4th Annual

Midwest Soil Improvement Symposium: 2014

Research and Practical Insights into Using Gypsum

Understanding Gypsum's Use in Agriculture

Ron Chamberlain
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GYPSOIL/BRM

AUGUST 13, 2014

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Understanding Gypsum's Use in Agriculture

Ron Chamberlain
Lead Agronomist
& Founder - GYPSOIL
August 13, 2014

HEALTHIER SOILS. BETTER CROPS.

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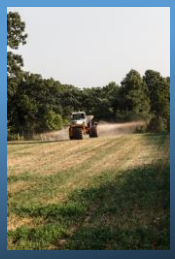
Topics today:

- Overview of gypsum research initiatives
- Gypsum rate recommendations
- Commercial observations of soil changes



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Understanding gypsum in agriculture

- Limited commercial agriculture market until recently
- Very little formal research to date
  - Some university and USDA work
- Growing commercial perspectives – GYPSOIL's leadership position
- Expanding number of retail and on-farm trials

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GYPSOIL research initiatives

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GYPSOIL research focus

- Soil amendment
- Water management
- Water quality
- Nutrient Source
- Crop
  - Vigor
  - Yield
  - Quality
- Salt remediation
- Aluminum amelioration
- Golf course turf applications

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GYPSOIL research initiatives

14 states

- Funded research
  - University, independent, USDA
- Supported research
  - Product, coordination, protocol, other
- On-farm research

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Funded research

- Alabama
- Arkansas
- Indiana
- Kansas
- Mississippi
- N. Carolina

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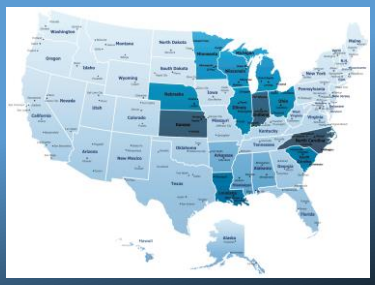
Supported research

- Illinois
- Indiana
- Kansas
- Louisiana
- Michigan
- Minnesota
- Nebraska
- N. Carolina
- Ohio
- S. Carolina
- Wisconsin



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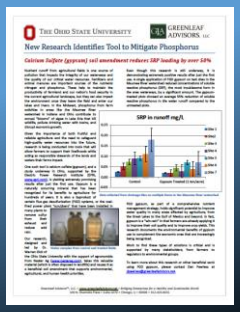
Supported research

- Exciting new results in Ohio
- 55% reduction in SRP concentrations in tile water
- Timely given Toledo water crisis



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Plus, customer initiated research

- Illinois
- Indiana
- Kansas
- Louisiana
- Michigan
- Minnesota
- Nebraska
- N. Carolina
- S. Carolina

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GYPSOIL rate recommendations

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How we determine rates

- Recommendations developed over time
- Always begins with soil test
- Determine goal – Is gypsum being used as a ***soil amendment*** *or* ***nutrient source?***
- Consider soil amendment timetable – How rapidly do you want to alter structure?

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GYPSOIIL as a nutrient source

GYPSOIL is $CaSO_4 \cdot 2H_2O$ or *calcium sulfate dihydrate:*

- 20-23% calcium
- 17-20% sulfate sulfur

1 ton delivers approximately:

- 400 lbs. calcium
- 320 lbs. sulfate sulfur

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Recommended rates for GYPSOIL as a nutrient source

CROP		Calcium rate Lbs./acre	Sulfur rate Lbs./acre
Row Crops			200-500
Alfalfa			300-500
Peanuts		1,200-2,000*	
Potatoes		1,000	

*NC State Peanut Information

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GYPSOIL for soil amendment

Why improve soil structure?

- Increase crop production efficiency
- Improve long-term, sustainable soil quality
- Reduce negative impacts on the environment

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GYPSOIL for soil amendment

How do we improve soil structure with gypsum?

- Balance soil chemistry
- Move unwanted cations

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GYPSOIL for soil amendment

Criteria:

- Consider soil test, cropping history, field conditions
- Evaluate soil condition, texture – how much clay is present and any problems

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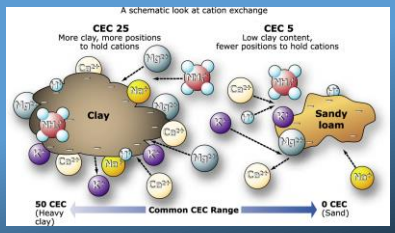
Differences in CEC



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GYPSOIL for soil amendment

Criteria:

- Base saturation goals
  - Ca – 70-80%
  - Mg – 10-13%
- CEC level

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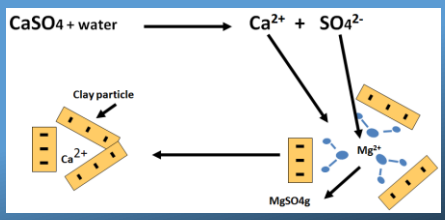
A balanced soil

EXCHANGEABLE ELEMENTS	BALANCED	TYPICAL
Calcium	70-80%	Deficient
Magnesium	10-13%	Excessive
Potassium	2-5%	Low*
Hydrogen	1-10%	High

Gypsum **flocculates** dispersible soils



Soil amendment rate based on CEC

CEC	Rate Lbs./acre
< 5	500
5-10	1,000
10-15	2,000
> 15	4,000

Example soil:

CONDITIONS		GYPSOIL?
Texture	Silty Clay Loam	Yes
CEC	18	Yes
Base saturation - Ca - Mg	 58% (Deficient) 25% (Excessive)	Yes
Observations	Compaction, poor rooting, ponding, erosion, droughtiness	Yes
Recommended Rate		**2,000 lbs./A per year**

Soil amendment total based on balancing formulas

Target x CEC x Meq/100 = Lbs. nutrient needed	
Soil Test Results -58% B.S Calcium -CEC of 18	Common Meq Values -Calcium 400 -Magnesium 240 -Potassium 782
Solution = 70-58=12 12x18x400/100 = 864 lbs. Calcium*	
864/.20= 4,320 Lbs. Gypsoil	
*Calcium needed in top 8" of soil to raise Base Saturation Ca to 70%	

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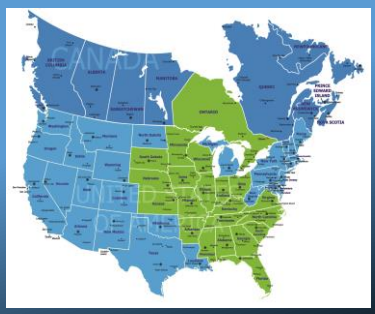
GYPSOIL now available in 21 states plus Ontario



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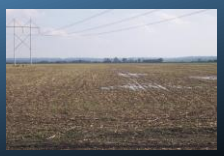
First year observations

No-till: mellowing surface

Somewhat less ponding



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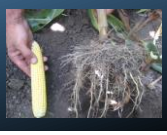
Second year observations

Deeper mellowing
Less ponding
Back in the field quicker

NH3 applicator pulls easier

Greater rooting volume



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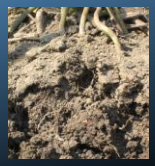
Third year observations

More earthworms/microbiology

Better emergence



Better rooting

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Fourth year observations

Deeper rooting

Late season crop vigor

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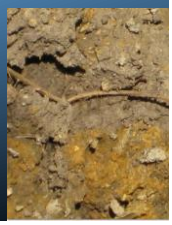
Fourth and fifth year observations

Usable subsoil



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Fourth and fifth year observations

Crop uniformity/vigor

Yield response

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Jared Nordic, Rothsay Minnesota

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Commercial results

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Questions?

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