

From the Ground Up



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Soil Solutions Gives Presentations on Gypsum Use

Soil Solutions recently attended the American Society of Agronomy/Soil Science Society of Agronomy 2009 International Meeting in Pittsburgh, PA. Bob Hecht gave a presentation entitled “Recommending Gypsum Use—What to Consider”. This meeting was attended primarily by university researchers and extension personnel. It was a great opportunity to share our experiences and challenges with marketing gypsum in agriculture. There were six other presenters with many years of research with gypsum materials, including Dr. Malcolm Sumner and Dr. Darrell Norton.

Gene Kenkel and Bob Hecht also recently attended a two day conference, Agricultural Uses of FGD Gypsum, in Indianapolis, IN. Bob gave a presentation to nearly 250 people on the use of gypsum in crop production in the Midwest. Although there were many presentations supporting the use of gypsum in crop production, the most interesting segment of the meeting was a three farmer panel where they discussed their experiences with using gypsum. The three farmers were from Indiana and Ohio and had used gypsum on their farms since about 1993. Their soils ranged from silt loams to silty clay loam to silty clays. They all described the challenges they experienced with no-till until they started using gypsum in their program. Benefits from gypsum use described by the producers included: 1) Better stands, 2) Drainage tiles work better, 3) Fertilizer efficiency is improved, 4) Better soil conditions at planting and at harvest making operations more timely, 5) Higher yields. Rates used by these farmers ranged from 1000# applied every year to one ton applied every other year. **All three commented that the longer they use the gypsum the better the soil gets.** Their goal is to have the soluble calcium level as high as they can (85% base saturation on soil test is their goal). All three expressed that the use of gypsum in agriculture has been slowed because of the hesitance of university extension to recommend it. They felt this hesitance was due to lack of experience or lack of financial support, because they all agreed that there is adequate research to support its use.

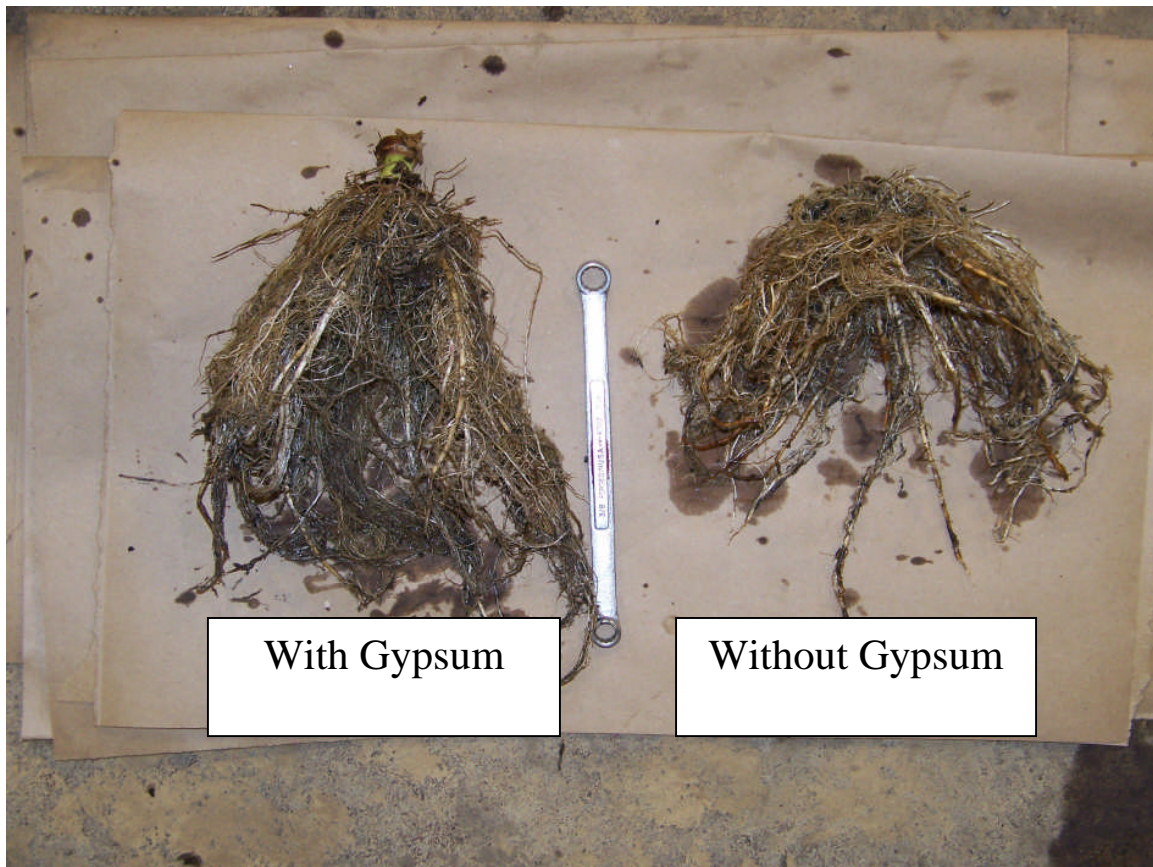
Reminder—Time To Re-apply?

As the article above describes, the continued use of gypsum in soils just continues to improve the soil conditions and improve yields. We have many customers who would agree with this statement and have made multiple applications of gypsum to their soils. However, we have other customers who would benefit from a sequential treatment of

gypsum. This is just to serve as a reminder that if it has been at least three years since you applied gypsum to your soil, you may want to consider another application.

Carbon Dioxide Poisoning?

With all of the articles written on green house gases and the effects of carbon dioxide you probably think this is another one. Wrong! Dr. Darrell Norton, USDA/ARS Soil Erosion Laboratory, has recently researched root growth in poorly drained soils and found that decreased root growth in these soil conditions may be due to the build-up of carbon dioxide (not just a lack of oxygen as we often hear). Plant roots use (inhale) oxygen from the soil and release (exhale) carbon dioxide when they breathe. Microbes in the soil also release carbon dioxide as they decompose organic matter. If the soils are near saturation or are “sealed off” carbon dioxide will accumulate in the root zone and become toxic to the roots. Dr. Norton has found that this is another reason why gypsum has given positive responses in poorly drained soils. Not only does the gypsum improve drainage, but it also reacts with the carbon dioxide in the soil. As gypsum reacts in the soil the calcium dissociates from the sulfate and becomes free calcium. In turn, this calcium can react with the carbon dioxide to form calcium carbonate thereby fixing the carbon dioxide into a compound that is no longer toxic to the plant roots. See the pictures below from Dr. Norton’s research showing the beneficial effects on corn root growth where gypsum was applied in a saturated soil condition. Note that the roots are more massive and whiter where the gypsum was applied.



Plant Respiration

Given the previous article I thought there may be some confusion on plant respiration. The leaves of plants can be thought of as “solar collectors” for capturing sun energy to transform water and carbon dioxide into plant sugar (photosynthesis). The plant’s leaves also have stoma which can be thought of as the mouth of the leaf. Through these openings in the leaves the plants inhale carbon dioxide from the air and exhale oxygen. But the opposite occurs in the roots of plants. The plant roots inhale oxygen and exhale carbon dioxide. This is an oversimplification because under some conditions plant leaves may also give off some carbon dioxide. Also there are some differences also between grass plants (C4) and broadleaf plants (C3). Essentially it is understood that the leaf stoma close at night and the roots use the plant sugars (energy) to cool the plant down through respiration. That is why under cooler night time conditions higher yields are theorized to occur because less energy is expended (less sugars consumed) to cool the plant. These sugars can then be used or stored for grain fill.

Tips for Achieving 100 Bushel Soybeans (or just increasing your yields)

This article is actually a synopsis of an article I read in the December 2009 Missouri Soybean Farmer magazine. It was written by Dr. Bill Wiebold of the University of Missouri. I thought it made some interesting points that were worth sharing with our readers.

- Yield is so simple that a plant without a brain can make it, and so complicated that even the most brilliant scientist has difficulty explaining it.
- Remember that we can do everything exactly right and our efforts may still be trumped by weather.
- Light absorption drives yield because light absorption is the first essential step to making yield. Plant early to capture more sunlight. Day-length and the angle of the sun decrease after the first day of summer. Narrow rows also increase light capture. Be knowledgeable about your field and know where emergence problems or reduced plant growth are possible.
- Although flowers are produced on every stem and branch node of a soybean plant, the majority of the soybean yield is produced in the upper portion of the middle one-third of the soybean canopy. This portion of the canopy is where maximum sunlight is absorbed since once reproductive growth begins the sugars produced from photosynthesis do not move far within the plant.
- Under normal conditions 65% or more of flowers are aborted. The amount of lost flowers increases with depth into soybean canopy. Soybean flowers, pods and developing seeds compete with their neighbors for sugars and nutrients. Any plant stress will aggravate this competition and loss of seed containing pods will increase so location of flowers on the stems will affect yield.
- Select the proper seeding rate so as to make sure you are above your target stand in every place within the field. This will capture maximum sunlight.

- Foliar diseases and chewing insects reduce yield by removing leaf area. Scout your fields and use fungicides and insecticides judiciously.
- The most important decision is variety selection. Use varieties that have the greatest yield stability over many conditions and locations because you never know the conditions your field will experience each year.
- High yields are associated with higher than normal precipitation in late July and August. Water need is not necessarily the same as water use. Water use decreases during grain filling but not necessarily the need for water.
- As light is captured for photosynthesis the leaf temperature rises. One way to lower leaf temperature is by water evaporation from the leaf. Water is needed for this to occur.
- Treat the soil as a living organism. Don't forget that nearly one-half of the soybean plant is below ground. Root health is essential for plant health. An actively thriving soil community of microbes and other living organisms means roots will also be healthy.
- Soil compaction and/or tight soils squeeze the life out of the soil. This can have season-long or even longer impacts on the soybean plant.
- Soybeans rely heavily on nitrogen fixing bacteria living in soybean nodules. These bacteria will need a healthy soil to maximize production of nitrogen. They also use the sugars that the plants produce so management practices that enhance sugar production in the leaves will also impact nodules.
- Foliar fertilization may be a useful means of supplementing the soil and meeting the high nutrient demand of 100 bushel soybeans.
- To reach 100 bushels/acre you are operating in an environment not often used in experiments in the field so don't take all research as gospel. Don't be afraid to experiment even if your ideas are not grounded in science or logic. Farmers have proven that logic can sometimes be counter-productive to high yield.

Stop and Say Hi.

We would like to remind you that we now have our shop and office in Onawa, Iowa just adjacent to Pamida. If you live in that area or are just passing through, feel free to stop by and say hi. We may just have a cup of coffee brewing or a soda in the fridge and would love to discuss your crop and soil management with you. If you call ahead we will make every effort to have one of our agronomists available.



The season for farm shows is fast approaching. Below is a list of those that we will be exhibiting at. Please stop by our booth and say hi. **Bring your soil tests and we will sit**

and discuss them with you. Maybe we can help you identify your next yield limiting factor. If you want us to spread some PRO CAL 40 on your fields **bring your field maps** and we will try to get it done this year.

<u>Date</u>	<u>Farm Show</u>	<u>Location</u>
Dec. 9, 10	Nebraska Power Farming Show	Lincoln, NE
Dec. 11	Soybean Expo and Machinery Show	Mead, NE
Jan. 6	Corn Expo	Fremont, NE
Jan. 27-29	Sioux Falls Farm Show	Sioux Falls, SD
Feb. 2, 3	Nebraska Alfalfa Expo	Kearney, NE
March 3, 4	Triumph of Ag Expo	Omaha, NE

We will also be attending the Dakota Farm Show in Vermillion, SD on January 5, 6 and the National No-Till Conference in Des Moines, IA on January 13-16. Hope to see you at one of these shows.

Happy Holidays!!

As I write this newsletter, Thanksgiving has passed but it isn't too late to **thank you for your business** this past year. Soil Solutions, LLC values our customers and our greatest reward is to know that we have made your operation more profitable. We also want to wish you and your families a Joyous and Blessed Holiday Season and Best Wishes for a prosperous 2010.



**Merry Christmas from the Staff at Soil Solutions
Kevin Heck, Dale Ronfeldt, Bob Hecht
Vickie Heck, Ron Hanks, Rodney Peasley, Garry Klein,
Dave Bresnahan, Kenny Eveleth, Jason Hulstein,
Gene Kenkel, George Bonnes, Les Jones, Andrea McCall**



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