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Understanding Nitrogen in Discolored Crops & Wet Soils

DeltAg Product Brief
July 12, 2004

In the past ten days we have had many calls from all across the Southeastern U.S. with concern about crops that are described as yellow, lime green, stunted, not growing, or just appearing stale. In this crop season many areas have had more rainfall in June than in recorded history.

Many dealers have reported what appears to be a nitrogen deficiency, while others have spoken of sulfur or perhaps potassium problems. The reality is that we have been experiencing several weeks of waterlogged soils.

When soil becomes saturated with water, oxygen in that soil becomes limited and a crop loses its ability to take in nutrients and convert proteins to carbohydrates. In other words, plant metabolism slows down. The result is the off-color that we are seeing. In extreme cases, we may have lost a large amount of our nitrogen fertilizer, and in low organic soils, probably sulfur also.

NITROGEN IN OUR SOILS: For a plant to respond to nitrogen, the conversion to nitrate and in some cases ammonium must take place. We apply forms of N that must be converted. However, the nitrate form of N is also the form that is most susceptible to leaching.

SOIL TEST for N: Estimating the amount of N left in our soils by utilizing soil tests is difficult and sometimes confusing. If samples are pulled at depths of six to twelve inches in damp or wet soils, we have two problems.

ONE: A large portion of the N that is present, may not be in the nitrate form, and will not show in a nitrate test. Extremely wet soils may only show 30% of what is actually there.

TWO: In wet soils, nitrate can go as deep as 24 inches or deeper and then come back into the topsoil as the soil dries out and becomes re-oxygenated. If your grower desires a soil test for N, we strongly advise pulling a 24 inch core and requesting a test for Total Nitrogen. This will show all N that is and/or will become available to the crop.

TISSUE TEST for N: A leaf analysis or petiole test will show the amount of nitrate N in the plant on the day of the sample. However, this will not give an indication of what will become available later. What we have to remember is that the plant is under stress and will most likely show several nutrients to be deficient. The ratio of other nutrients to N is critical in plant chemistry. If we are suffering from N problems, other nutrients will become tied up and the crop may show several different looks that could appear as sulfur, zinc, magnesium, or in some cases potassium.

HOW DOES NITROGEN FUNCTION in SOILS? Nitrogen is applied and must convert. Under ideal conditions, this can take 10 to 20 days, depending on soil moisture and temperature. Basically, conversion occurs, then nitrates MOVE. When wet and cool, nitrate moves downward, and once below 36 inches, is considered leached and gone. When hot and dry, nitrate moves upward and into the root zone. In extreme drought, nitrate can be concentrated in the top 3 inches where there is no moisture to aid uptake. In either case, too deep or too shallow, we see N deficiencies that become camouflaged by deficiencies of other nutrients.

WHAT SHOULD WE DO NOW? We need to buy time to determine actual N levels as compared to crop termination dates.

WHEN NITROGEN IS DEFICIENT: Our crops are well into the reproductive phase of crop development and extreme care should be taken not to OVERDOSE N at this late stage. Foliar N followed by top dress applications of N is our only real remedy.



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BUY SOME TIME: Foliar Urea, This is an excellent choice for buying time until your soils can dry out and N becomes available again. Remember, if soils are wet, many crops will green back up as the soil dries out, warms up and N moves back into the root zone as nitrates. Don't Lose Time in Crop Development. At some \$0.60 per gallon, we can apply two gallons per acre in a three to five gallon total volume on a weekly basis for two to three weeks and supplement the crop while soil conditions improve. At **DeltAg**, we recommend 8 to 12 ounces of **PercPlus** to be applied with the foliar urea to allow several weekly applications.

Coarse Sandy Ridges: Many are showing a sulfur deficiency. These ridges are very low in organic matter, our primary source for sulfur, and sulfur reacts very similar to nitrogen in soils. The sulfate form is available to the crop and it leaches and moves just like the nitrate. In these cases, **DeltAg** recommends **Sulfur Plus** at 32 ounces per acre to be applied with the foliar urea and **PercPlus**.

SOURCES FOR SOIL NITROGEN APPLICATIONS:

Calcium Nitrate: Our first choice, calcium nitrate has no sodium, and calcium is the most overlooked and underrated nutrient in plant chemistry. Calcium Nitrate is 15.5% Nitrate nitrogen, very soluble, and readily available. "Quick & Gone"

Bull Dog Soda: A good choice at 16% N, bulldog is sodium nitrate, very soluble, and readily available. Two or three days of heavy dew will melt it into the topsoil. "Quick & Gone"

Ammonium Nitrate: A good N source (34%), provided it is applied at least six weeks before anticipated harvest. Ammonium Nitrate is 50% nitrates and the other 50% is ammonium N which must convert. This could create two surges of N, one immediate and another some two weeks later. In other words, if you know you need more N, use Ammonium Nitrate if you can apply it NOW.

Urea: Not an option; Even though 46% nitrogen, urea must convert to ammonium and then nitrate to become used by the plant. It is not as soluble, and if it lays on the soil surface (unless rained or watered into the soil) could volatilize and be lost to the atmosphere in as little as four to six days. Also, if urea is impregnated with an N inhibitor, this will delay conversion even further.

SUMMARY: Apply Foliar Urea in 2 to 3 weekly applications and if discoloration persists, follow up with Calcium Nitrate or Bulldog Soda. This will give quick results with no N to linger and possibly cause problems with late growth or disease.

It's Not What you Put Out, But What Gets in the Plant... That Counts !