

Midwest Soil Improvement Symposium:

The year 2012 is displayed in a green, rounded rectangular box with a decorative border, flanked by three dots on each side.

Research and Practical Insights into Using Gypsum

FOR IMMEDIATE RELEASE

Contacts:

Robert Spoerri
Beneficial Reuse Management LLC
312-784-0303
rspoerri@beneficialreuse.com

Karen Bernick
563-285-6832 or 563-320-2625
agnews@karenbernick.com

Good for crops and environment:

Symposium shows FGD gypsum offers many soil quality benefits

September 7, 2012... As one of several speakers at the recent Midwest Soil Improvement Symposium, Indiana farmer Jack Maloney recounted that he started applying synthetic gypsum on his corn and soybean fields 11 years ago at the urging of his agronomist. The agronomist had seen tight clay soils like Maloney's become softer and more permeable to rain water after two or three applications of gypsum.

"Now we can take a 2-inch rain and not pond," said Maloney. "The water infiltration is phenomenal. And it helps structure the soil."

The Midwest Soil Improvement Symposium: Research and Practical Insights into Using Gypsum was held August 21, 2012, at Rulon Enterprises, a family farm operation in Arcadia, IN. The Rulon operation is managed by Ken, Rodney and Roy Rulon, and Roy's sons Nick and Neal. In addition to Rulon Enterprises, the Conservation Technology Information Center and the GYPSOIL Division of Beneficial Reuse Management sponsored the symposium.

Symposium host Rodney Rulon says gypsum helps “supercharge” his family’s no-till cropping system. The Rulons began applying gypsum seven years ago to problem fields where persistent wet spots delayed fieldwork and reduced yield.

After seeing changes in the soil’s physical properties resulting in quicker drying and better crop results, applications of 1 to 1.5 tons gypsum per acre became a staple across their entire 5,900-acre system.

“We’re using it to build soil structure and healthy no-till soils,” explained Rulon.

At the one-day symposium, university and USDA researchers, industry experts, crop consultants and experienced growers presented sessions on the impact of using gypsum on crop production, soil and water quality, water infiltration, erosion, runoff and nutrient loss. Field demonstrations of gypsum application equipment and soil physical properties were also part of the program. Approximately 150 researchers, crop consultants and growers attended.

Banking moisture

Maloney, who operates a 2,600-acre no-till farm based in Brownsburg, IN, has observed dramatic differences between his fields and neighboring conventional fields during wet years, as well as dry years such as 2008 and this past season. “Our crop stays green where the others are fired up,” he said.

Panelist Cameron Mills, a grower from Walton, IN, who has used gypsum on sections of his 3,500-acre farm for the past three years, also sees differences in crop reaction to moisture stress. “We’ve got some fields where we have not spread gypsum yet, versus the ones where we have applied, and you can definitely see the difference this year in our crops,” said Mills.

USDA research indicates that gypsum helps soil absorb more water and hold onto it for use later in the growing season. That improves crop yield, especially in no-tilled fields, according to Dr. Allen Torbert, lead researcher at the USDA’s National Soil Dynamics Laboratory in Auburn, AL, where several gypsum trials are underway.

“Gypsum improves soil physical properties. It improves aggregation, increases water infiltration, reduces runoff, improves water-holding capacity, and reduces erosion losses and nutrient losses,” Torbert said.

Better aggregation

Gypsum contains soluble calcium, which counteracts sodium and magnesium, and helps improve soil particle aggregation, according to Dr. Jerry Bigham, professor emeritus, School of Environment and Natural Resources, The Ohio State University. Clay-type soils in the Midwest often have high concentrations of magnesium, particularly soils historically treated with high-magnesium limestone, he said.

Without remediation with calcium, clay soil particles act like a “house of cards,” Bigham explained. “There is a natural tendency for those particles to fly apart or disperse.” When dispersion occurs, soils are prone to compaction and crusting, which contributes to faltering plant emergence and poor rooting.

By contrast, strong, well-aggregated soil particles, surrounded by defined pores, are what make up ideal soil structure.

“We need large pores that can receive and transmit water during times of excess, and we need small pores that can hold water by capillary action during times when we have (moisture) stress,” Bigham said.

Improved soil quality enhances soil biology, emphasized Maloney in his remarks. “It makes that ground sweeter,” he said. “We have a ton of earthworms out there working for us.”

Gypsum also contributes to optimal root growth. “We can get 10 times more surface area of the root by adding a soluble calcium source. This can make a difference to carry the crop over until the next rainfall event,” said Dr. Darrell Norton, a soil scientist recently retired from the USDA Agricultural Research Service’s National Soil Erosion Laboratory in West Lafayette, IN.

FGD gypsum

Gypsum, or calcium sulfate dihydrate, has been used for centuries, and was promoted by Benjamin Franklin and George Washington. Colonial crop growers observed fields that were green and lush when mined gypsum or “land plaster” was applied, said Dr. Warren Dick, a long-time gypsum researcher and professor in the School of Environment and Natural Resources, The Ohio State University.

The cost of mining and shipping gypsum to crop producers, however, caused agricultural use of gypsum to dwindle over time except for on high value crops like potatoes, tomatoes and peanuts.

But thanks to the 1990 Clean Air Amendments, there is a new supply of high quality and lower cost synthetic gypsum available called flue gas desulfurization gypsum or FGD gypsum. FGD gypsum is produced as a byproduct by wet scrubbing systems used to clean emissions at certain coal-fired utilities.

FGD gypsum contains 20 percent soluble calcium or about 400 lbs/ton and 16 percent sulfate sulfur or about 320 lbs/ton, explained Ron Chamberlain, agronomist and director of gypsum programs for GYPSOIL/Beneficial Reuse Management. It has the same basic chemical composition as mined gypsum but at significantly lower cost.

FGD supplies are becoming more widely available as more scrubbers come online, noted Chamberlain. GYPSOIL serves as a liaison between utilities and growers, and has developed a network of distributors throughout the Midwest, Mid-south and Southeast.

“Typically, FGD gypsum is about 10–12 percent moisture, and can be applied using a truck or pull-type litter or lime spreaders,” Chamberlain said. “Gypsum does not affect pH. It’s a neutral molecule so it’s not a liming agent.”

FGD gypsum is regulated on a state-by-state basis as a byproduct and it has been shown to be free of contaminants in repeated analyses, said Chamberlain.

Sulfur depletion

University of Illinois soil fertility and plant nutrition specialist Dr. Fabian Fernandez outlined his work studying sulfur response in corn. He said sulfur deficiency has increased across the Midwest in recent years because less sulfur is being deposited from the atmosphere as a result of emissions regulations. In addition, high producing crops have greater removal rates, Fernandez said.

While Fernandez has seen a response to added sulfur in some, but not all, Illinois trials, Dick presented several research reports that showed significant yield responses in alfalfa and corn when gypsum was used as a sulfur source.

“Gypsum puts an abundance of sulfur out there,” Rulon commented. “Deficiencies kind of become a non-issue.”

“We have done tissue tests in the last year and the sulfur was at the top of the charts on the tissue samples,” Maloney agreed.

Water quality

Beyond the crop benefits, the impact of using gypsum on agricultural soils to improve water quality offers many potential environmental benefits. Norton showed several examples of gypsum’s positive impact on runoff, erosion and soluble phosphorus loss.

Joe Nester, a crop consultant from Bryan, OH, recalled seeing a 2002 experiment by Norton showing gypsum-treated soil vs. untreated soil in both untilled and tilled sections. Nester showed a picture of a water collection bottle from the untreated soil that was filled with cloudy, sediment-loaded runoff. That signals environmental risks and a waste of money, he said. “Where are the nutrients?” he asked. “They’d better be going into the crop. If not, you are wasting money.”

“Where erosion and runoff are a problem, you can almost bet you’re going to be able to get a benefit from adding gypsum...no matter what the tillage system,” Norton said.

For more information about gypsum, or to view symposium presentations, visit www.gypsoil.com.

END

Sidebar on application rates, a list of speakers and background on the sponsoring organizations follow. Visit www.gypsoil.com for photos and presentations.

Sidebar

Recommended application rates

One of the big questions surfacing at the Midwest Soil Improvement Symposium: Research and Practical Insights into Using Gypsum held August 21, 2012, at Rulon Enterprises, Arcadia, IN, was recommended application rates for gypsum applied as a soil amendment.

Ron Chamberlain, chief agronomist and director of gypsum programs for GYPSOIL/Beneficial Reuse Management, recommends growers look at the Cation Exchange Capacity (CEC) of the specific soils to be amended. Samples should be tested to determine base saturation and CEC using a reputable soil testing laboratory.

Recommended rate guide:

<u>CEC Rate</u>	<u>Gypsum Application Rate*</u>
<10	0.5 T/A
10-15	1.0 T/A
>15	2.0 T/A

Goal: Base saturation of Ca = 70 to 85%.

*GYPSOIL recommended rate for soil amendment purposes

END

Symposium speakers:

- **Karen Scanlon**, executive director of CTIC, West Lafayette, IN;
- **Dr. Warren Dick**, professor, Environmental and Natural Resources, Ohio State University, Wooster, OH;
- **Dr. Fabian Fernandez**, researcher and assistant professor of soil fertility and plant nutrition at the University of Illinois, Champaign-Urbana, IL;
- **Dr. Darrell Norton**, noted soil scientist recently retired from the National Soil Erosion Research Lab, USDA-Agricultural Research Service, West Lafayette, IN;
- **Dr. Rufus Chaney**, research agronomist, Environmental Management and Byproduct Utilization Laboratory, USDA-Agricultural Research Service, Beltsville, MD;
- **Dr. Allen Torbert**, research leader, National Soil Dynamics Laboratory, USDA-Agricultural Research Service, Auburn, AL;
- **Dr. Jerry Bigham**, professor (retired), Environmental and Natural Resources, The Ohio State University, Wooster, OH;
- **Dr. Martin Shipitalo**, soil scientist, USDA-Agricultural Research Service, Ames, IA;
- **Ron Chamberlain**, agronomist and director of gypsum programs for Beneficial Reuse Management, marketer of GYPSOIL™ brand gypsum, Chicago, IL;
- Grower panelists include: **Rodney Rulon**; **Jack Maloney**, Brownsburg, IN; and **Cameron Mills**, Walton, IN;
- Consultant panelists **Joe Nester**, Nester Ag, Bryan, OH; **Daryl Starr** of Advanced Ag Solutions, Lafayette, IN; **Tom Weaver**, Kow Consulting, Darlington, WI;

Midwest Soil Improvement Symposium 2012 Sponsors

Rulon Enterprises is a 5,900-acre family farm partnership in Arcadia, IN, owned by Ken, Roy and Rodney Rulon. Started in 1869, the operation is based on the homestead farm where four generations of Rulons have farmed with sustainability and environmental responsibility as the focus. The operation was winner of the American Soybean Association's 2012 National Conservation Legacy Award.

www.rulonenterprises.com

The **Conservation Technology Information Center** champions, promotes and provides information on technologies and sustainable agricultural systems that conserve and enhance soil, water, air and wildlife resources and are productive and profitable. This year marks CTIC's 30th anniversary. www.ctic.org

GYP SOIL is a division and tradename of Beneficial Reuse Management LLC. Its mission is to make a positive impact in its customers' soil and crops while conserving natural resources and protecting the environment. GYP SOIL identifies gypsum supplies, assists in meeting regulatory requirements, develops cost-effective distribution networks and helps growers understand the agronomics and application methods in using gypsum. GYP SOIL brand gypsum is distributed to crop growers in the Midwest, Delta and Southeast. www.gypsoil.com.



Beneficial Reuse Management LLC • 212 W. Superior Street • Chicago, IL 60654 • 1-866-GYP SOIL (497-7645) • www.gypsoil.com



Attendees at the Midwest Soil Improvement Symposium: Research and Practical Insights into Using Gypsum listen as Dr. Allen Torbert, Lead Researcher at the National Soil Dynamics Laboratory, USDA-Agricultural Research Service gives highlights from gypsum research underway. The symposium, held August 21, 2012, at Rulon Enterprises in Arcadia, IN, drew approximately 150 attendees.



Jack Maloney (left), a corn and soybean grower from Brownsburg, IN, discusses how he uses gypsum as part of his no-till system to improve water infiltration and soften tight clay soils. Sitting next to him are fellow panelists Cameron Mills (middle), Walton, IN; and Rodney Rulon (right) who is a partner in Rulon Enterprises where the symposium was held on August 21, 2012.



Dr. L. Darrell Norton, a retired soil scientist from the National Soil Erosion Research Lab, USDA–Agricultural Research Service, explains soil profile changes resulting from gypsum applications. He was speaking at the Midwest Soil Improvement Symposium, held August 21, 2012, at Rulon Enterprises, Arcadia, IN.



Nick Rulon of Rulon Enterprises demonstrates gypsum application at the Midwest Soil Improvement Symposium: Research and Practical Insights into Using Gypsum, held August 21, 2012, at Rulon Enterprises, a family farm operation in Arcadia, IN.