

BENEFITS AND VALUE OF



VersaLime


YWTG Grower Meetings
2011



American
Crystal
Sugar
Company



Outline

- Value of spent lime to soil tilth
 - Effects on other rotational crops
 - Application methods
 - Minnesota Pollution Control Agency (MPCA) policies & procedures
 - American Crystal Sugar's recommendation
- 

No Lime

Resistant Variety
45 g Tachigaren

Susceptible Variety
No Tachigaren



10 Ton Lime

Resistant Variety
45 g Tachigaren

Susceptible Variety
No Tachigaren





No Lime

10 Ton Lime



Soil Tilth

- Windels/Brantner noted limed soil screened better than non-limed soil
- Better downward percolation of water and drainage
- Raise pH of acidic soils
- May increase beneficial soil microorganisms





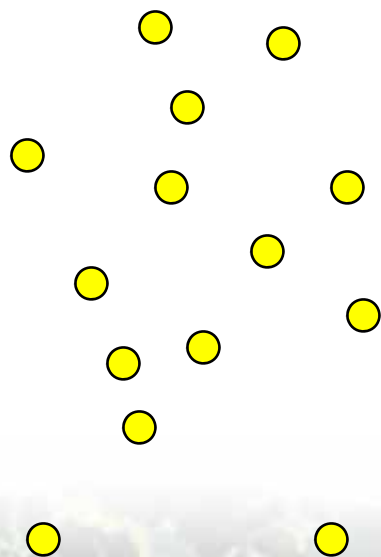
Soil Tilth

- Increased Ca and Mg in lime improves soil structure by causing *flocculation* of clay particles
- Soil structure is a major factor in the drainage characteristics of a soil
 - Flocculated soils drain better
 - Less restrictive to plant root growth
- Lime can increase the buffering capacity of a soil

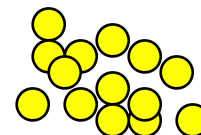


Soil clay particles can be unattached to one another (*dispersed*) or clumped together (*flocculated*) in aggregates. Soil aggregates are cemented clusters of sand, silt, and clay particles.

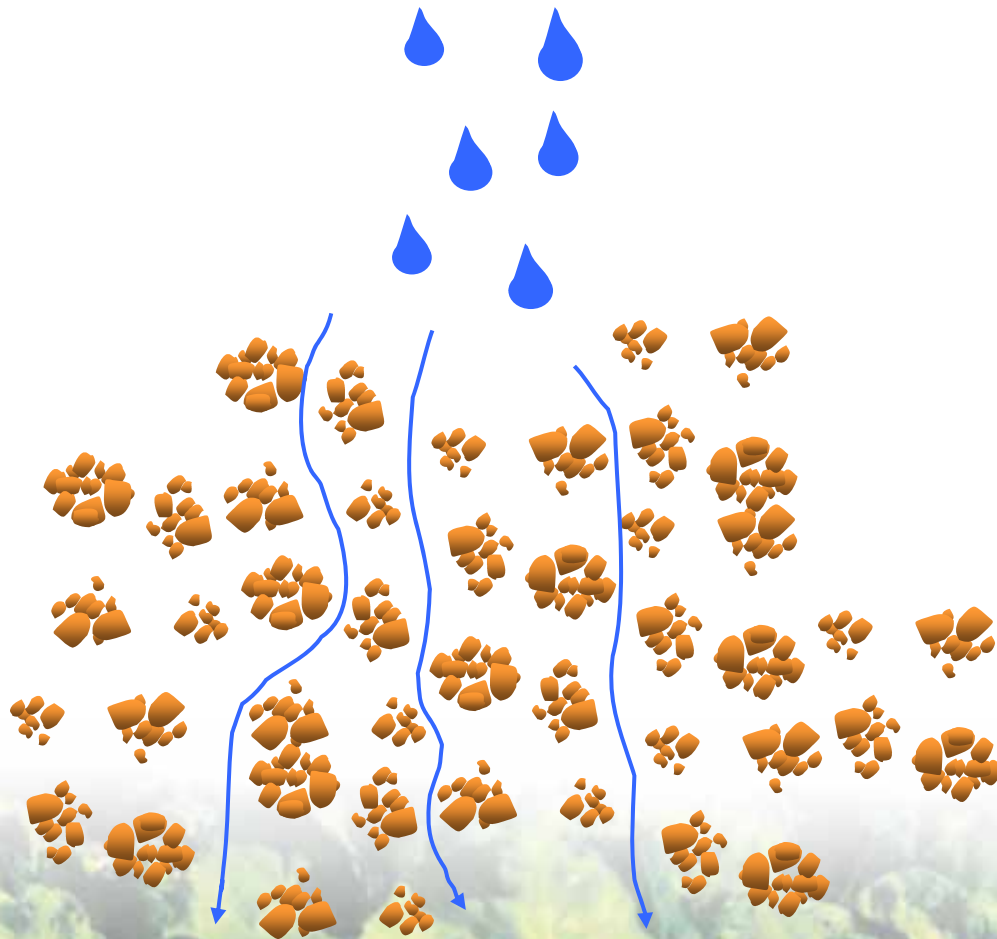
Dispersed Particles



Flocculated Particles



Flocculation is important because water moves mostly in large pores between aggregates. Also, plant roots grow mainly between aggregates.



In all but the sandiest soils, dispersed clays plug soil pores and impede water infiltration and soil drainage.



Soil Test on Limed Soils

2005 Hillsboro Spent Lime Trials, Soil Collected and Analyzed in May of 2005

Lime Rate	NO ₃ -N	Olsen P	pH	EC	Ca	Mg	K	Na
Wet Tons A ⁻¹	ppm	ppm		dS M ⁻¹	ppm	ppm	ppm	ppm
0 – 3 Inch Soil Depth								
0	12.1	19.5	7.42	0.67	3357	1038	768	35.4
5	12.1	24.1	7.66	0.71	4118	1097	768	35.4
10	12.1	31.5	7.74	0.69	4643	1185	768	35.4
20	12.1	41.7	7.75	0.73	5210	1280	768	35.4
30	12.1	56.6	7.78	0.76	5332	1402	768	35.4
Effect	none	positive	OK	OK	positive	positive	none	none

VersaLime Nutrient Summary



VersaLime
crystalsugar.com

ACSC VersaLime Average Annual Nutrient Values

2011

	<u>Mhd</u>	<u>Hlb</u>	<u>Crk</u>	<u>EGF</u>	<u>Dtn</u>
Total Nitrogen (As Received) lbs/ton	5.2	4.7	5.7	4.8	5.1
Lime P₂O₅ Content (As Received) lbs/ton	16.0	13.3	15.5	15.5	18.4
Lime K₂O Content (As Received) lbs/ton	1.2	1.3	1.3	1.4	1.5
Lime Sulfur Content (As Received) lbs/ton	7.0	4.8	5.0	4.4	6.3
Moisture Content	31%	34%	31%	36%	30%



Nutrient Value

**Average Nutrient Content of Spent Lime,
A. Sims, U of MN NWROC, 2005**

Nutrient	Lbs/Dry Ton	\$ Value
P₂O₅ equiv.	20.0	\$13.50
K₂O equiv.	3.5	\$1.65
Total		\$11.00

**Total Nutrient Value at Recommended
Application Rate of 10 Tons/Acre**

Nutrient	Total Lbs	\$ Value
P₂O₅ equiv.	200	\$135.00
K₂O equiv.	35	\$16.50
Total		\$151.50

11-52-0 @ \$700 (P₂O₅) 0-0-60 @ \$573 (K₂O)

Prices based on DTN survey of retail dealers (Feb 8th 2011)



Effects of Lime on Other Crops

Dr. Larry Smith Results

University of Minnesota

2005 Soybean yield, oil and protein following sugarbeet at different spent lime rates applied in 2004. Trial shows lime applications had no effect on soybean yields.

Variety	Lime Treatment (TDM/A)	Yield (bu/A)	Oil (%)	Protein (%)
Garst 0211RR Chlorosis Susceptible Variety	0	41.5	20.0	29.6
	5.0	45.4	19.5	31.4
	10.0	42.1	20.1	29.7
	15.0	42.6	19.5	31.1
Gold Country 923RR	0	42.9	19.8	30.5
	5.0	45.7	19.1	32.2
	10.0	43.8	19.8	30.4
	15.0	45.3	19.2	32.1

Different studies have found similar result for other crops grown in rotation with sugarbeet (wheat, canola, corn).



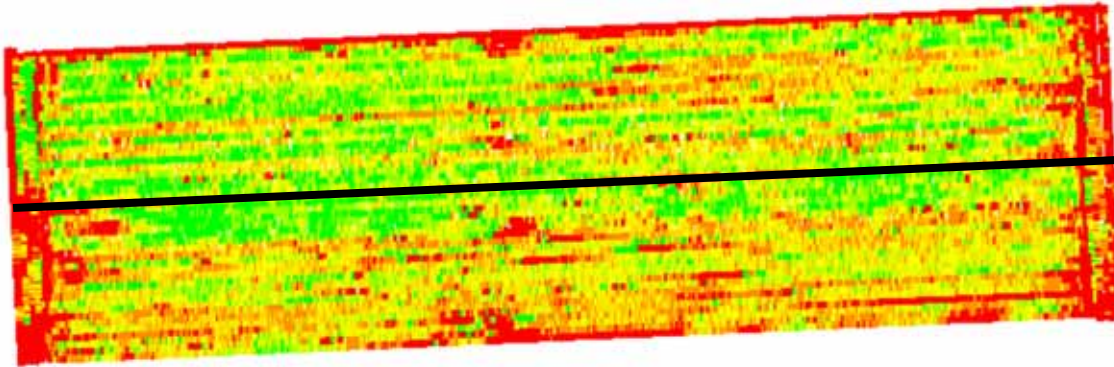
NDSU Canola Trials

Sugarbeet lime as a sulfur source for Canola, Langdon 2010

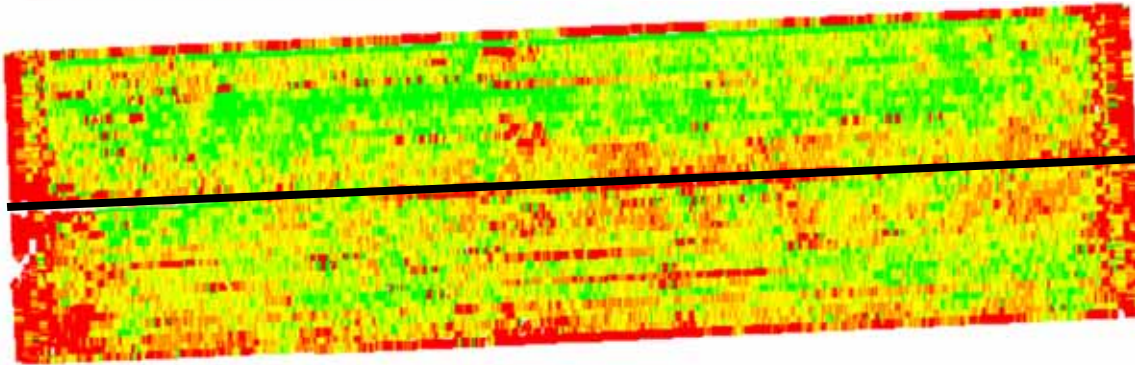
Fall applied 2009	Spring applied 2010	Yield lb/a	Height cm	Phys. Mature July date
80 lb el.S/a + 60 lb P/a	none	2059	113	23.3
10 ton lime material/acre	none	2030	111	22.0
60 lb P/a	7.5 lb SO ₄ /a	2027	108	24.0
60 lb P/a	15 lb SO ₄ /a	1966	114	21.5
none	15 lb SO ₄ /a	1915	107	22.3
5 ton lime material/acre	none	1906	103	22.5
60 lb P/a	80 lb el.S/a	1257	111	28.0
60 lb P/a	none	1045	106	28.8
none	none	818	111	29.3
LSD 5%		420	NS	2.0



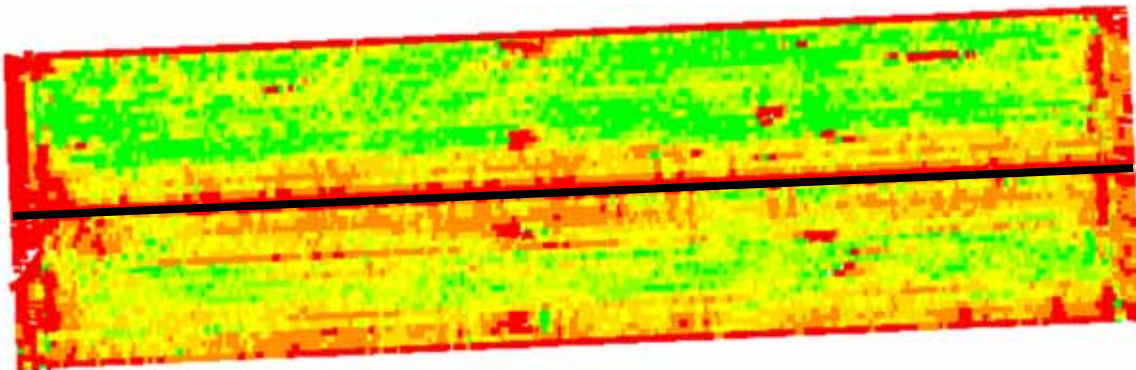
Yield Monitor Data



2008 Corn - Top portion had
lime applied



2009 Soybeans +4 bu/acre



2010 Corn +14 bu/acre



Liming Benefits

Query 1

Layer 1 - Harvest - 1 Corn - Corn

Total area 40.81 acre

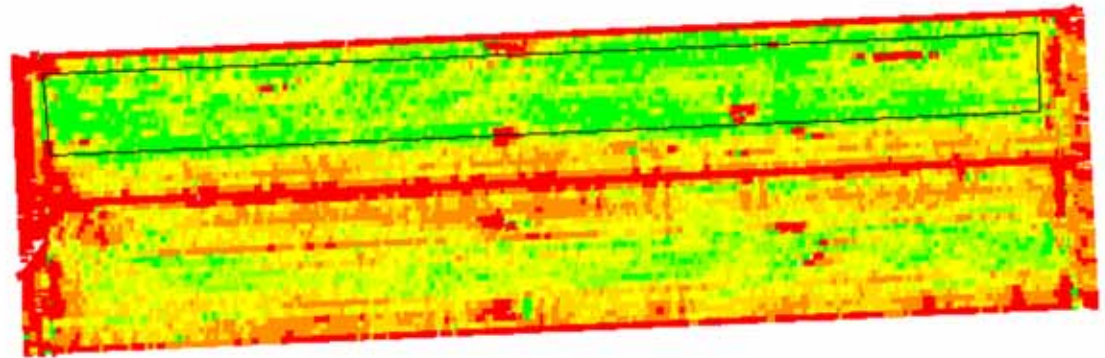
Description

Average

Estimated Volume (Dry) 177.45 bu/ac

Moisture 15.67%

Elevation 883.77 ft



14 bu/a X \$6.70 Corn = \$94

4 bu/a X \$14.50 Beans = \$58

Query 2

Layer 1 - Harvest - 1 Corn - Corn

Total area 39.45 acre

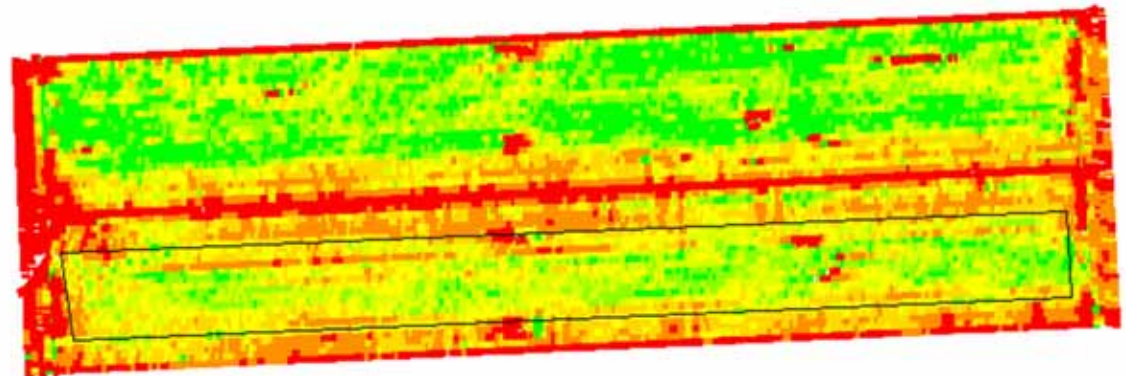
Description

Average

Estimated Volume (Dry) 163.12 bu/ac

Moisture 15.82%

Elevation 884.81 ft





Spreading Equipment

- Common spreader types
 - Broadcast
 - Flail
- Spreader power
 - Ground drive (tire size is important)
 - Powered drive (PTO)



**Vertical Auger
spreader**



**Twin spinning disk
broadcast spreader**



Loading Spent Lime



Spreading Spent Lime






Close-Up Of Limed Field



Inconsistent Spreading





LIME APPLICATION RECOMMENDATIONS

- Apply 7-10 wet Tons/Acre
- Apply 1 year prior to sugarbeets for best results
- Spread as evenly as possible
- Incorporate thoroughly with tillage
- Contact Ag Staff for any assistance with procedure





Policy and Procedures

- Soil test prior to application
- Lime can be stockpiled for 7 months at the field where it will be applied
- Only the amount of lime to be applied to the field may be stockpiled





Take Home Message

- No detrimental effects on rotational crops
- Increase yields of sugarbeet crops with severe Aph
- Every ton of lime applied will increase soil test P by 1 ppm
- Increase soil pH of acidic soils
- Addition of numerous micro-nutrients to soil
- Benefits of lime could last 7 years
- VersaLime is free





Thank You For Your Time

Any Questions



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