From the Ground Up

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Gypsum Use as an Agricultural Amendment

The Ohio State University has recently published a reference bulletin titled "Gypsum as an Agricultural Amendment". This is the best concise guide of recent research and gypsum use guidelines that is available. It covers everything from properties and benefits of gypsum in agriculture to gypsum applications and rates recommended. If you are interested in ordering this useful bulletin give us a call at 712-433-0000 and we will send one to you.

Wheat Head Scab

Although incidences of wheat diseases were low this year I have observed several fields with wheat head scab. The picture to the right is wheat plants from one field that I looked at in SE Nebraska with this disease. Note the heads which are brown or partially brown while others are still green. These brown heads are infected with head scab. This field was wheat planted after corn harvest. The disease that causes head scab is Gibberella zeae or also known as Fusarium graminearum. In corn this fungus also causes stalk rot and ear rot. The fungus will survive through the winter in the corn residue. The following spring the fungus will grow on the residue and produce spores which will infect the wheat plants during flowering if there is adequate moisture and temperatures. For this reason it is not recommended to plant wheat after corn in eastern Nebraska or Kansas especially in no-till conditions. Fungicides to control this disease are available, but timing is critical and must be applied around flowering. The fungicides in the triazole family are most effective, but be certain to check the pre-harvest intervals. Even the best fungicide products will only give 50% control of head scab, though, meaning that you will still see a significant number of heads affected even after a fungicide application.

It should be noted that this is also why continuous corn has more risk for stalk and ear rot diseases. If planting continuous corn you may be more diligent in managing for diseases both early and late in the season.

Time to Take Irrigation Water Samples

Irrigation season will soon be upon us. If you haven't taken a recent water sample from your irrigation well it is a good idea to take a sample and send it in to a reputable laboratory to see what the current levels are and if there have been any changes from previous analyses. If you have never taken an irrigation water sample then now is a good time to start so you have baseline data for future reference. Ask for a complete irrigation analysis so you have all the information needed.

How Long Will My Plants Survive Flooded Soils?

Not long enough will be the answer in many cases in fields along the Missouri River this summer. But every summer there are fields that get flooded only temporarily and this question arises. The obvious answer is…..it depends. It depends upon water temperature. It depends upon whether there is moving current or standing stagnant water. It depends upon the stage of the crop at the time flooding occurs. It depends upon the crop to be grown. Varieties can vary also. It depends whether the soil is a sandy soil or a heavy clay soil. There is no easy answer. Soybeans will normally withstand flooding of up to two days with no appreciable yield loss. Once flooding is longer than four days yields can by significantly impacted. Soybean plant can survive being fully submerged for 4-5 days if water termperature is below 55 degrees, but only 1-2 day if the water temperature is above 65 degrees. Corn on the other hand is somewhat more tolerant and can withstand being fully submerged up to a week if water temperatures are less than 55 degrees. If water temperatures are warmer, 65 degrees or warmer, then they may only tolerate being submerged for 2-3 days. Larger crops can usually withstand flooding or totally submerged conditions better. Of course if the crop does survive, it is much more susceptible to diseases later in the season. Crazy top is

quite common in corn that has been fully submerged and root and stalk rots will be more prevalent where fields have been flooded.

How does gypsum improve water efficiency?

The most recent "buzz" in research circles is how we can be more water efficient with our crop production. (Believe it or not.....even with the floods of 2011 there is concern that water will be at a premium for crop production.) Gypsum is one of those materials that does help crops be more water efficient. How does it do this?

Less runoff.....Gypsum has been proven for years to improve infiltration and reduce runoff. Even this data from the 1950's showed the increase in infiltration/percolation and the reduction in ponding water.

Treatment	Depth of Water Standing after 24 hrs., In.	Percolation ml/24 hrs.
Check	.50	86
CaSO4, 1 ton	.18	190
Ca SO4, 5 tons	.15	280

McGeorge et al. (1956). Irr. Plots; Impermeable soil.

More recent data from Iowa, Illinois and Indiana soils show infiltration rates increasing 3 to 5 fold with the use of gypsum.

If water goes into the soil, there is less running off and more is stored for plant uptake. This means better water efficiency.

Better soil structure; more water holding capacity.....Gypsum causes soil particles to flocculate into micro-aggregates or soil peds. This allows for more pore space which means more water holding capacity.

Deeper root depth.....Studies have shown deeper root growth when gypsum is applied. The data below reflects this effect in alfalfa, but has also been observed in most other crops.

Alfalfa (Georgia)

Root density ($m\ m^{-1}$)

Depth, cm	Control	Gypsum
0-15	375	439
15-30	40	94
30-45	11	96
45-60	52	112
60-75	4	28

There are many reasons for this increase in root growth. The calcium in gypsum enhances root growth. There is more oxygen in soils treated with gypsum since water moves through the soil and doesn't pond. This means more air/water exchange. Soils where gypsum is applied is less sticky/tight which means less resistance for root growth.

If roots are allowed to grow deeper this means that the plants can explore more soil and use more of the water that is stored rather than just being leached deeper. Also as the roots use more water even at the shallower depths, there is more space left for additional incoming water.

Affects on compaction.....Gypsum does tend to reduce compaction in soils. Since gypsum applications increase the calcium content of the soil the soils become less dense and have a better soil structure. This calcium is more mobile than lime and will increase levels to a greater depth in the soil profile. This means less compaction is created by tillage or by implements operating on the soil. With gypsum use we often see increased earthworm activity due to the higher calcium content and the greater oxygen level in the soil. These earthworms can be the "tillage implements" to reduce the compacted layers.
Soils with a high level of "free lime" can appear to have a large amount of calcium, but this lime can act as a cementing agent and cause the soil particles to form dense layers. Gypsum helps soften these soils and reduce the "hard setting" of these soils. These things all help in allowing better root growth which will improve water efficiency especially during tassel development and maturity when yields can be greatly reduced.

Reduce aluminum effects.....Low pH soils (below 5.3) can have aluminum toxicity. Aluminum becomes much more available in these pH ranges and will greatly inhibit root growth. If this occurs in the surface soil applications of lime are most beneficial, however, when these pHs occur at deeper depths lime applications are rather ineffective due to its immobility. Applications of lime plus gypsum should be considered in these soils to improve the calcium mobility and help reduce the effects of the low pH and aluminum toxicity. When gypsum is applied in these soil conditions the root growth is improved resulting in better water efficiency also.

We often hear customers say that our crops get better with each successive application of gypsum. Part of the reason is due to improved soils deeper into the profile and greater water efficiency as a result. If you want to improve your water efficiency start with an application of PRO CAL 40 on your fields.

Sulfur Deficiencies Showing Up in Iowa

This spring there have been several reports of light green to yellow corn across Iowa. In some of these situations sulfur has been identified as the limiting factor. This may be due to the cool growing conditions not allowing as much mineralization of sulfur. It may be due to more removal of sulfur during the previous growing season. Sulfur soil tests are

trending lower over the years, especially as we move to more no-till and cleaner fuels and fertilizers. Applying sulfur in the form of gypsum is a very economical practice since you are not only applying a plant nutrient, but you are also improving availability of many other nutrients through better soil conditions and better microbial activity. In an Iowa State study in 2006 a side dress application of gypsum at a rate of 40# of sulfur (250# of actual gypsum) gave responses ranging from an 8 bushel increase to a 76 bushel increase with an average of 38 bushel increase in yield across six locations. If you haven't looked at the benefits of applying sulfur in your fertility program now is the time to get started. PRO CAL 40 is the least expensive source of sulfur in the marketplace and can satisfy your sulfur needs for multiple years. Give us a call to discuss applying PRO CAL 40 on your farm.

Sulfur Deficiency in Corn

New Mode of Glyphosate Resistance Discovered

Controlling marestail weeds in row crops has been an increasing challenge with glyphosate. Resistance or increased tolerance of this weed has been a concern for the past several years, but recent research may help in explaining the mode of resistance by marestail. Weeds such as waterhemp which have become resistant have done so by increasing the production of EPSPS enzyme to the point that glyphosate cannot tie up all of it thereby surviving the herbicide.

However, scientists at Washington University in St. Louis and Monsanto have discovered that marestail uses a different mode of action. Their findings, through the use of nuclear magnetic resonance, show that resistant plants were moving the glyphosate into the plant vacuole. In fact, the resistant marestail had moved 85% of the glyphosate into the vacuoles within 24 hours of application. By comparison the sensitive marestail had only 15% of its glyphosate in the vacuoles. The vacuoles, which are found in all plant cells, can be thought of as "garbage disposals" for chemicals which are foreign to the plant. Once a chemical is there it is trapped and not available for transportation to the rapidly growing parts of the plant therefore decreasing the effectiveness of the herbicide.

Another interesting fact from their research showed that when the marestail plants were subject to lower temperatures (about 50 degrees) they were not as effective in moving the glyphosate into the vacuoles. Consequently the "resistant" marestail when sprayed in cooler early spring conditions were more effectively controlled with glyphosate. This is in contrast to what we have believed about spraying glyphosate under cooler conditions. (Taken from June 20, 2011 Ag Professional Magazine)

Managing Diseases in Your Crop

A reminder that if you want protection against many of the plant diseases in corn and soybeans and increase your overall plant health you may want to consider using Safestrike and Procidic on your crops. Procidic has shown suppression of many fungal and bacterial diseases. Procidic works by weakening the cell membrane of the bacteria and by denaturalization of capsules of spores and conidia of fungi. Procidic is a GRAS product (generally recommended as safe) and is approved by the USDA/FDA. Procidic is also sold as CITREX in other parts of the world.

Results by most of our customers during 2010 were favorable including using it in corn fields that had Goss's Wilt despite applications that were a little late. If you suspect Goss's Wilt infection in your fields try to make the application at early onset of the disease. Other considerations to improve efficacy are start with a pH of spray water at 5.0 to 5.5. Never use chlorinated water. Don't combine with alkali reaction products. Avoid spraying when leaves are wet or when heavy dew is present so as to avoid runoff of the product.

Rates of Procidic to apply are generally in the 2-2.5 oz. in 10 gallons of water per acre. For Goss's Wilt, (especially if disease is already present) rates should be increased to 5-12 oz. per acre for better activity.

Midwest Soil Improvement Symposium

Take a summer crop tour to Wisconsin!!! The first Midwest Soil Improvement Symposium: Research and Practical Insights into Using Gypsum will be held August 23, 2011, at the University of Wisconsin Arlington Agricultural Research Station. USDA and University researchers will discuss soil quality and gypsum use plus farmer panels of producers who have used gypsum on alfalfa and corn and soybeans will also be included.

Co-sponsors include the University of Wisconsin-Madison College of Agricultural & Life Sciences; University of Wisconsin-Cooperative Extension; the Conservation Technology Information Center and Gypsoil.

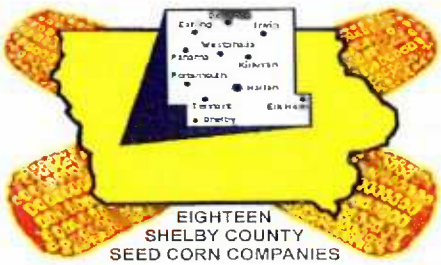
Cost is $15 in advance and $20 at the door. For more information, visit http://midwestsoilimprovementsymposium.eventbrite.com/ or call (563) 320-2247. CCA Credits are also available.

The Hybrid Corn Pioneers Historical Expo to be held August 27th and 28th.

We are always interested in what our customers' interests are. The attached flyer below is for the upcoming Hybrid Corn Pioneers Historical Expo that will be held August 27th and 28th. Steve Kenkel has done all the work himself in arranging this interesting and unique

program. To see how far we have progressed with corn seed the last 200+ years is really interesting. If you have any interests, please save the date to attend this expo.

The Hybrid Corn Pioneers
HISTORICAL EXPO



SATURDAY & SUNDAY
August 27 & 28, 2011
10:00 a.m. - 7:00 p.m.

Steve and Nadine Kenkel's Farm
2040 Ironwood Road, Earling, IA
(2 miles east and 1-3/4 miles north of Earling)

Corn Plot Tour: View Three Centuries of Corn

PLOT:	1800's:	1900's:	2000's:
Wire Check planted in 40" rows, 3 seeds per hill.	Reids Yellow Dent (Open Pollinated Variety) 1847	US-13 (First Hybrid Variety) 1930's	Dekalb 62-97 (Triple Stack Variety) Today

Tour the Hybrid Corn Pioneers Museum Historical Exhibits:

- Hybrid Corn Pioneers sack collection and history of Shelby Co., IA - "The Hybrid Corn Capital of Iowa".
- 1860's Wooden 2-row corn planter built by George W. Brown, "The inventor of the corn planter."
- Earliest patented cylinder corn sheller, 1848.
- Vast collection of corn planters from 1850s to 1950s.
- Hundreds of cloth seed corn sacks and signs on display.
- Rare antique corn items and machinery include: walking plows, shellers, binders, slicers, grinders, graders, husking hooks and pegs, check wire and stakes, choppers, cultivators, dryers and many other corn items.

4-H Food Concessions and Beckman's Homemade Ice Cream!

TRACTOR RIDE
Saturday
August 27, 2011

TRACTOR RIDE FROM HARLAN TO FARM
Arriving at Kenkel Farm late morning
Sponsored by
NISHNA VALLEY ANTIQUE TRACTOR CLUB
For Information on tractor ride, contact Lance Scott 712-249-6178.
ADMISSION TO EXPO FREE WILL DONATION
For additional information, please contact Steve Kenkel 712-579-1320.

Soil Solutions Employees are busy with Flood of 2011!!

Our employees have been extraordinary this spring as they have put in long sleepless hours helping with the diking of several communities. businesses and some of our own fields. We have helped haul soil for berms that were built in Dakota Dunes, S. Dakota, in Sergeant Bluff, IA, in Hamburg, IA, near Council Bluffs, IA and on a farm we rent near Decatur, NE. I'm sure there will be many more as the summer progresses. We appreciate the hard work of our employees and their dedication to helping our neighbors in need. Our thoughts and prayers go out to these communities and others as they continue to endure through this flood of 2011.