Cocodrie
- Salt less of a problem in heavier soil

No info on yield impacts!

Guideline: no yield reduction where soil salts are below 750 ppm

Rationale

- Literature suggests 1200-1500 ppm is a reasonable level
- Prices were low
- A sample with 750 ppm salts probably came from a field where some areas are much higher

Should we add gypsum or lime?

Gypsum ($CaSO_4$) is often added to sodic soils to improve permeability and leaching.

When the pH is not above 8, $CaCO_3$ can also be used.

Conclusions (leaching study)

- No significant benefit of adding gypsum or lime
- Salts readily leached
- Leaching with 3 pore volumes significantly lowered EC and raised pH (>pH 8.2)
- Crowley silt loam ‘collapsed’ after two pore volumes

Conclusions
(Flooding Studies)

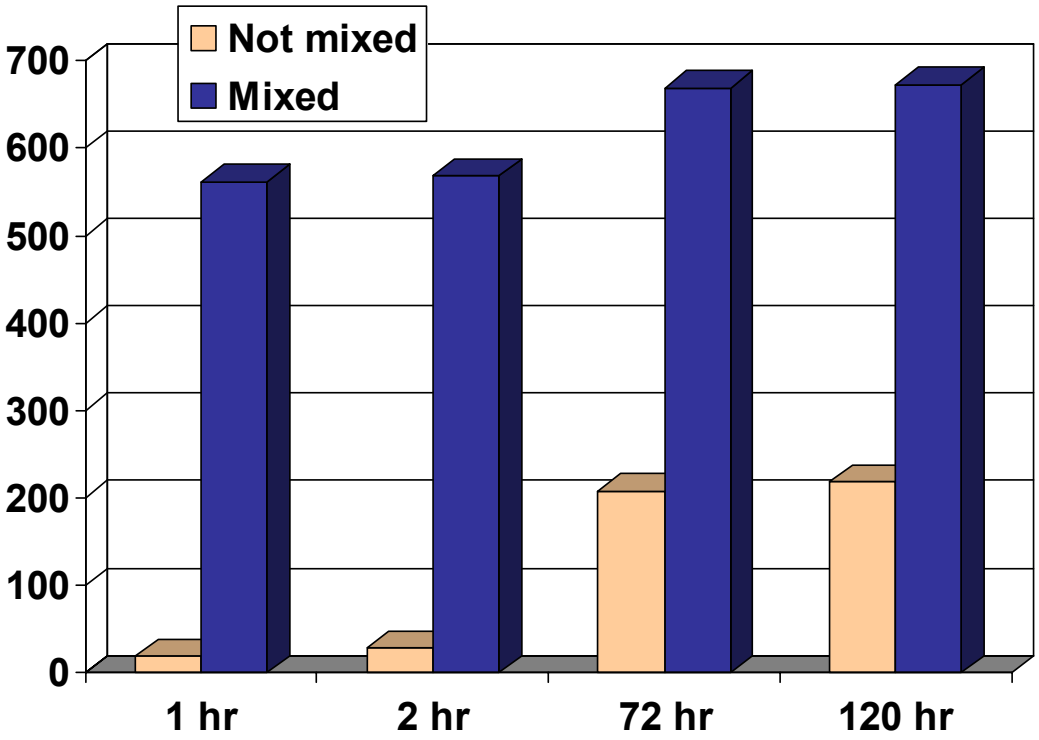
- Salts leach downward at a far greater rate than they diffuse upward, especially in silt loams
- After rain on a dry soil, salts move downward rapidly.
- Working flooded soil to the hardpan likely to remove the greatest amount of salt.

Water Management?

Open the levees or leave them closed during the winter?

Work the soil or leave it alone?

Effects of Mixing on Flood Water Salinity



Mixing greatly increases release of salts to floodwater!

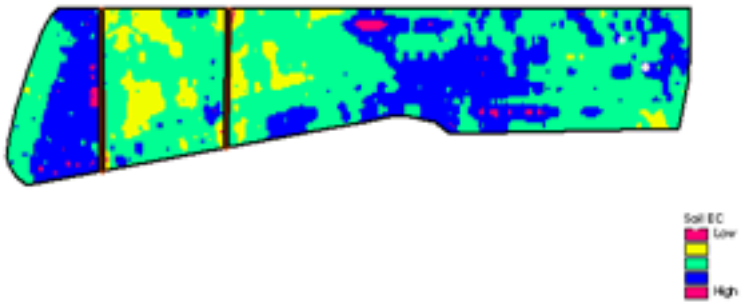
Averages of 3 soils, 3 reps each

Remediating Salty Rice Fields

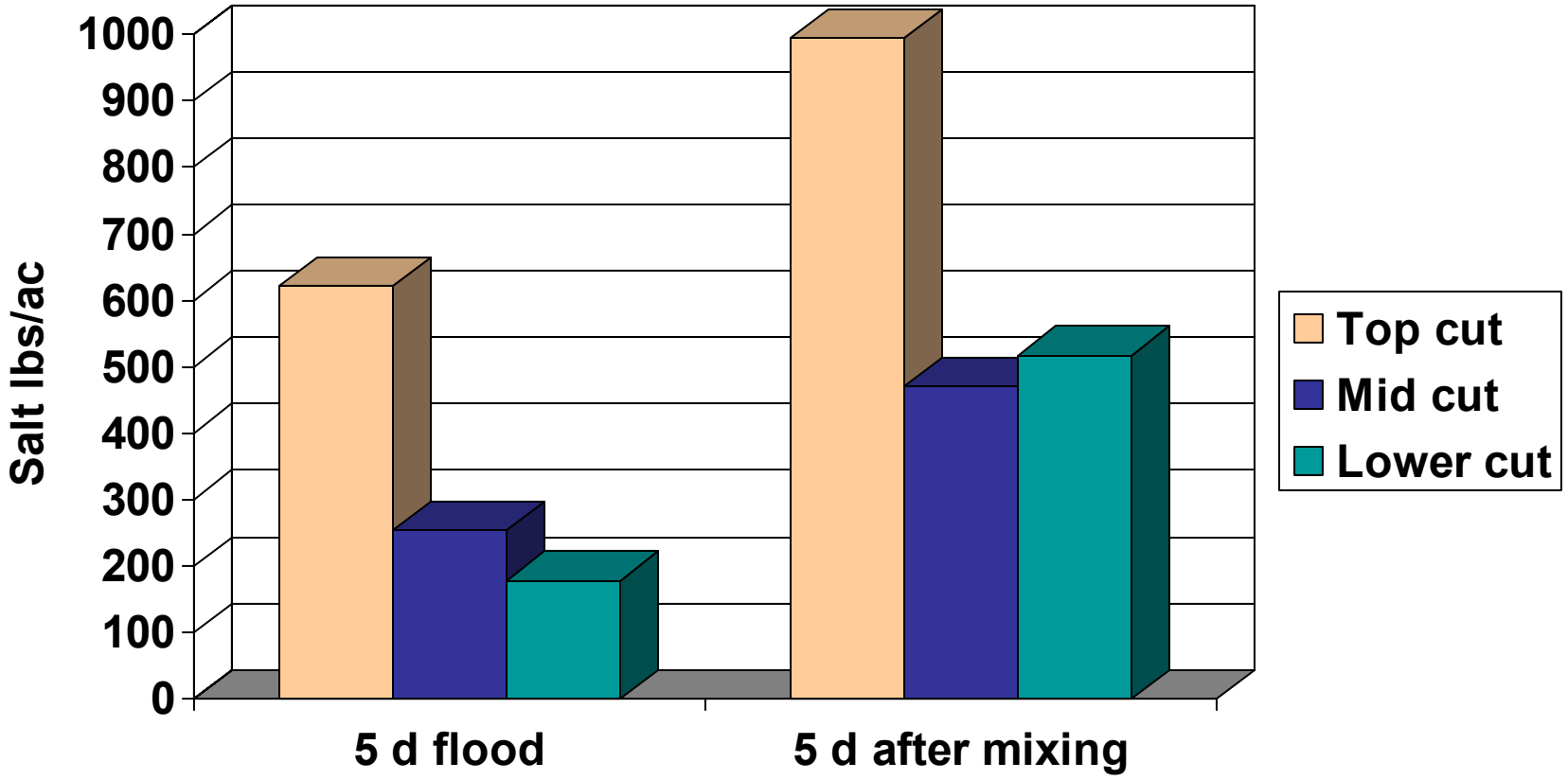
- Flood soil ~5 days
- Water-level
- Wait till soil settles ~5 days
- Discharge water
- Repeat if necessary once soil dries

Salt Reclamation Study

Donald Sagrera Farm

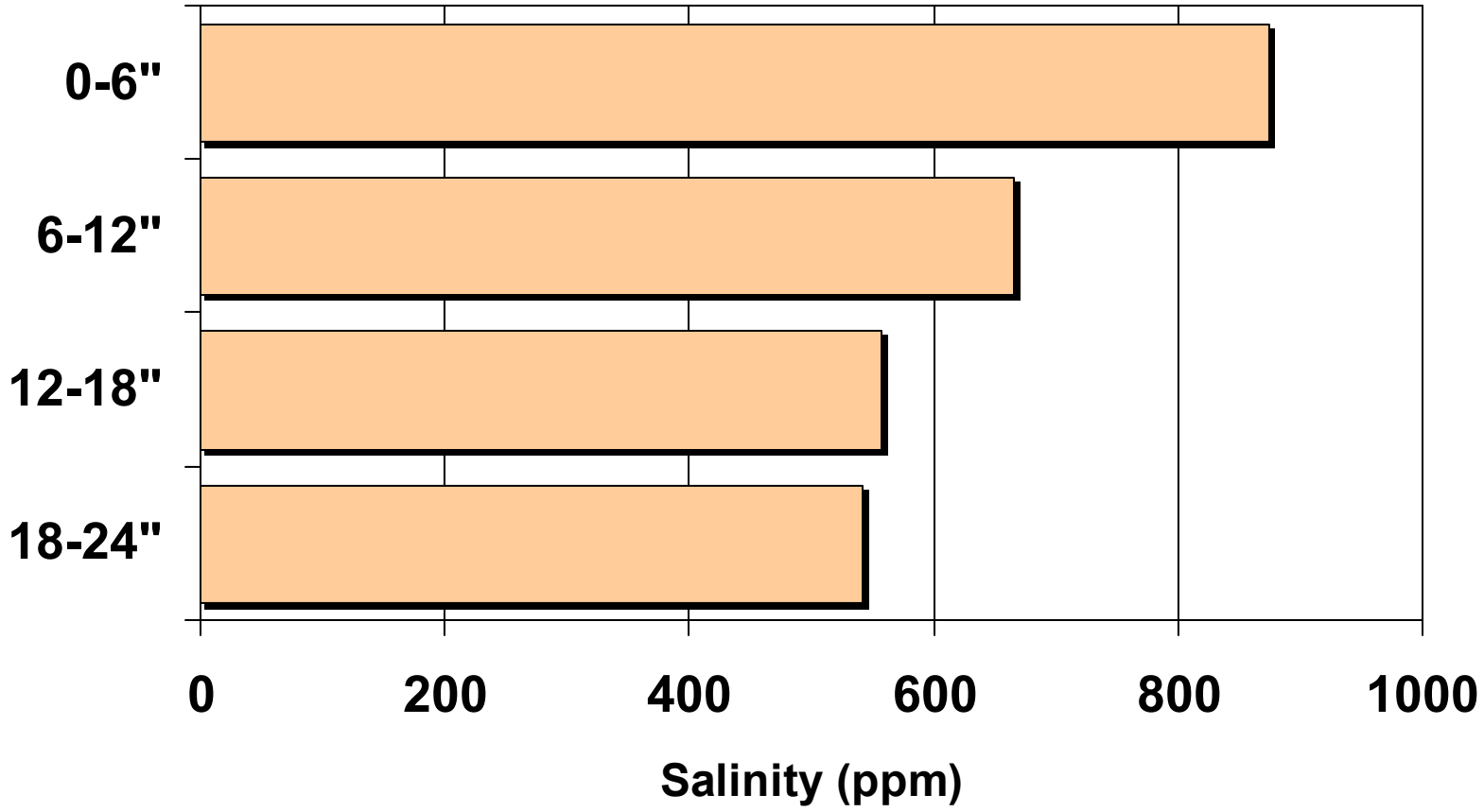


Salt (lbs/ac) in Flood Water




Deep sampling indicates
that most of the salt lies
between 12 and 18”

Salt distribution in surface 24” after flushing

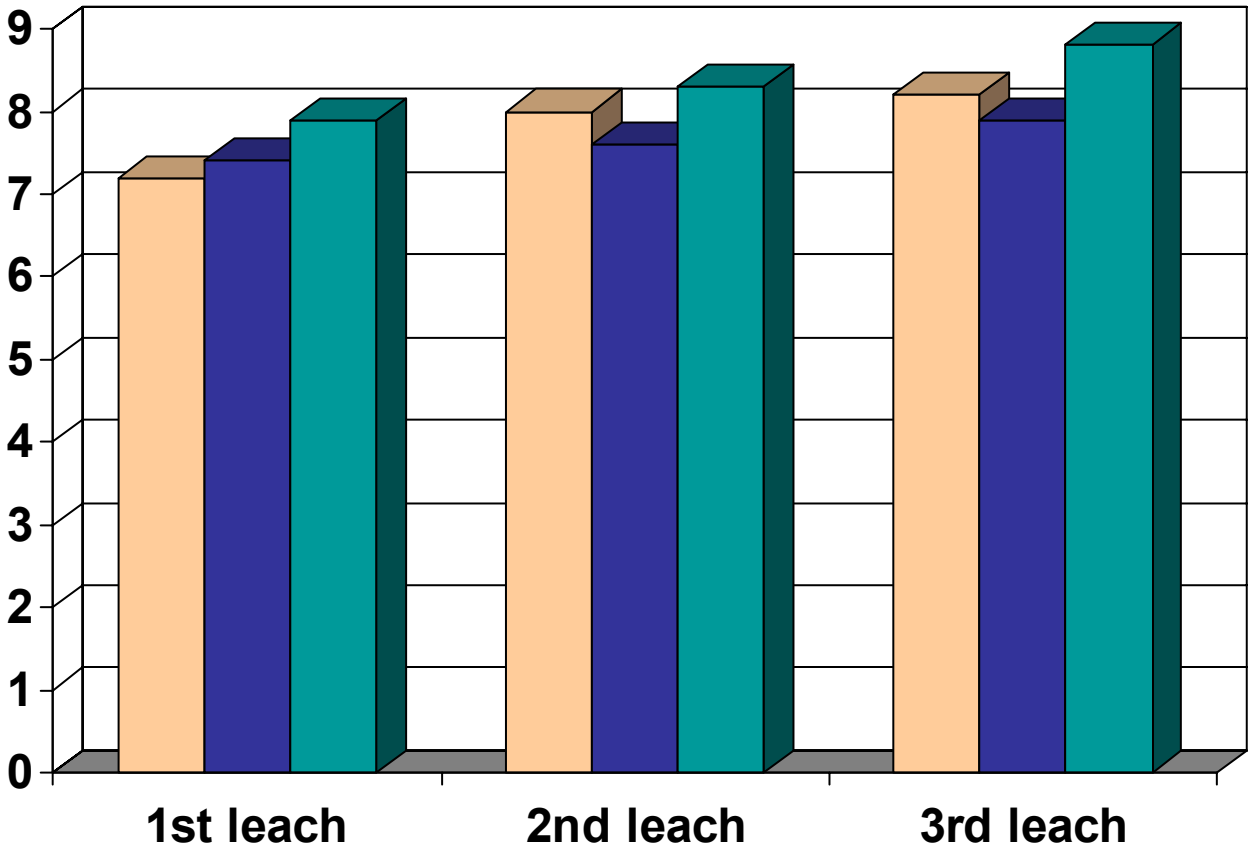


Is it too salty to plant?

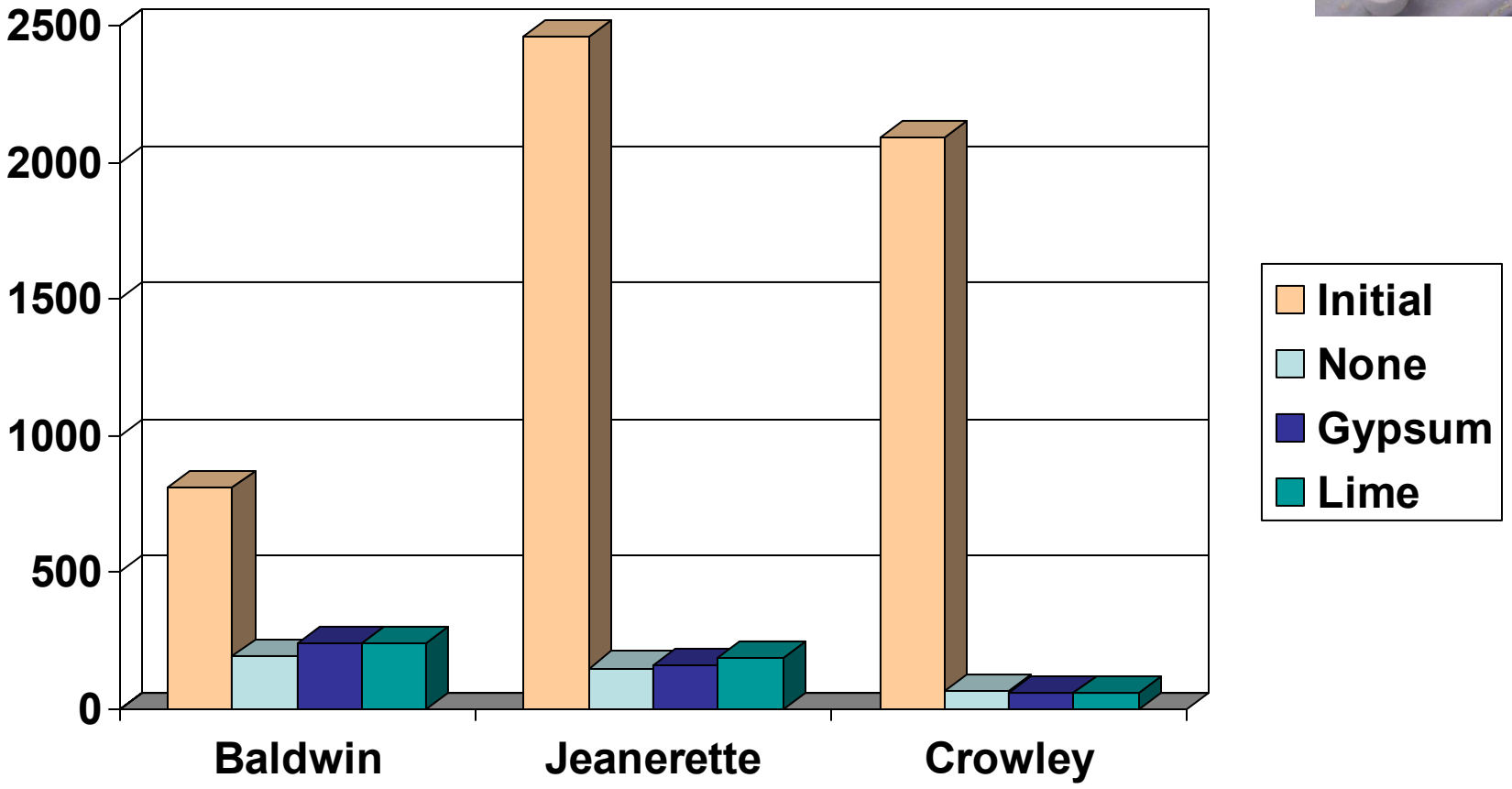
We are looking for a few good collaborators:

- with fields containing more than 1000 ppm salts
- with access to gps yield monitors

Effects of treatments and leaching on soil pH

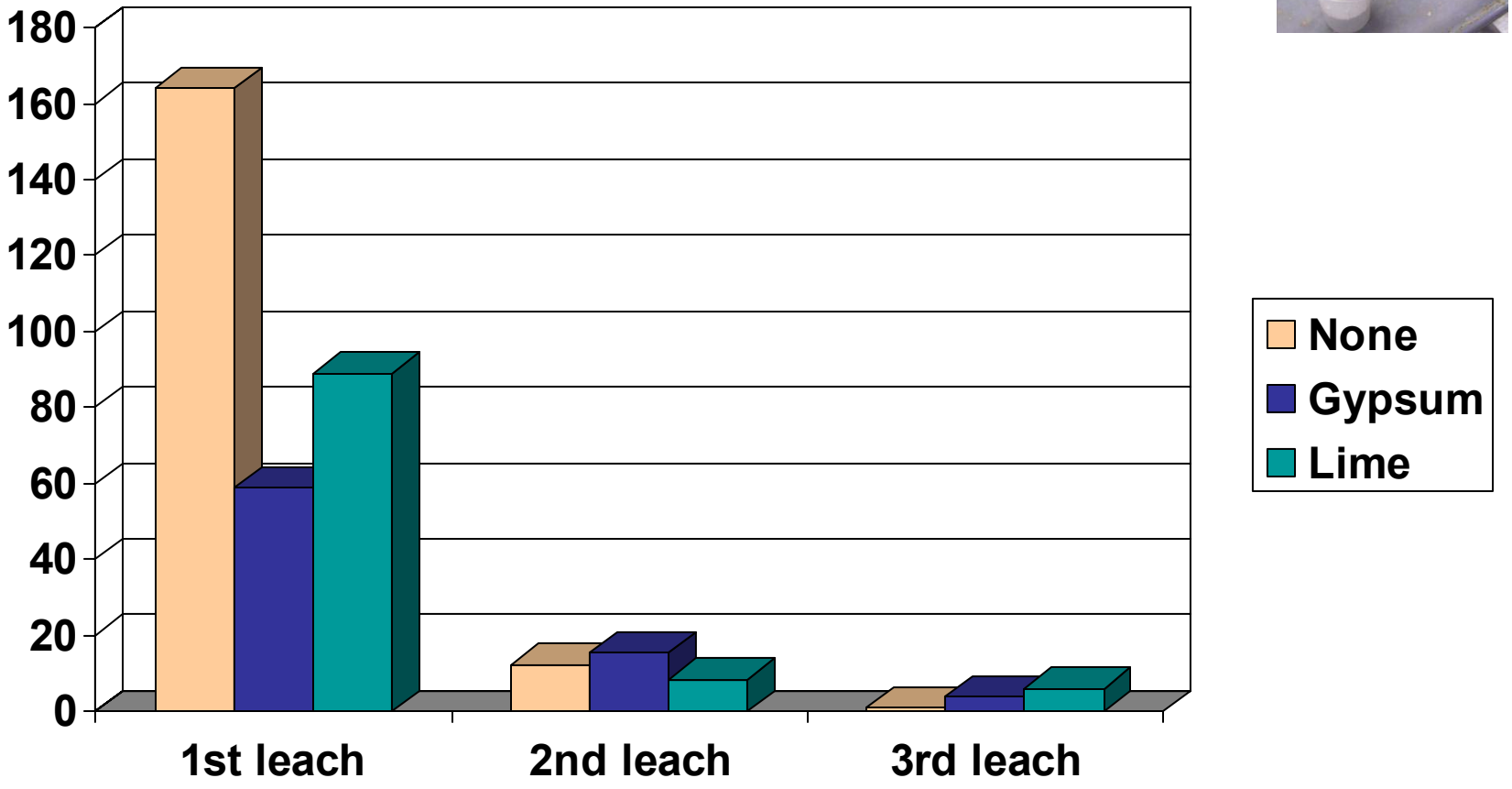


Salinity (ppm) of Soils
After 3 leachings

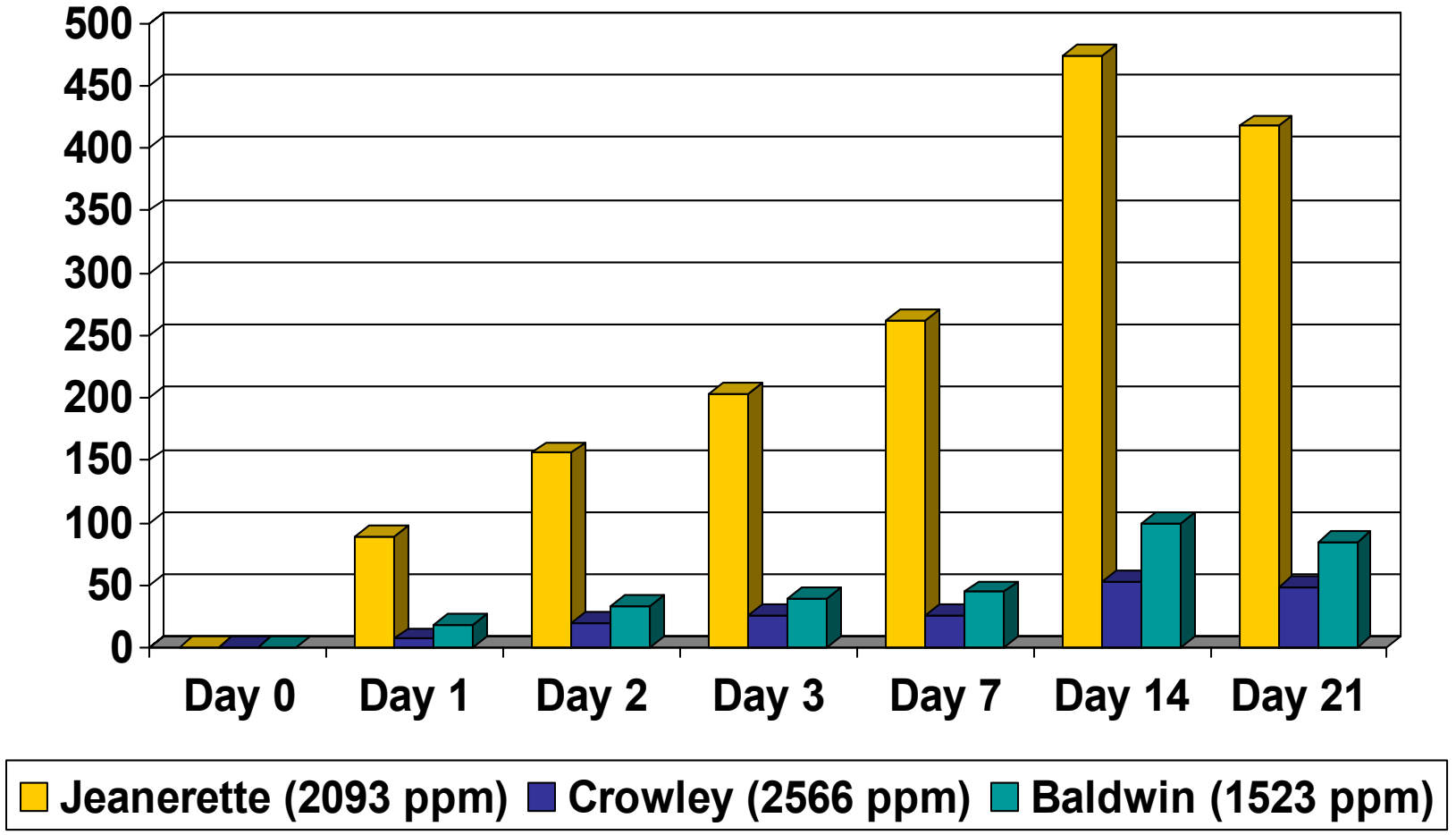


Infiltration rates (mm/hr)

Avg. of three soils



Salinity of 4” flood



Distribution of Salt after 21d Flood

Soil salinity (ppm) before and after flushing

Averages of 36 ‘grid’ samples (0-6”)