

Precision Farming: Maximizing Production on Fewer Acres II



Reasons for Reducing Sugarbeet Production Acreage

- High Yields ('06, '07, and '08 largest in ACS History)
- Sugar Marketing Allocations
- Yield Potential For the Future



Reasons for Maximizing Sugarbeet Production

- Necessity
- Competition W/ Other commodity prices
- On-Farm Profits
- High Production Costs (nearly \$900/acre)
 - \$892 Total Input Cost **
 - \$41 Beet Payment (Estimate)
 - = 21.8 ton Break-Even Yield **

** Average of 2007 ACS Grower Cost Benchmark Data factoring in a \$100/a management cost and a \$300/a land and stock cost

Effect of Wind On Seed Placement In the Field Study

(Norman Cattanach, 2008)



Effect of Wind On Seed Placement In the Field Study (Norman Cattanach, 2008)

- With Poncho-Beta Insecticide coming on-line this spring, growers would like to remove wind shields from planters
- Wind shields protect more than granular insecticide at planting
- Seed is expensive and getting more expensive
- Plant population is crucial for maximizing sugarbeet production (yield & quality)
- The Red River Valley isn't exactly calm in the spring
- Should a grower keep planting in the wind??



Effect of Wind On Seed Placement In the Field Study (Norman Cattanach, 2008)

- A study was set-up to identify planting tendencies with the following treatments utilizing two seed sizes (small-sized seed and large-sized seed:
 1. With the wind & against the wind
 2. With wind shields & without wind shields
 3. With seed tube windshield & without seed tube windshield



Planter Windshield Used in the Study

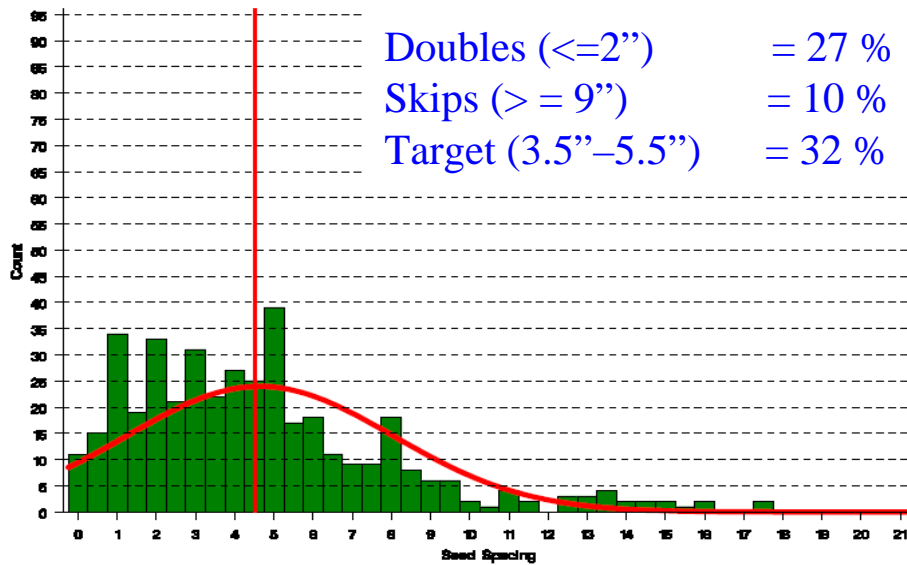


Seed Tube Shield Used in the Study

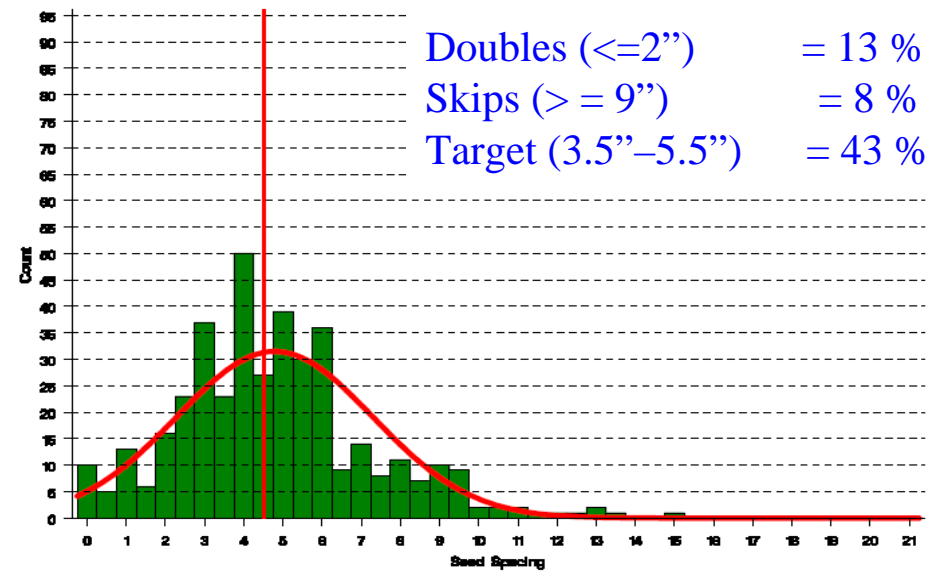


Effect of Wind On Seed Placement In the Field Study (Norman Cattanach, 2008)

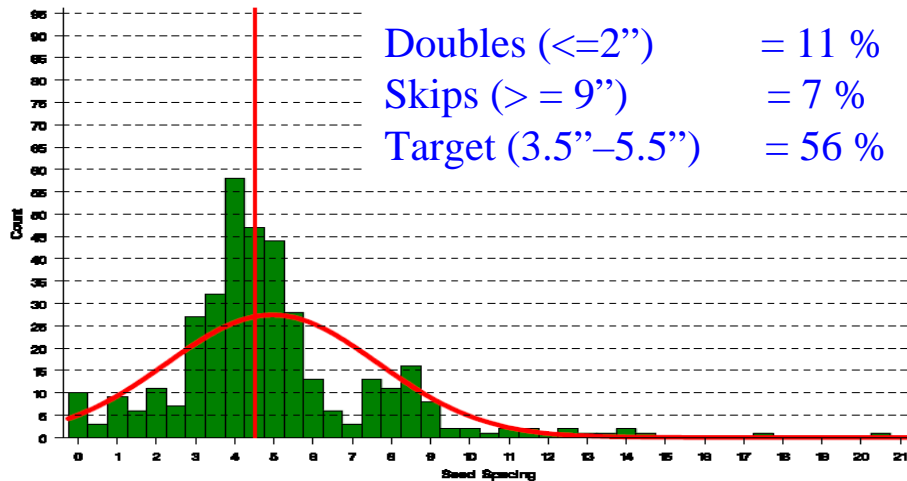
Histogram for Treatment #1 — Plant w/Wind No/Wind Shield — Pro 50



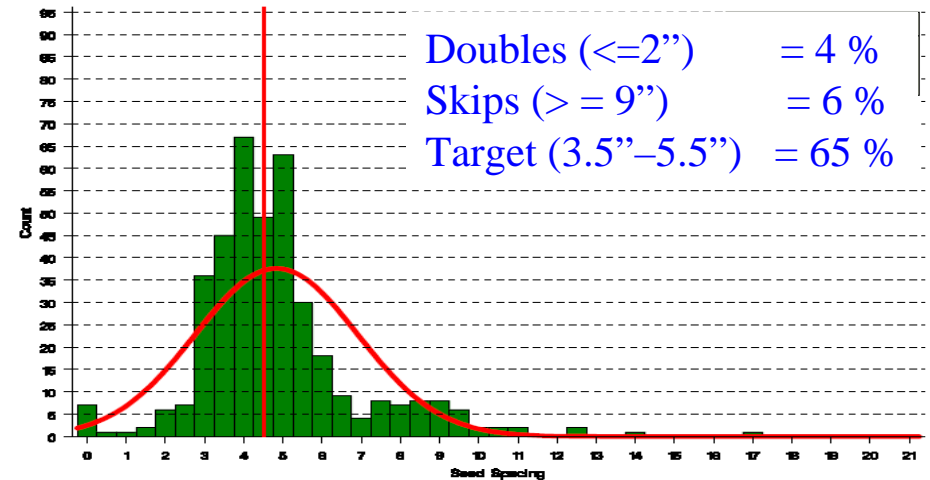
Histogram for Treatment #2 — Plant w/Wind No/Wind Shield — Pro 200



Histogram for Treatment #3 — Plant Against/Wind No/Wind Shield — Pro 50

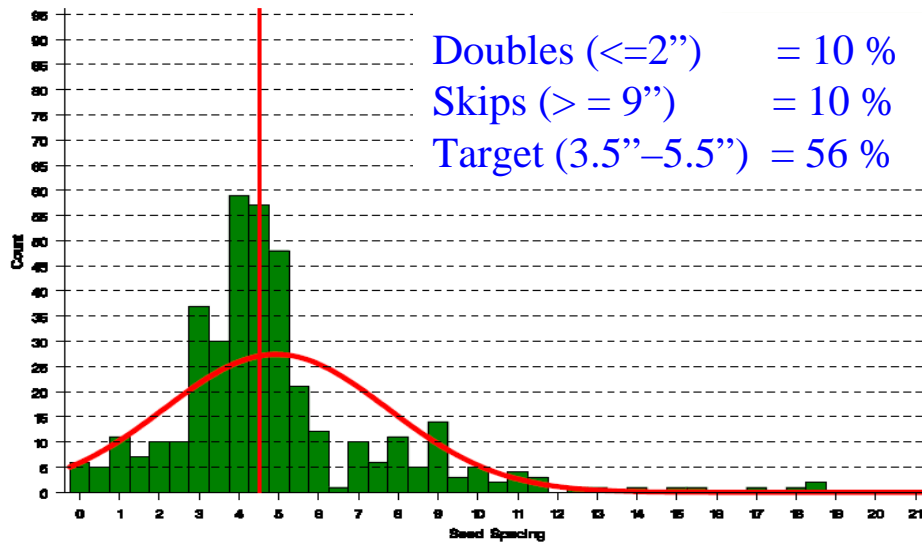


Histogram for Treatment #4 — Plant Against/Wind No/Wind Shield — Pro 200

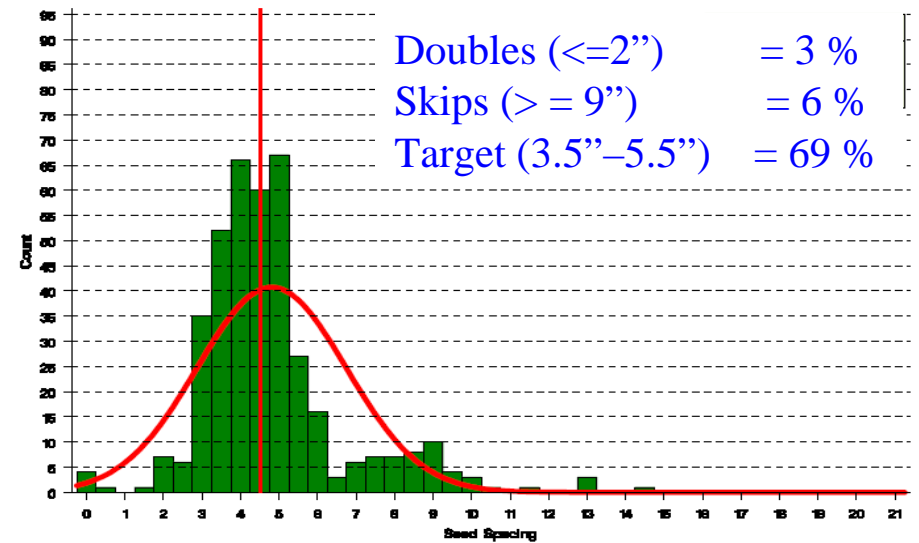


Effect of Wind On Seed Placement In the Field Study (Norman Cattanach, 2008)

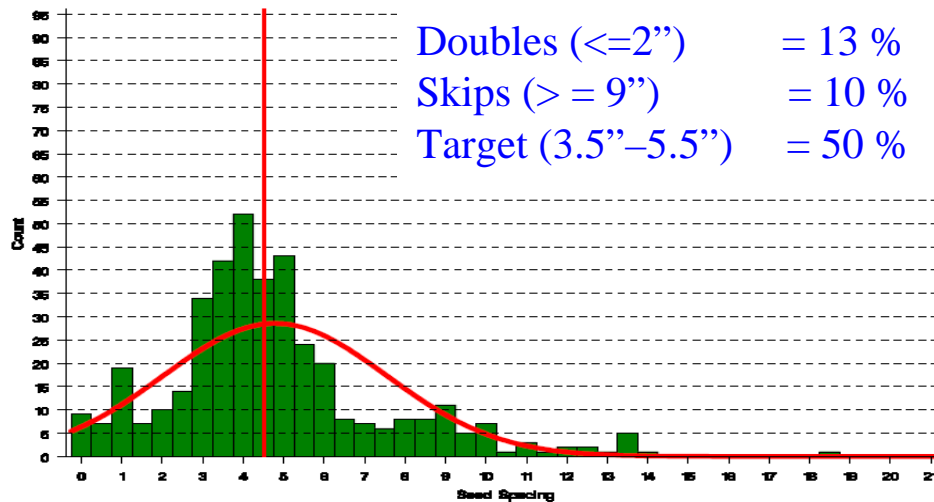
Histogram for Treatment #5 — Plant w/Wind w/Wind Shield — Pro 50



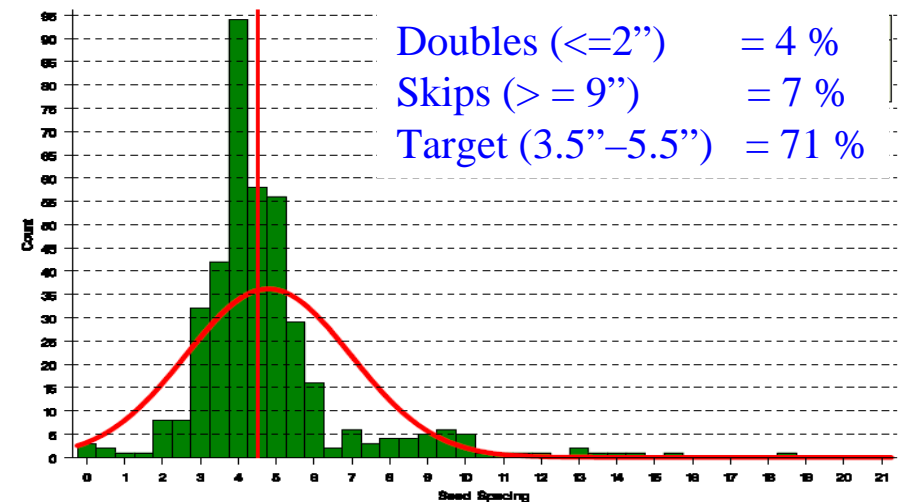
Histogram for Treatment #6 — Plant w/Wind w/Wind Shield — Pro 200



Histogram for Treatment #7 — Plant Against/Wind w/Wind Shield — Pro 50

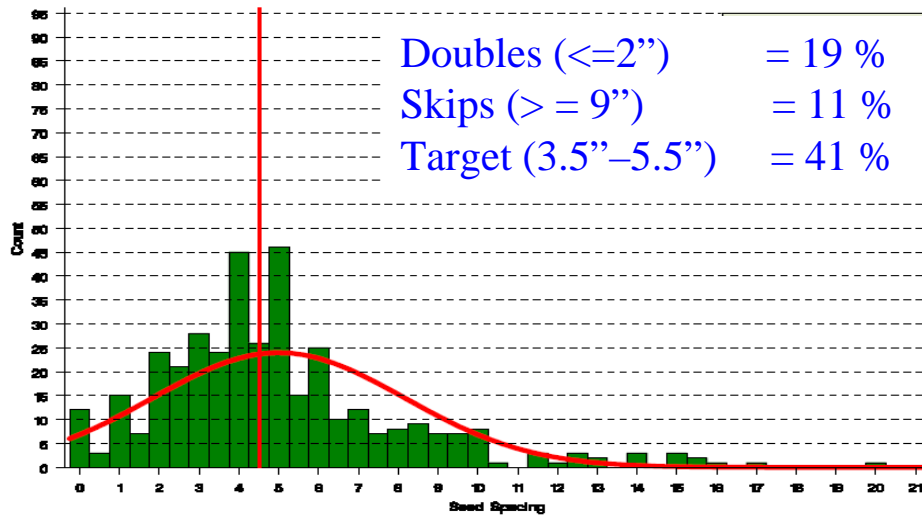


Histogram for Treatment #8 — Plant Against/Wind w/Wind Shield — Pro 200

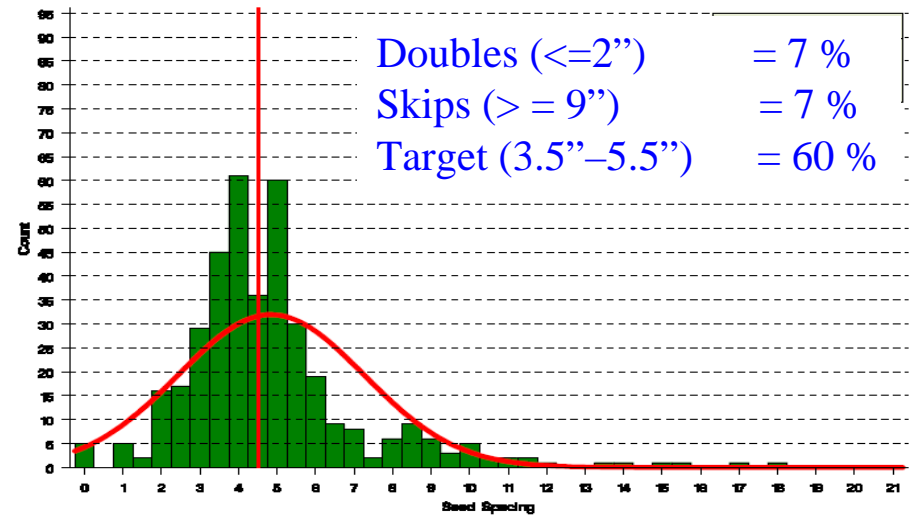


Effect of Wind On Seed Placement In the Field Study (Norman Cattanach, 2008)

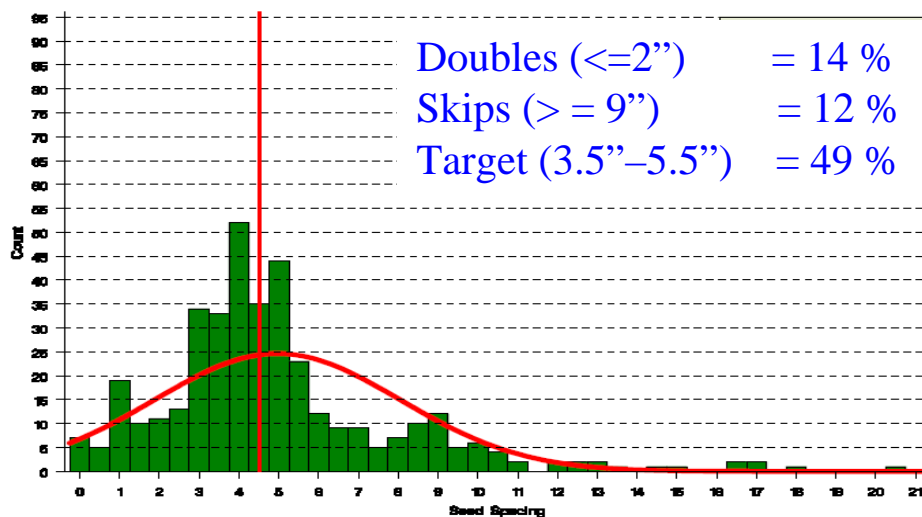
Histogram for Treatment #9 — Plant w/Wind w/Seed Tube Shield — Pro 50



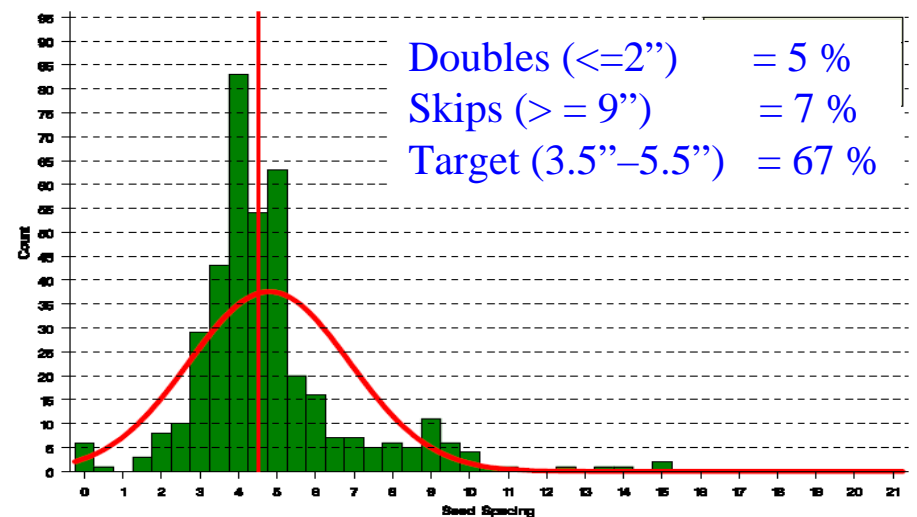
Histogram for Treatment #10 — Plant w/Wind w/Seed Tube Shield — Pro 200



Histogram for Treatment #11 — Plant Against/Wind w/Seed Tube Shield — Pro 50



Histogram for Treatment #12 — Plant Against/Wind w/Seed Tube Shield — Pro 200



Effect of Wind On Seed Placement In the Field Study (Norman Cattanach, 2008)

Conclusions:

- Improved stand establishment with the large size seed resulted in a 2 t/a yield increase over small seed yield, and 573 lbs/a more recoverable sugar
- Use of wind shields significantly increased the percentage of seed in the target zone
- The traditional wind shield improved stand establishment more than the tube shield
- The traditional wind shield resulted in 140 lbs/a more recoverable sugar than no shield and about 40 lbs/a more than the tube shield



Effect of Wind On Seed Placement In the Field Study (Norman Cattanach, 2008)

Conclusions (Cont.):

- Wind shields reduced skips and doubles, especially with the traditional type shield
- It might have been expected that improvements in plant uniformity and reductions in skips and doubles should have improved defoliation and harvestability of the crop
- Growers choosing to plant when wind speeds are high should consider using larger size seed and wind shields in combination to achieve better stand establishment
- For the 2009 study this year...another treatment of planting on a calm day as soon as possible after planting on a windy day will be added



ACSC Precision Farming Team Variable Rate Planting Study

**Lynn Dusek, and Agriculturist
Moorhead & Moorhead Ag Staff
Cooperator: Tang Farms**

- ACS Project to Monitor benefits of VRS
- Can Productive Zones Support Higher Populations
- Results / Observations...let's take a look



ACS Variable Rate Seeding Project

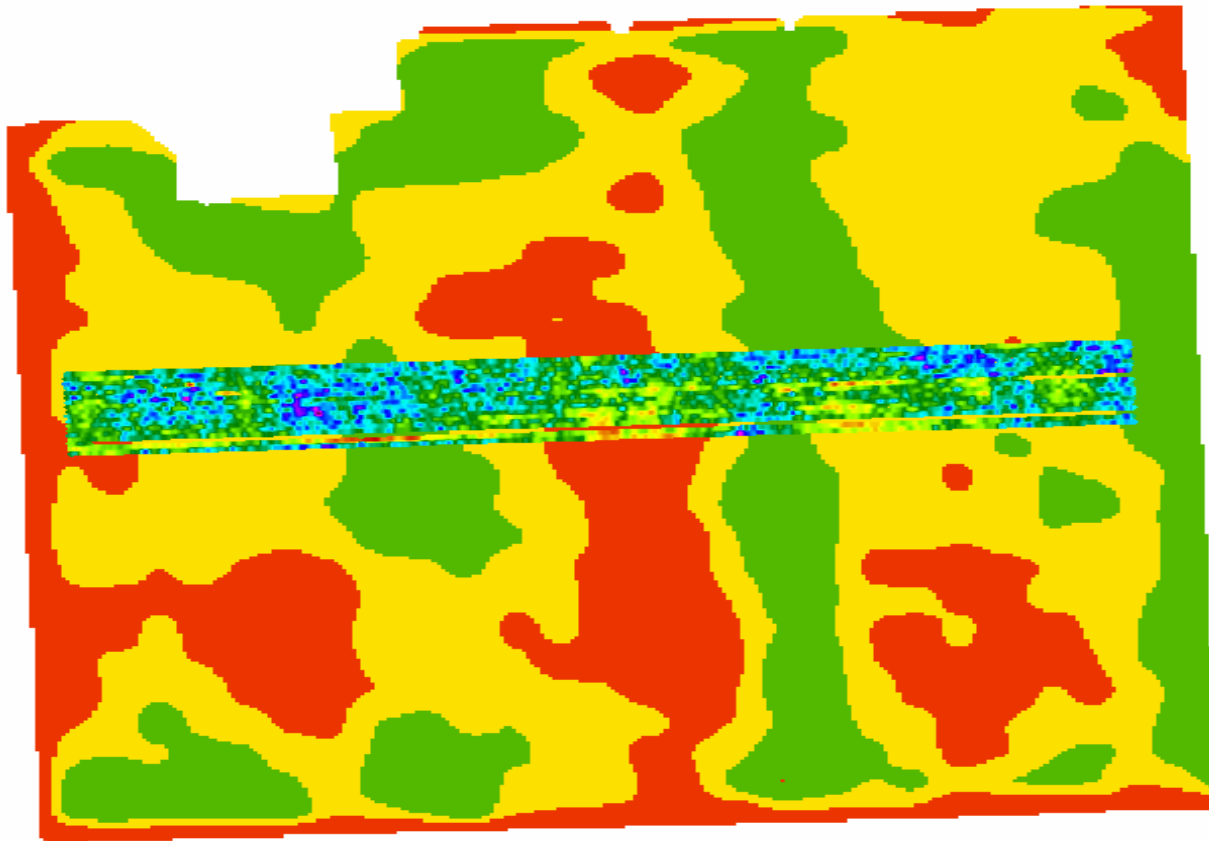
Stand Counts- Tang Farms, 2008

	Zone 1	Zone 2	Zone 3
	<u>Green</u>	<u>Yellow</u>	<u>Red</u>
5.5" spacing **	169	144	142
4.5" spacing	196	202	174
3.5" spacing	252	218	207

** For the 5.5 inch spacing all zones had less than our 170-210 target pop.



ACS Variable Rate Seeding Project – Satellite Image and Plant Population Map - Tang Farms, 2008



ACS Variable Rate Seeding Project Trial Data Tang Farms, 2008

Treatment (spacing in inches)	RST	RSA	Revenue / ton	Revenue / acre
3.5"	276	6,556	\$31.37	\$744
4.5"	287	6,711	\$33.94	\$794
** 5.5"	297	6,901	\$36.42	\$847
3.5"	294	6,678	\$35.77	\$812
4.5"	299	6,883	\$37.06	\$852
** 5.5"	305	6,558	\$38.45	\$827
3.5"	305	6,671	\$38.35	\$840
4.5"	287	6,380	\$34.09	\$757
** 5.5"	308	6,310	\$39.14	\$802

* Revenue based on 2008 crop November payment forecast

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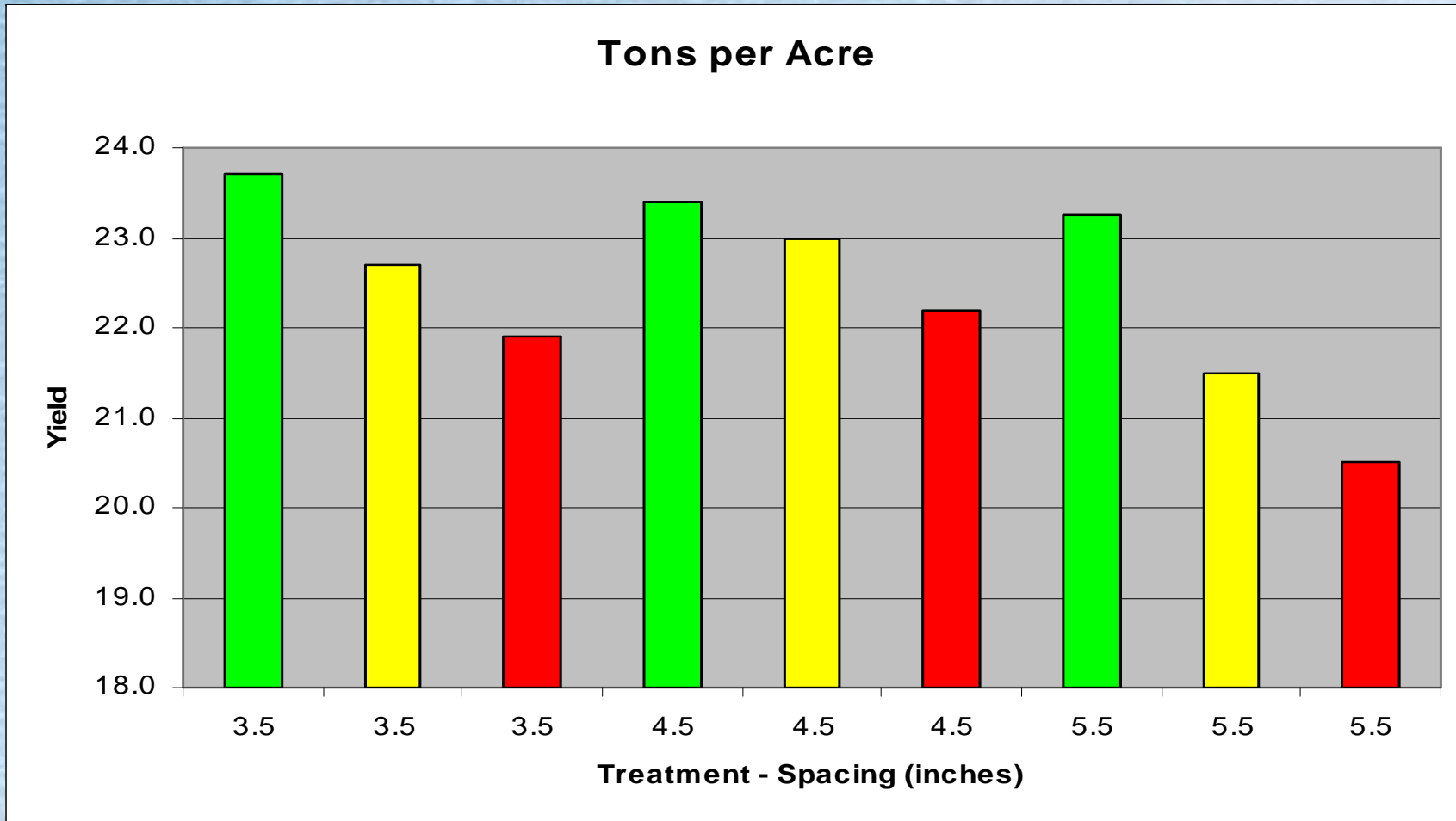
ACS Variable Rate Seeding Project Trial Data Tang Farms, 2008

Harvest Loss Measurement

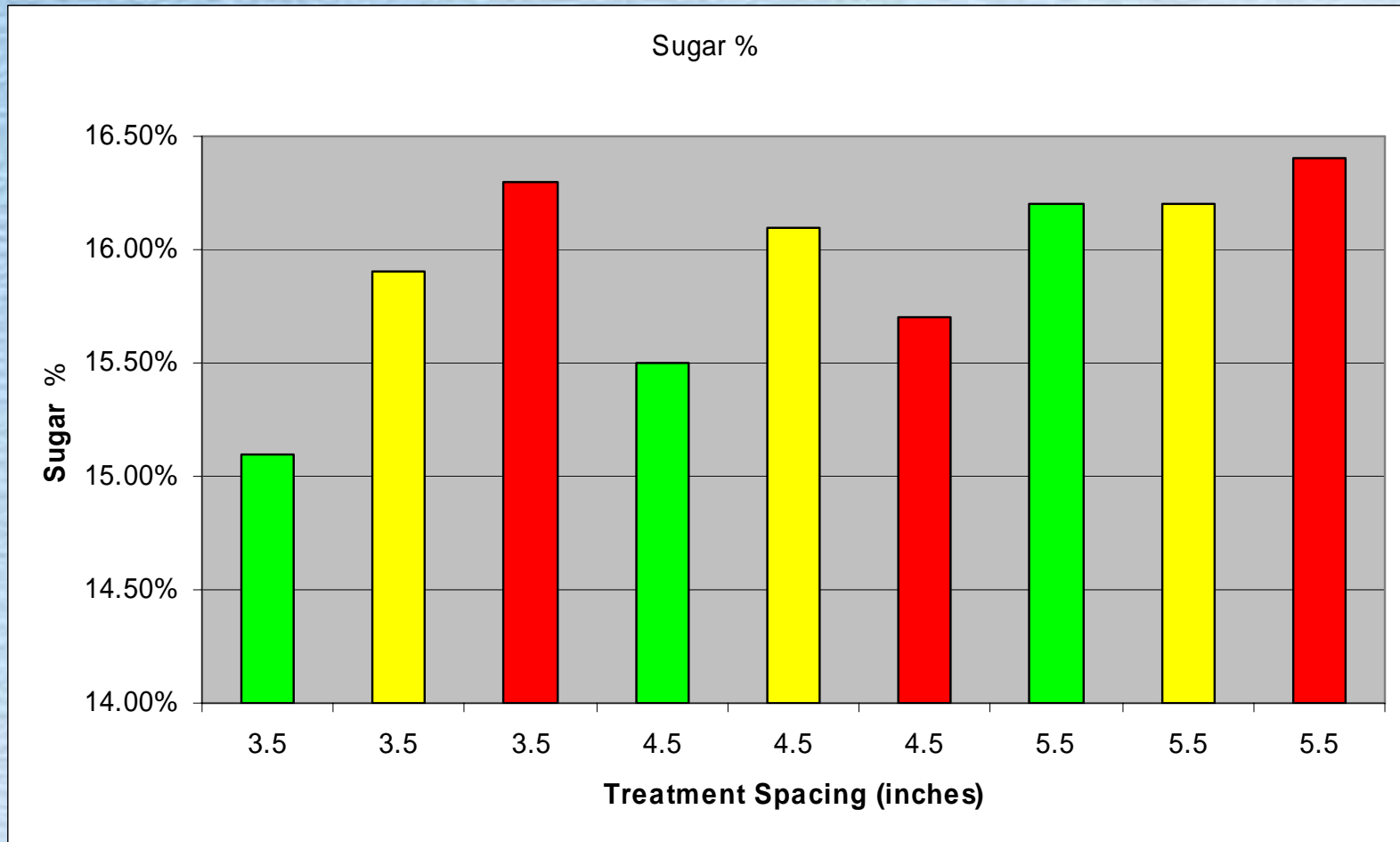
Treatment (spacing in inches)	Harvest Loss/acre (tpa)	Value of Tons Left in Field
3.5"	1.48	\$46.42
4.5"	1.52	\$51.59
5.5"	0.70	\$25.49
3.5"	1.09	\$38.99
4.5"	0.70	\$25.94
5.5"	0.82	\$31.53
3.5"	1.75	\$67.11
4.5"	0.78	\$26.59
5.5"	0.46	\$18.00



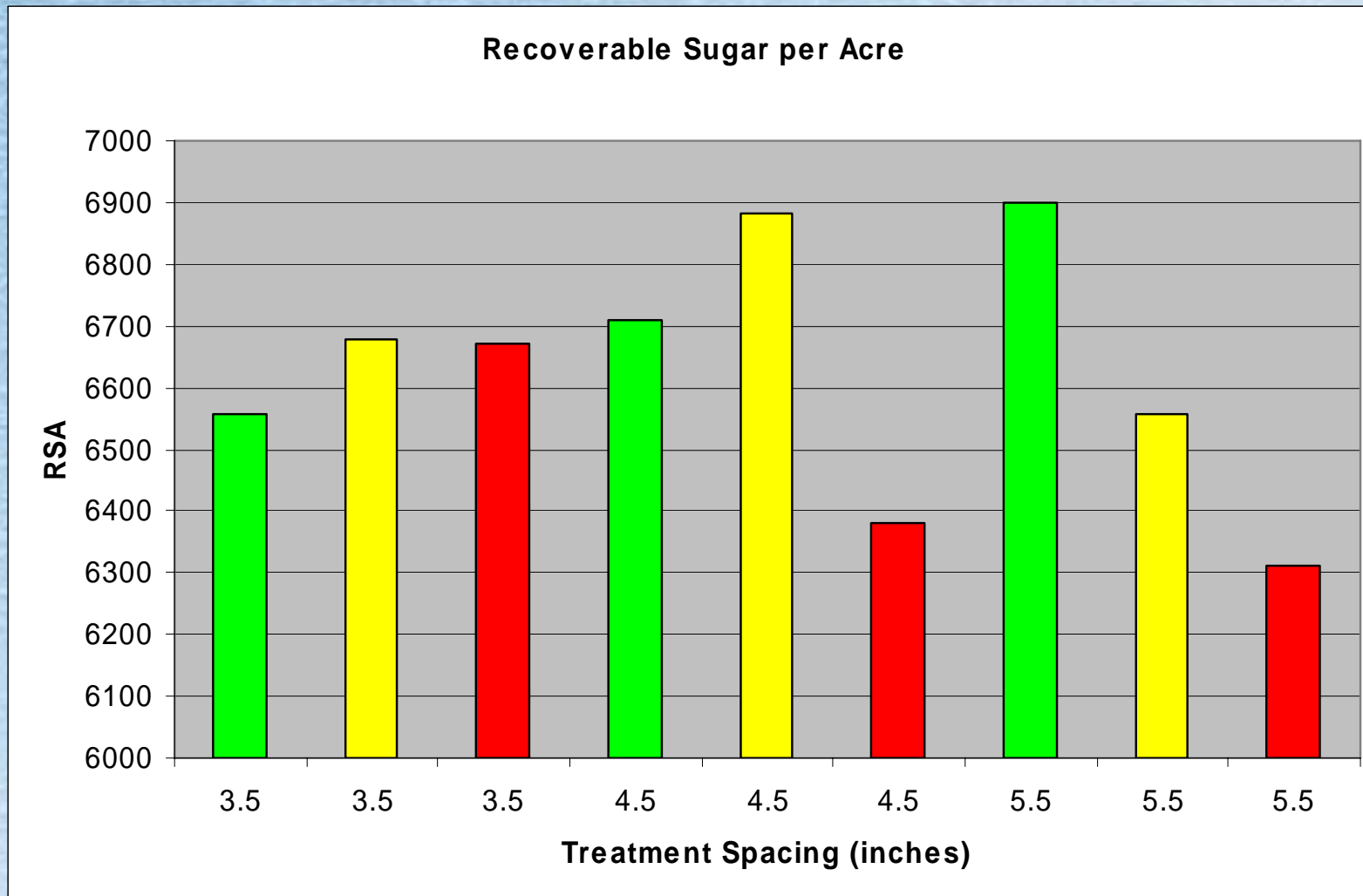
ACS Variable Rate Seeding Project – Yield Data by Treatment - Tang Farms, 2008



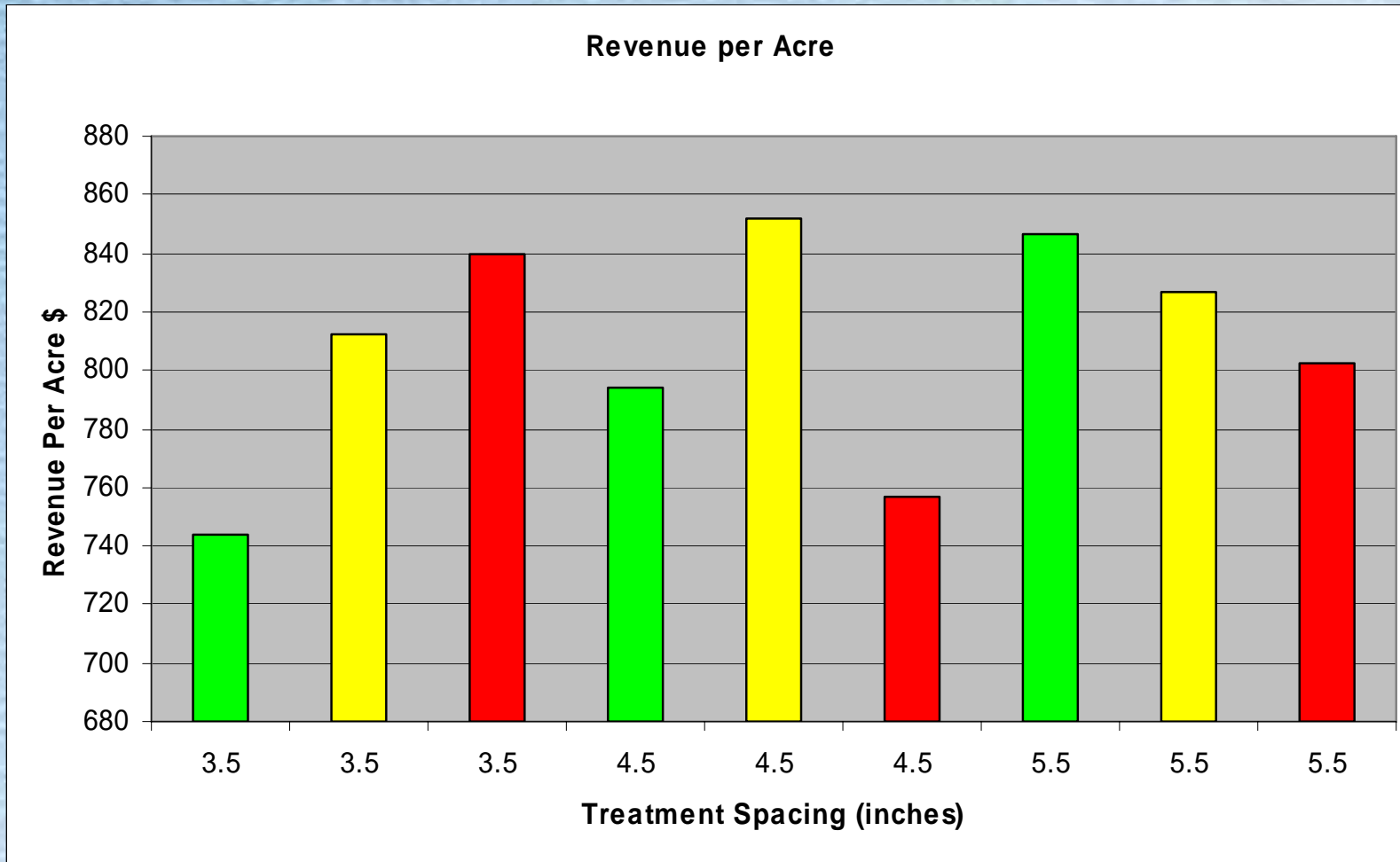
ACS Variable Rate Seeding Project – % Sugar Data by Treatment - Tang Farms, 2008



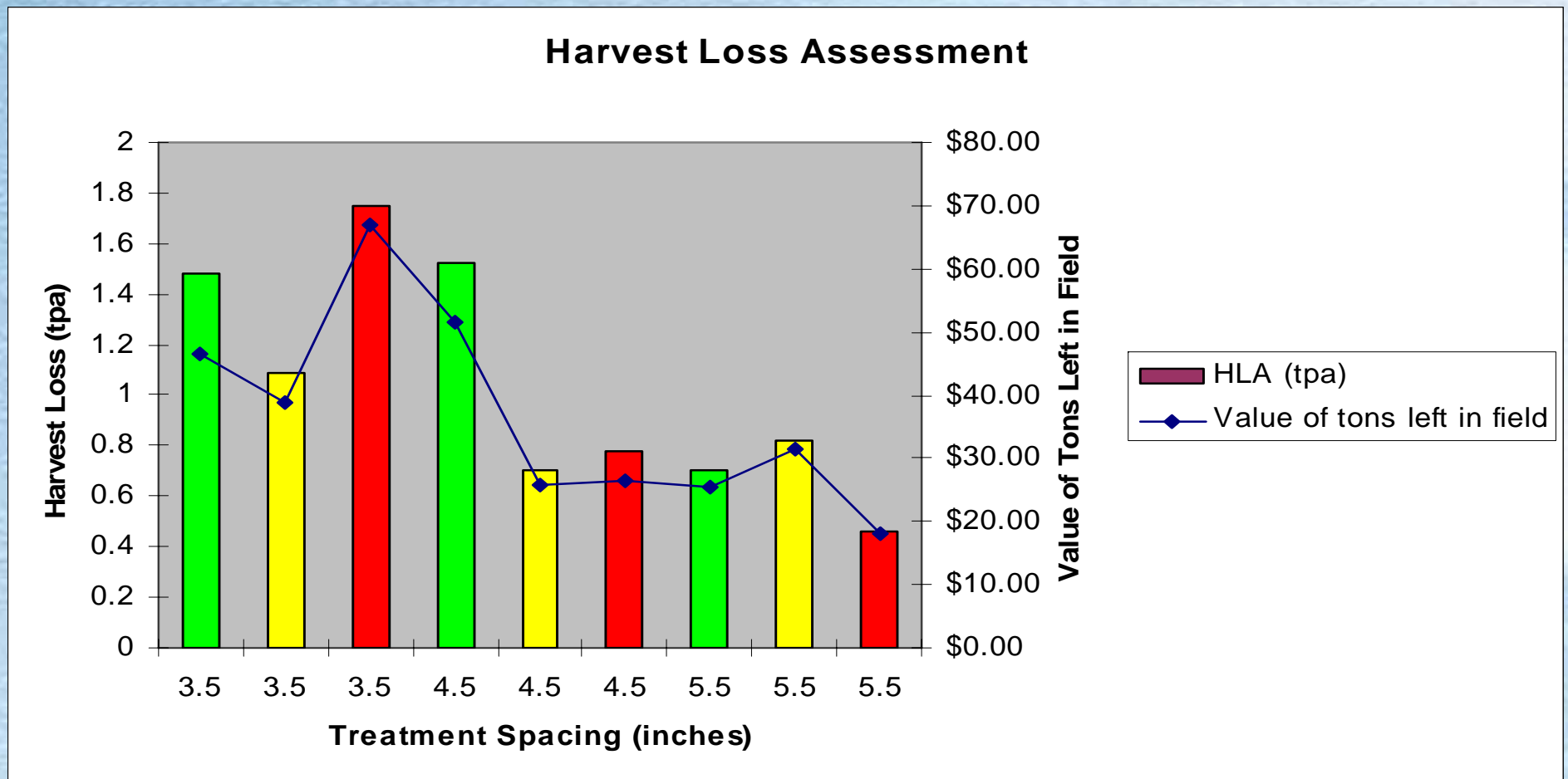
ACS Variable Rate Seeding Project – RSA Data by Treatment - Tang Farms, 2008



ACS Variable Rate Seeding Project – Revenue per Acre Data by Treatment - Tang Farms, 2008



ACS Variable Rate Seeding Project – Harvest Loss Data by Treatment - Tang Farms, 2008



ACS Variable Rate Seeding Project – Trial Conclusions

- Data seems to correlate with imagery
- In field visual confirmation between zones
- Probably little to no seed savings
- Tough field conditions: Wet, tough to get pesticide applications on timely
- More data needed
- Also, ACSC will work with some Planter-Row Shutoff planters this year



Planter Row Control

Courtesy Butler
Machinery/Ag Leader

- Expensive Seed Costs...Planter Row Shut-Off

SeedCommand™ – Precision Planting



Plant Pattern Spacing Study

(Norman Cattanach, 2008)



Plant Pattern Spacing Study (Norman Cattanach, 2008)

- Stand Establishment crucial to high production potential (yield & quality)
- Pop. Of 40,000 to 50,000 (170 to 210 beets / 100' of row) is recommended
- Uniform spacing is ideal for maximizing water, nutrients, and sunlight uptake



Plant Pattern Spacing Study

(Norman Cattanach, 2008)

- Corn industry indicates diamond-pattern planting maximizes nutrient, water, and sunlight uptake
- A study was established to compare current plant-to-stand process with a uniform in-row spacing, and to a diamond-pattern plant spacing...precision stand establishment



Plant Pattern Spacing Study

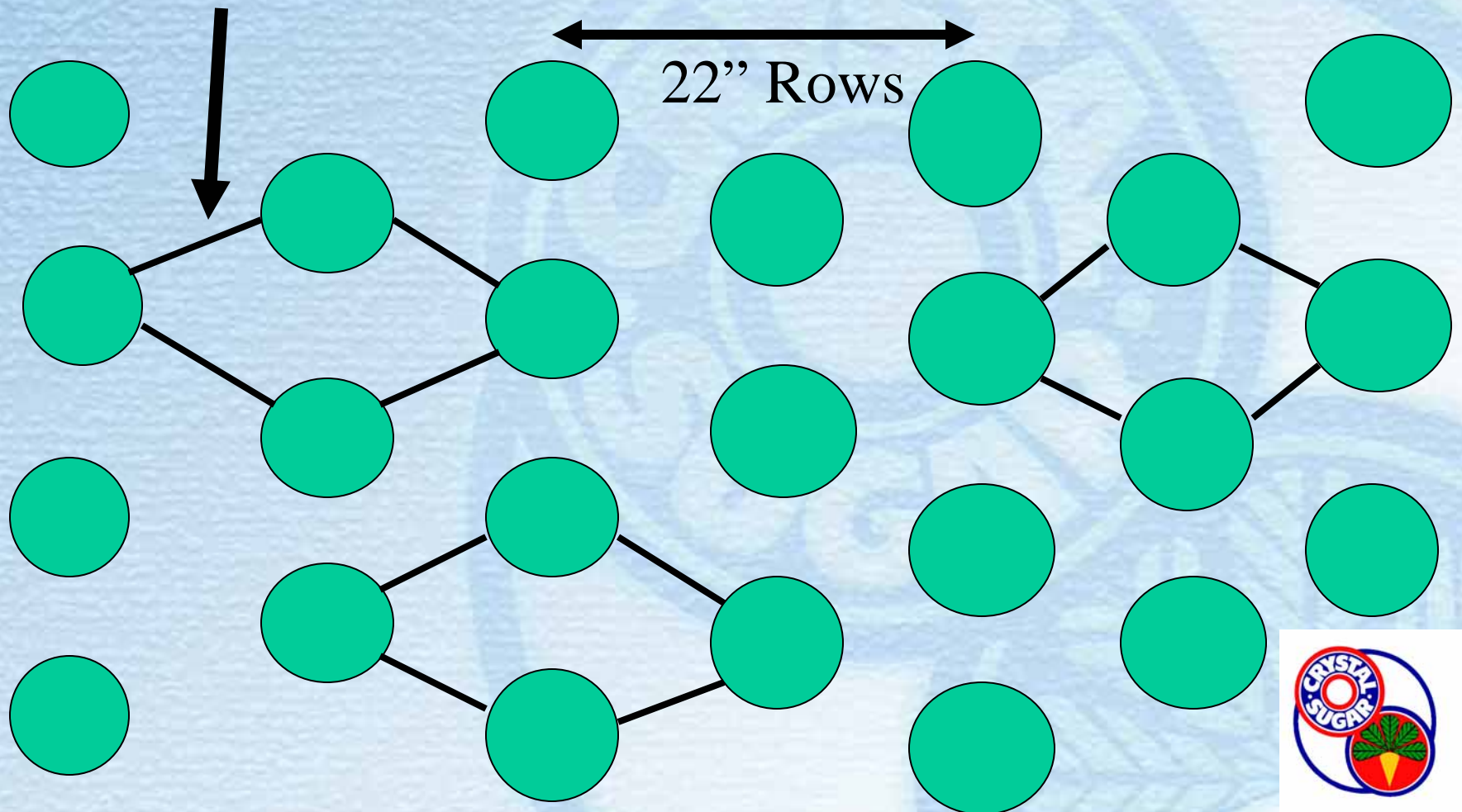
(Norman Cattanach, 2008)

- The conventional plant-to-stand beets were planted and left at a 4.5" plant spacing
- Uniform spaced beets were planted and later thinned to get each of the stand count targets (150, 200, & 250 beets/100 ft of row)
- Diamond pattern beets were planted and later thinned to get each of the stand count targets (150, 200, & 250 beets/100ft of row), however, each row was offset to alternate plants from one row to the next to achieve a offset, staggered, or diamond pattern



Plant Pattern Spacing Study (Norman Cattanach, 2008)

- Diamond Pattern Example:



Plant Pattern Spacing Study

(Norman Cattanach, 2008)

Plant spacing	Target Pop. / 100' row	Harvest. Beets / 100' row	Yield (Ton/A)	Sugar %	LTM %	RST (lbs)	RSA (lbs)	Rev/T \$	Rev/A \$
Uniform	150	130	30.7	15.0	1.33	272	8406	29.33	910
Uniform	200	150	30.3	15.8	1.25	289	8834	33.40	1032
Uniform	250	172	29.7	15.2	1.28	278	8298	30.75	924
<i>mean</i>			30.2	15.3	1.29	280	8513	31.16	955
Diamond	150	132	28.6	15.6	1.24	287	8171	32.84	935
Diamond	200	148	28.5	15.0	1.37	272	7774	29.27	838
Diamond	250	162	28.2	15.3	1.30	279	7877	31.07	875
<i>mean</i>			28.4	15.3	1.30	279	7941	31.06	883
4.5 inch (Plant to Stand)		164	28.5	15.3	1.18	283	8099	32.01	920
		14	NS	.715	.180	NS	NS	NS	NS

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		14	NS	.715	.180	NS	NS	NS	NS

Plant Pattern Spacing Study (Norman Cattanach, 2008)

Conclusions:

- Plant population responses appeared to follow normal expectations in the uniformly spaced beets
- Revenue per acre was maximized at the expected 200 uniformly spaced beets but maximized at 150 beets in a diamond pattern
- New equipment technologies will be available in the future for growers to alter planting patterns if they can be justified
- Another year of evaluations of planting patterns may be justified to verify results and conclusions from the 2008 growing season



ACSC Precision Farming Team
Strip-Till Study
Curt Meyer Agriculturist
Moorhead District
Cooperator: David Watt Farm



Strip Tillage Trial Glyndon, David Watt Farm

- Planted May 9th @ 4.5" Seed Spacing
- Crystal RR539 with X-Beet
- 8lbs of Counter
- 3 gallons of 6-24-6
- 2 year rotation, Wheat 07, Soybeans 06
- 2 Applications of Roundup
- Proline on July 26th & Headline August 28
- Harvested late and wet



Strip Tillage Trial Glyndon, David Watt Farm

May 9th Planting





July 20th

Conventional

Strip
Till



Comments

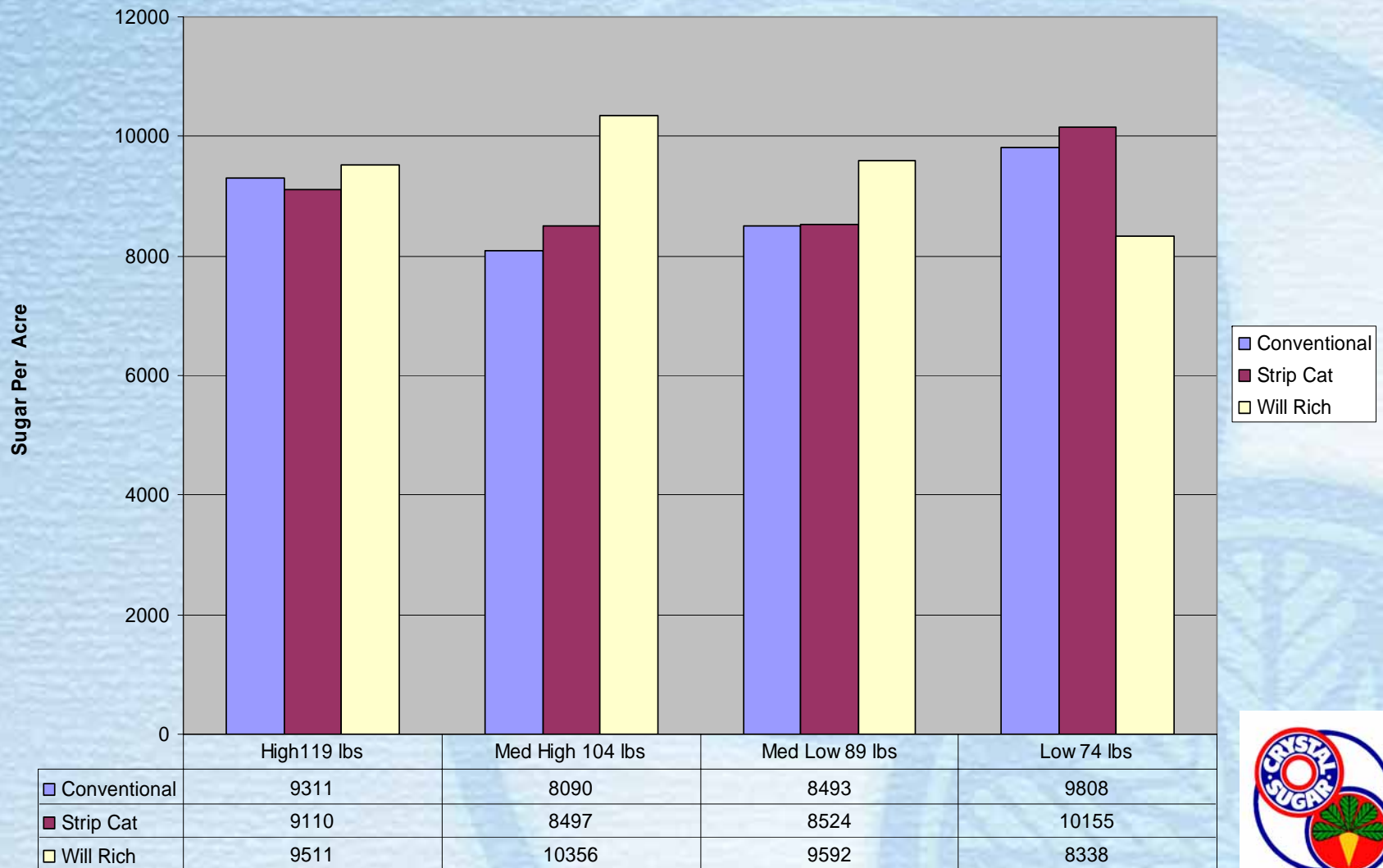
Strip Tillage Trial Glyndon, David Watt

- Perennial weeds will become more of a problem
- Defoliator tracking can be a problem under wet conditions
- Harvester trash, no place for leaf material to go
- Plant population
- Soil Temps
- Trash Cleaners are needed at planting



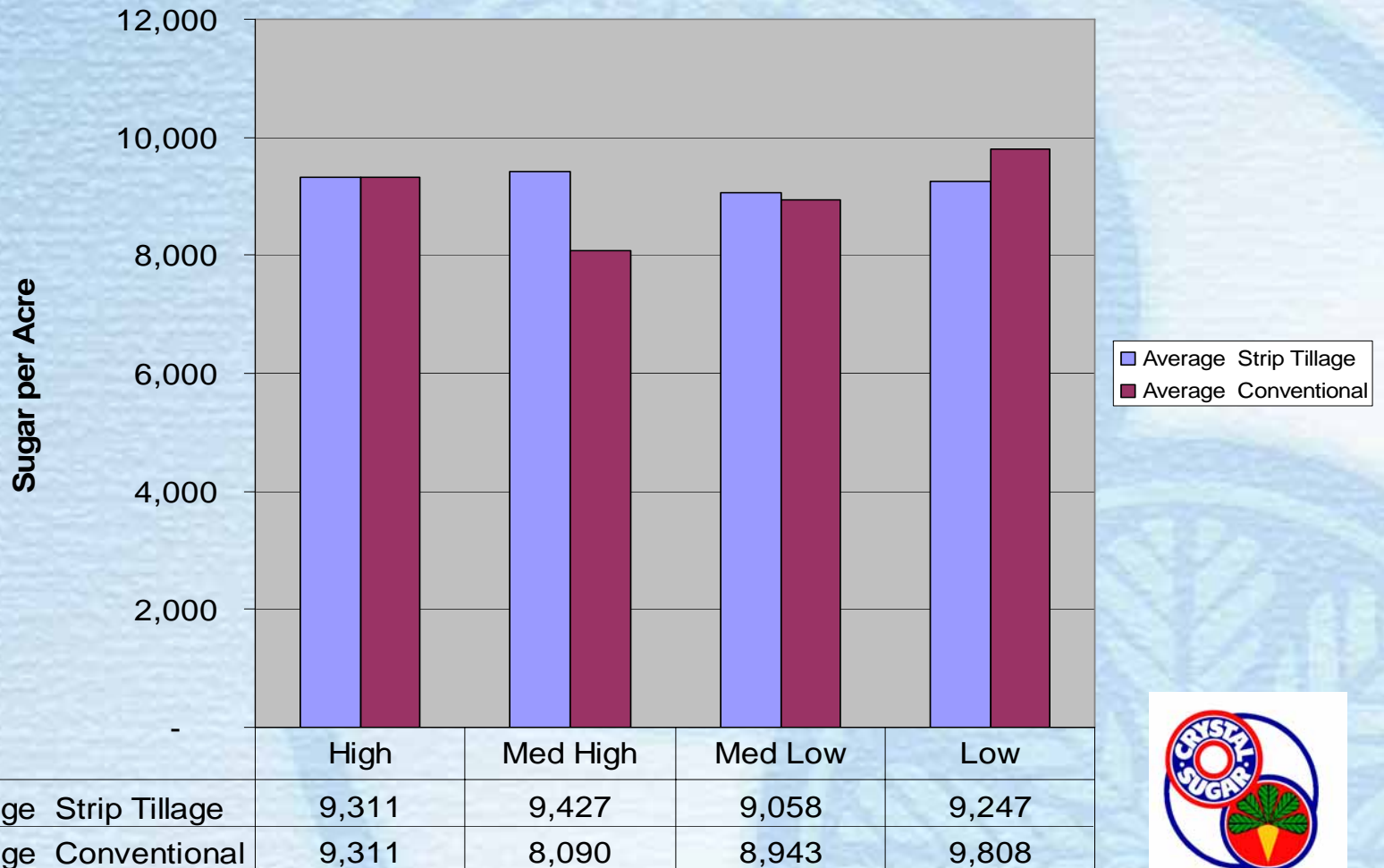
Strip Tillage Trial Results

Glyndon, David Watt Farm

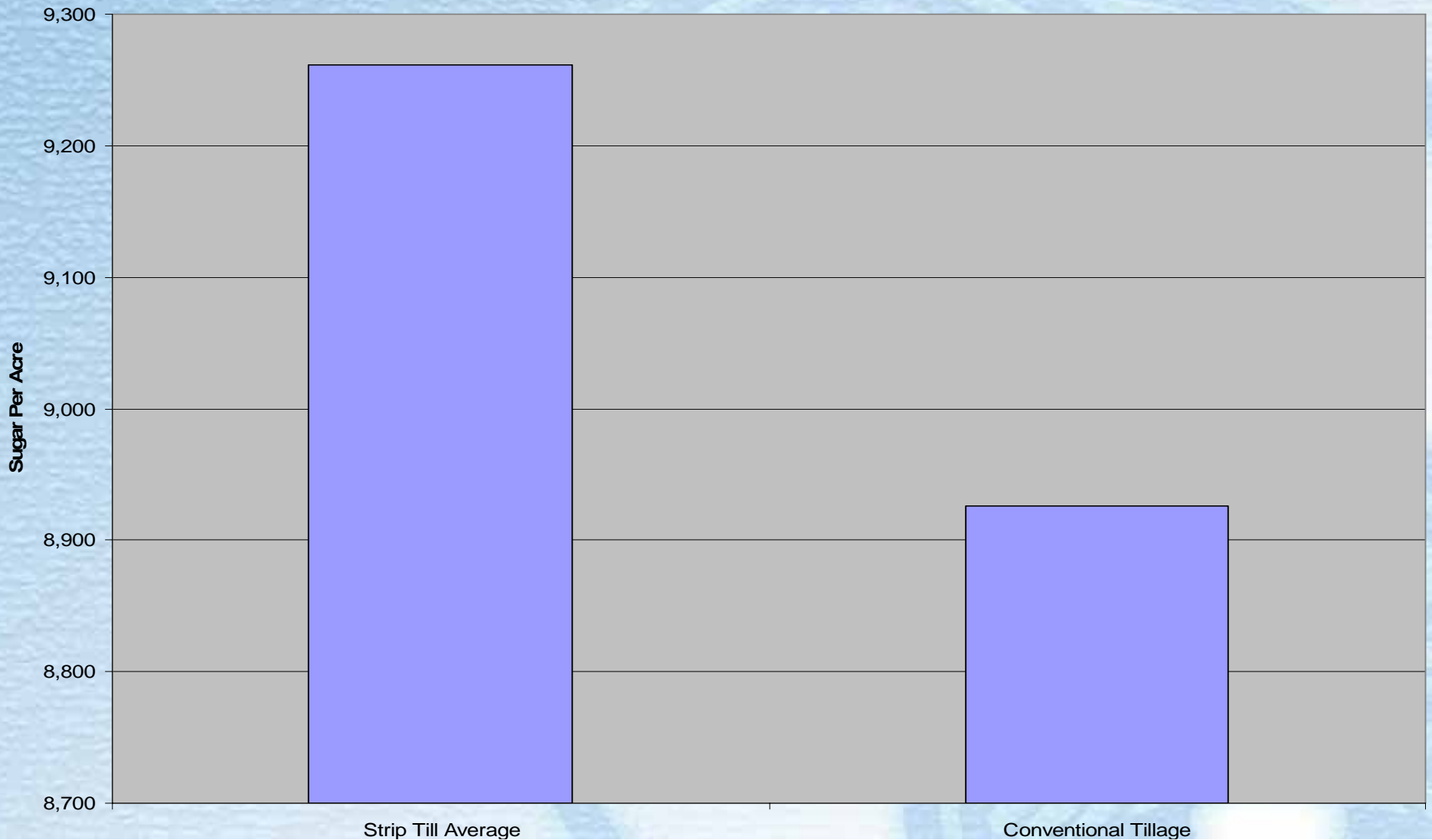


Average By Tillage Tool

Strip Tillage Trial Glyndon, David Watt Farm

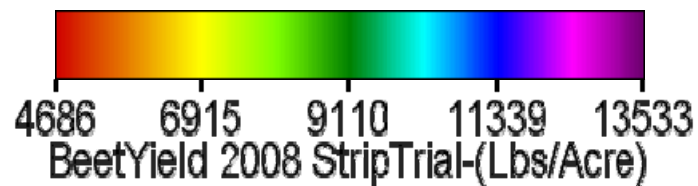
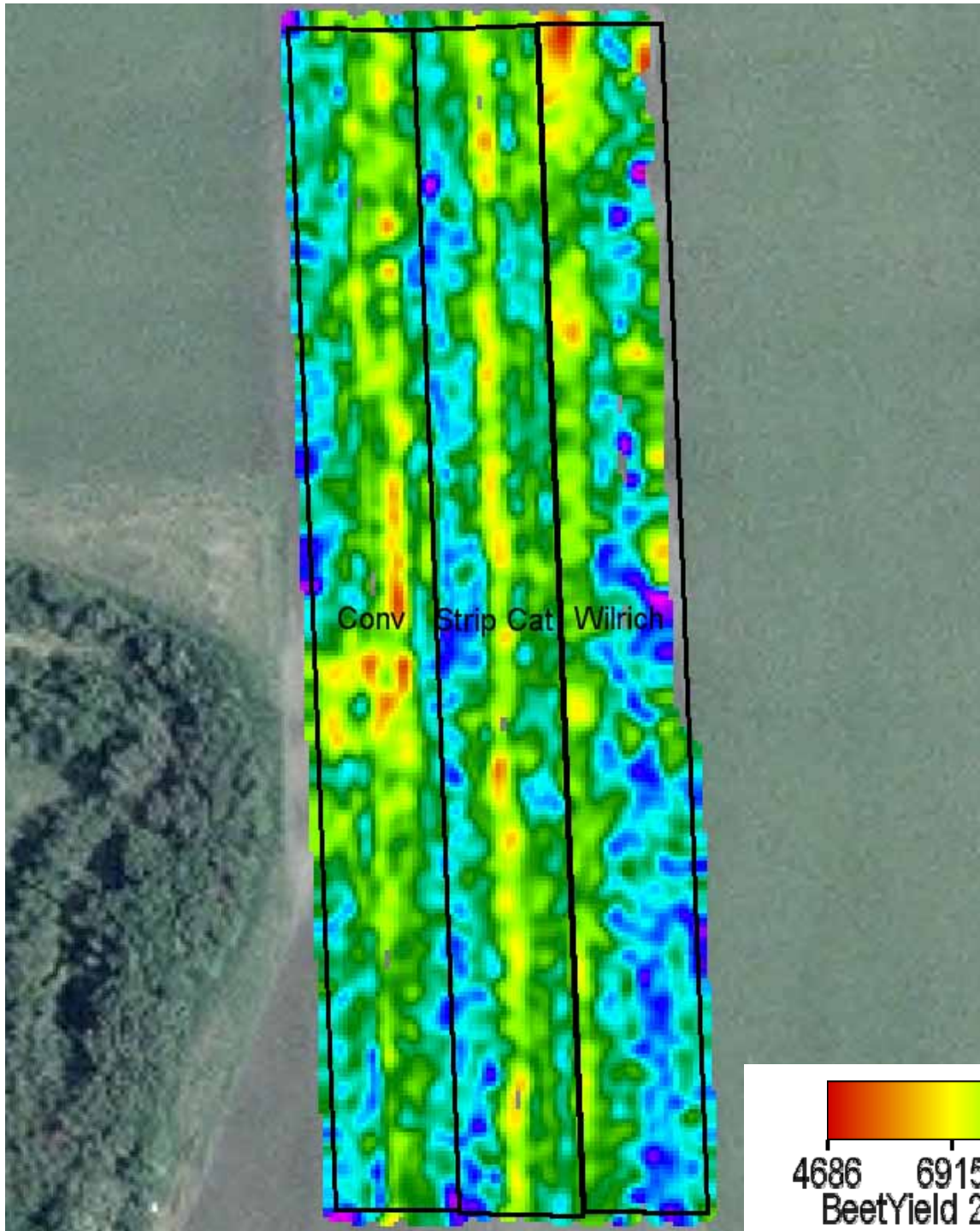


Tillage Type Average by Nitrogen Application Strip Tillage Trial Glyndon, David Watt Farm



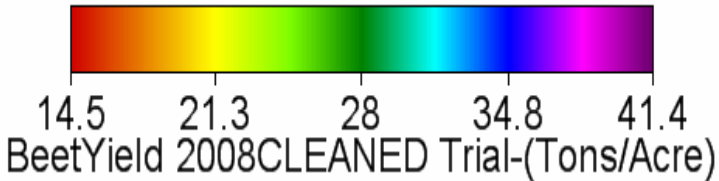
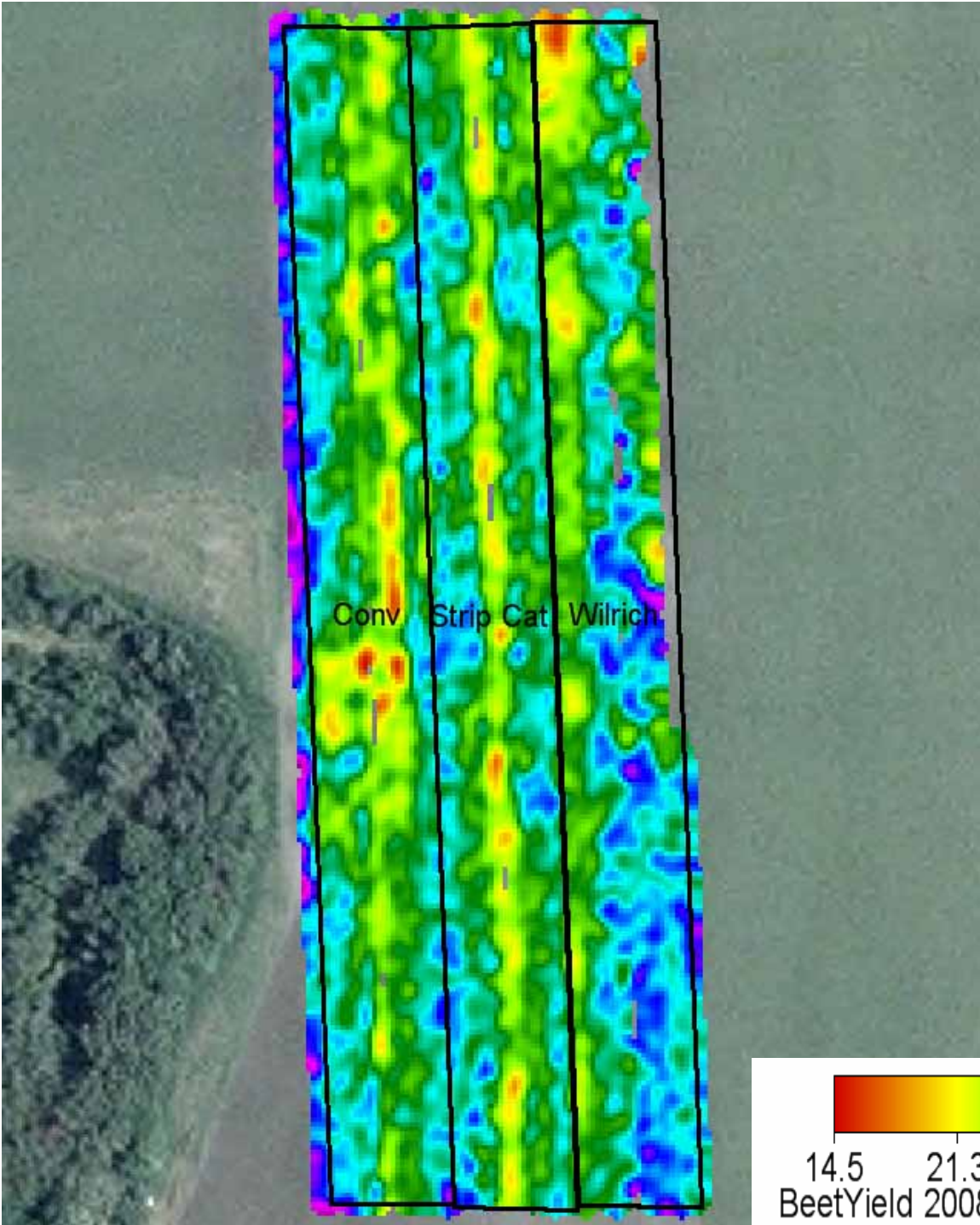
Strip Tillage Trial by Nitrogen Rate Glyndon, David Watt Farm

RSA Map



Strip Tillage Trial by Nitrogen Rate Glyndon, David Watt Farm

Yield Map



Results – Multi-Crop Strip Till

(Courtesy Dr. Overstreet NDSU)

Location – Tillage Treatment	Average Yield SOYBEAN (bu/a)	Average Yield CORN (bu/a)
Prosper – Strip Till	53.25 a	230 b
Prosper - Conventional	55.61 a	205 a
Moorhead – Strip Till	44.23 b	197a
Moorhead - Conventional	36.46 c	163 c

Results – Multi-Crop Strip Till

(Courtesy Dr. Overstreet NDSU)

Location/ Tillage Treatment	Root Yield (Tons/a)	Net Sugar (%)	RSA (lb/a)	RST (lb/ton)	Stand (Beets / 100 ft)
Prosper – Strip Till	29.3a	13.6a	7947a	272a	97a
Prosper Conventional	32.1a	14.3ab	9190a	286ab	122a
Moorhead – Strip Till	25.5a	14.8 b	7551a	296 b	178 b
Moorhead Conventional	26.0a	15.2 b	7913a	304 b	168 b

Multi-Crop Strip Till: Conclusions

(Courtesy Dr. Overstreet NDSU)

- Prosper - Soybean yields very good for both tillage treatments; corn yields exceptional for both tillage treatments
- Moorhead - Soybean yields above average; corn yields very good for both tillage treatments at the Moorhead location.
- Sugarbeet - No s.d. between tillage types for yield or RSA. Lower stand for ST at Prosper, but slightly higher stand for ST at Moorhead, so...???
- Overall – Strip tillage is a viable alternative to conventional tillage for all crops tested



A Need for Larger Planters



A Need for Larger Planters

5-7-06
RSA 9,126 #/A

5-23-06
RSA 6,584 #/A

2,542 # RSA Difference = \$47,000

Take Home Messages...

- Consider the wind conditions you are planting in
- Variable Rate Seeding is increasing in popularity
- Consider planter Row shut-off to offset high seed costs and to improve yield & quality
- Planting patterns and spacing are being looked at...maybe more to come
- Consider a larger planter for your operation...time is of the essence in the RRV



**Thank You For Your Time
Questions?**

08.01.2005