



The Growing Edge

Improving Agriculture Through Science & Nature
A Quarterly Newsletter Produced by Ag Tech Services, LLC
for HUMA GRO Clients

June 2009
Volume 2, Number 2

Understanding Plants and Soils

As we come out of winter and into a very nice spring, I am reminded of something that I have not seen a lot of this year: standing water. There are spots in some fields where the clay content is higher than normal creating some puddles but by and large there is nowhere near the standing water that I have seen in past years. This article is going to examine what keeps water moving through the soil, also known as soil porosity.

There are three basic components of a soil that will govern its porosity. They are Cation Exchange Capacity, soil tilth, and soil biological systems. I will go through each one of them.

The Cation Exchange Capacity (CEC) of a soil is a numeric way of showing how cations, positive-charged elements, can be exchanged from the soil exchange sites. If this number is low, such as under 10, the soil is very sandy and will have very few exchange sites as they are normally found on clay particles. A medium-textured soil with a CEC in the mid teens, 15-17, will have more clay and will hold more cations. A heavy textured soil, such as 18-24, will have the highest amount of clay and therefore will have the most exchange sites. This does not mean it is the best for porosity as this clay can seal over and you can have a swimming pool instead of a crop field. Some of the best drained and most productive fields that I have seen are in the 15-17 CEC bracket. They will hold and exchange the greatest number of cations and produce the best crops.

As important as CEC is to understanding soil porosity, soil tilth is also a major factor. Soil tilth can be defined as the "physical condition of the soil" but that is a very simplistic way of defining a very complex integrated system. We all understand soil tilth from the way a field lays when you first start your tillage operations. What makes soil work up nice and loose is all the years of putting plant residue back into the soil profile. As you work down wheat straw, corn stalks, or cover crop,

you are starting the process of creating macro pores in the soil profile. These macro pores allow for air and water movement in and out of the upper 10-14 inches of topsoil which is your main root depth. When you take a grass field out of production after 3-5 years you can also see how its root system acts to keep the soil more friable with increased porosity.

I have often talked about the importance of a healthy soil biological system. It has been proven that many bacteria help in root development during a growing season which means there will be more roots to plow down. Also, as the residue sits in the soil over winter there are many fungi that are breaking it down so it can be properly managed in the spring before planting. One of the very important functions of soil biologicals is the way they can bind soil colloids together creating macro pores where you once had micro pores. This too aids in air and water movement in and out of your root zone.

Sometimes a field needs a little help to keep the water moving down. This is where a farmer may use a soil penetrant. These products come under different names but their main goal is to help keep the soil from ponding. Although the formulas will vary, these products are basically surfactants. Once added to the soil and incorporated they act to help water move past the soil particles and into the subsoil. These are temporary at best and should not be counted on for a long-term solution.

So how do you increase the natural porosity of soil? There is an old saying: "There is no better way than nature's way." Long term grass fields such as 3-5 years in pasture is a great start. With so much of our farm land changing hands from year to year, there is only so much everyone can do. Tilling in crop residue is something that will help. It will also promote soil biology which will in turn support soil porosity. This is a program that works better when all farmers do what they can to improve the soil quality. Remember, in a few years you will probably be farming the same field again.

Rudy's Corner



As the great Bob Dylan once wrote, “The Times They Are A-Changin.” He was referring to society in the 60’s but we can say the same about the ag business in the 2000’s. The changes are inevitable and part of our new global/electronic society where information can come from the East Coast or Australia in a matter of minutes.

The questions that we used to hold for university researchers can be put on the web for instantaneous responses. This is all well and good but how certain can you be about the accuracy of the answers? Someone with no ag background or education can build a very impressive web site with all sorts of information just to sell you a magic cure

for \$65.95 a gallon. Oh and by the way, his main office is in Flat Hat, Minnesota, but he will pay for the freight for this product if you buy a full pallet. Sounds crazy doesn’t it? But there are people like that on the internet selling the “magic cure” and there are some who will buy it.

If you have questions concerning crop production and soil science, go to a professional who will consider your best interest and not just his bank account. The best way to determine professionalism is by how they answer your questions. If a person has **all** the answers, run away. No one has all the answers and there is no magic cure. If you ask a professional a question, sometimes he might need to say “I don’t know but I will find out.” This answer is real and if he follows through and gets you an answer, then he too is real. Remember professionals are just people.

The main concern I have about gathering information comes from those who claim to be agronomists. This is a term that has been thrown around a lot but what is the real meaning? Wikipedia defines the term agronomist as a scientist who specializes in agronomy which is the science of producing and utilizing plants for food, fuel, feed, and fiber. This definition is fairly accurate but it does not go into the other studies that make up the agronomic consultant. Knowledge of plant physiology, soil biology, plant breeding, and genetics, as well as plant biochemistry are all part of the agronomist’s training.

In 1975, I sat across the desk from a professor at Oregon State University. He was teaching a class in cereal crops and I was learning all I could. This was not easy since I grew up on a berry farm and didn’t know wheat from rye grass. We were discussing careers in agriculture whereas it was my junior year and he asked me what I wanted to do with my education. When I told him that I wanted to work with farmers in some type of consulting, he advised me that I was very naïve to think that I could save the world one farmer at a time. For the past 33 years I have been trying to prove him wrong. He was correct, however, when he said I would never get rich that way. But professionals don’t have to be rich in the monetary sense; we gather greater wealth in our crop successes.

Organizations such as the American Society of Agronomy, Certified Crop Advisor Program, and ARCPACS, a certifying board for Certified Professional Agronomists (CPAg), are all in place to help those who are true agronomists keep their professionalism at its highest level. Crop advisors who are associated with these programs and organizations will have both the qualifications and integrity you need when seeking information.

I guess what I am driving at is this: we may not have an advanced degree, but there are some pretty sharp individuals out there who can answer many of your questions when the university researcher many not be available.

Potato Production

What a difference a year makes. If Mother Nature lets us, I think all the potatoes will be planted by the end of the first week of June. Some of the crops weren't even 25% planted by the first week of June last year. But let's not dwell on last year as it just brings back bad memories.

As of today, we have early plantings out of the ground and most of them look pretty good. The pictures you see here are early plantings that have a bacterial inoculant in combination with a high organic acid in-furrow treatment. As you can see, the plant has thick stems and many feeder roots. This is very important early in the plant's development to maintain a root dominant profile. There are some plants that I have seen that were not planted with this program. The stems in those plants are thin and the roots are not as vigorous. These will be impacted by stress early and often during their production cycle. The one theme that I have been consistent on is to keep the roots healthy and they will make the crop.

The other theme I have preached before is no stress. If you can keep ethylene from increasing in the plant cells, production should go on very smoothly. If not, we could have problems. If the temperatures start to get above 80° or if there are some fields that do not have irrigation, we better start applying foliar to keep them happy. I often recommend Huma-Gro's Vitol to reduce stress and increase vigor. This year I plan on doing the same but also adding some products known to reduce ethylene and/or increase the plant's natural defense system.

As many of you know, I am a strong advocate of petiole analysis. I take one sample when the first tuber set is pea sized and a second when they are golf ball size. We are looking not only for the major elements but also the minor ones. Elements such as zinc, manganese, copper, and magnesium are extremely critical in total plant health. My experience tells me that if these start to slide at any time of the growing season, your crop yield and quality can suffer. If you do not believe in petiole samples, it would be a very good idea to apply a quality micro mix at least twice during the growing season.

Even though I have already mentioned the importance of a vigorous root system, the picture on the right tells a lot about keeping roots active up to harvest. As you can see, there are viable feeder roots at the time of vine kill and the tubers are nearly perfect. Dying or dead roots do not produce a good crop. It is best to get the most back from your crop input investment.



Viable root system at harvest



Example of a thick stem with excellent root structure

Vegetable Production

As with many springs before, many of our vegetable and seed crops were planted under fairly good conditions only to be met with cool temperatures and rain. This does not make for a strong seedling with a lot of vigor. What we want to see is often different from reality. Seedlings look like they have good growth but if you gently pull them up you will see a plant that is 66% top growth and 34% root. This is not the ratio for good plant vigor whereas it is top dominant and not root dominant.

If you look at the pea seedlings in this picture you will see nitrogen producing nodules on the roots. The very impressive aspect is that these plants are only 24 days old. They have been subjected to the same cold, wet conditions as other fields but they are still stress free. They were planted with a program designed to promote root development and reduce plant stress. Looks like it worked again.

This root dominance can still be achieved after planting by using HumaGro's Vitol and MicroF. This combination of nutrients and natural stress relievers will enhance root growth and contribute to greater yield and quality.

As you can see its all about the roots and reducing stress. Follow this advice and it will reduce a lot stress in the farmer as well.

Lateral
branching
with
nitrogen
fixing
nodules



The Growing Edge (ISSN 1942-2520)
is published on line quarterly by:

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Small Fruits

As spring moves forward I have seen a lot of blueberries starting to bloom. Blueberries, just like raspberries, do not bloom all at once. From the plant standpoint this is a good thing as the plant needs to offset the ethylene buildup in the flowers with IAA from the growing points on the plant. You guessed it: there are not very many growing points on the plants that early. It is understandable why so many of those flowers abort and drop and why it is difficult to keep the fruit developing once it sets.

To keep the flowers from dropping and keep the fruit developing, I would strongly recommend using Huma-

Gro's Breakout at both bloom and a second application at fruit set. Used as directed, the ingredients in Breakout will help keep your flowers from aborting and keep the fruit developing. Even if you have bees in your fields, if the temperature is not in the low 70's the bees will not fly as actively as they should and the plant cannot make the IAA that it needs to keep the flowers healthy. These products have been used in both blueberries and raspberries nationwide with very good results. We have found that even if total yield is not greatly increased, the uniformity and weight per berry is increased. Even in a soft market, increasing fruit uniformity and berry weight will always pay off.