



The Sabal

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“MY SOIL ISN’T ANY GOOD”

by Mike Heep

....continued from February, 2007 *The Sabal*

A couple of caveats: If you use an ammonium fertilizer, you must water it in very well. Let me repeat that: You must water it in very well. Here is what will happen if you were to spread the granules of ammonium fertilizer on the surface of the soil and get them just a little moist. Most of the ammonium will gradually turn into ammonia. Ammonia is a gas. So, much of the fertilizer that you spent money on is going to disappear into the air. Gone with the wind. A different caution when using any product containing urea: If applied too heavily, or not watered in sufficiently (or both), urea molecules combine with each other and form a toxic (to plants) substance called Biuret. A friend once killed a rather large Cedar Elm that way.

PHOSPHORUS: Plants will also not do well if there is not enough phosphorus in the soil. Phosphorus is important for flower and fruit

production and also for adequate root growth. If you are going to use an inorganic fertilizer, pick one with a high second number. Another form that comes in sacks is “superphosphate” which is 0-45-0. Bone meal (0-11-0) is also another source.

If you have a sample of your soil analyzed, you will find that your soil contains quite a bit of phosphorus. The problem is that most of it is not available.

Here’s what is meant when you hear or read about a nutrient being available or unavailable. With only a few very minor exceptions, in order for a nutrient to be available it must be dissolved in the water in the soil. The nutrient will be able to pass into a plant root only if it is dissolved in the soil water first. Unlike nitrogen, which exists in many soluble forms in the soil water, phosphorus tends to join up with other nutrients, particularly calcium and magnesium, and form solids. So, part of the actual solid part of your soil is phosphorus in a solid, unavailable form. And if it’s in this solid form it’s not going to get into your plant.

So, what do you do? How can any phosphorus get into a plant if it forms a solid in the soil? You might want to read this next part very slowly. The situation is that a very, very small amount of this solid will be dissolved in the soil water at any one time. This amount that is dissolved is the same all of the time even though it isn't very much. So, as a little bit of the dissolved phosphorus, in the form of phosphate, passes into the root, that leaves room for a little bit of the solid to dissolve and replace it.

So, much of the phosphorus that you add to your soil will stay in the solid, unavailable form. You will be adding a lot of phosphorus relative to the amount that is actually going into the plant. But, by adding it you are ensuring that some will be available for your plants.

A good practice when applying phosphorus is to not just sprinkle it on the surface of the soil. Almost none of it will actually get deep enough to get into the root zone of the soil. One thing you can do to ensure that there is enough phosphorus near the roots is to put a small amount of superphosphate or bone meal in the soil at the bottom of the hole before you plant a plant.

POTASSIUM: Potassium has a lot of functions within a plant. Sufficient potassium is required for disease resistance, vigorous growth, and cold hardiness. It is also an important contributor to fruit quality.

Potassium is very soluble and thus is readily available when present. But that means it is also leached out readily.

Most analyses of Valley soils that I have seen indicate that there is sufficient potassium present. However, my plants seem to grow better and look healthier if I add some potassium. And, I've noticed that the citrus growers always add potassium in their inorganic fertilizers. The N-P-K formulas I've seen for citrus are 18-4-4 and 15-5-5.

I believe that the reason why adding potassium results in better growth and fruit yield etc. even though the soil analysis shows that there is a lot of it already present is this: Much of that potassium is stuck very, very tightly inside soil minerals, particularly in the clay molecules. So, it's there. But it isn't coming out.

OTHER NUTRIENTS

Of the other nutrients required by plants, I have seen and heard of deficiencies in only a few. The following is a rundown of most of the nutrients:

Calcium and Magnesium: The soils in the Valley were mostly formed from limestone parent material, which contains high amounts of calcium carbonate and some magnesium carbonate. So, neither calcium nor magnesium should be in short supply. However, adding some calcium to the soil doesn't seem to hurt anything. Adding gypsum, which is calcium sulfate, will actually help loosen up tight clay soil. As for magnesium, if it will make you feel better, for a couple of bucks you can buy a box of Epsom Salts (magnesium sulfate) and sprinkle it over your yard. This should ensure that there will be enough available magnesium for a long time.

Iron: Other than NPK, this is the nutrient that is most commonly limiting. If the leaves on your plant have green veins, but the tissue in between the veins is yellow, the problem is usually a lack of iron. There are a number of soil amendments that will help correct this: you can add iron sulfate (also called Ferrous Sulfate). It is available in small sacks or even in 50 pound sacks and is not very expensive. If sprinkled onto, or worked into, the soil, it will dissolve very well. But, don't drop any on your concrete. It will leave a reddish stain that is hard to get out.

A better option in my opinion is to get the soil a little more acidic. This is a good thing to do to ensure that not only the iron but almost all of the other micronutrients will be available in ample supply. Iron and the other micronutrients are there in the soil minerals. But, as is the case with the phosphorus, they are in solid form. They are in solid form because the soils here are generally somewhat alkaline. These solids are mostly your desired nutrients combined with, stuck to, substances called carbonates and hydroxides. By making your soil more acid, some of the solids will dissolve. The carbonates and hydroxides dissolve in acids. If your soil has more acid, more of the carbonates and hydroxides will dissolve. When they dissolve, they free up the nutrients that are stuck to them.

Using compost will help make your soil more acidic. Decomposed organic matter is a little acidic. So, working compost into your soil on a regular basis will help keep your soil a little more acidic. Any fertilizer containing

ammonium (a weak acid) will, in addition to increasing the nitrogen levels help make the soil a little more acidic. Ironite, Rose Food, and most products sold as soil acidifiers in little boxes with pictures of pretty roses on them don't really give you much acid for the money.

Using soil sulfur is a way to get more acid for your money. It is sold either in little bags on the counter in some nurseries, or in 50 pound bags. It comes in powder form but is mostly sold in the form of little granules. When it is worked into the soil there are little bacteria just waiting to pounce on it. They use oxygen and water to convert it into sulfuric acid. So, your soil will contain a dilute solution of sulfuric acid which is great stuff for dissolving those carbonates and hydroxides and freeing up iron and the other micronutrients.

Another method for getting iron, and also zinc, into your plants is by applying a spray to the leaves. Foliar iron is available in little bottles at some nurseries. Most foliar iron products also contain some zinc. But be careful as it is really easy to damage your plants if you use too much.

If, when you dig into your soil, you spot little streaks of white material that look kind of like chalk, you have what is called a calcareous soil. I see this mostly in soils in Willacy County and western Hidalgo County. Most of that chalk is calcium carbonate. That calcium carbonate is a huge reserve of alkalinity. What I mean by a huge reserve is that there may be tons of it per acre. So, if you have these chalky things in your soil, you will never permanently get that soil more acidic. Adding compost or soil sulfur or any other product will help some. But, I recommend that you not use any method that is going to cost you a lot of money because it really won't cause any permanent change.

If your soil is very calcareous, one way to make iron and other micronutrients available is to use a chelating agent. Chelating agents surround metal ions such as iron and zinc and most of the other micronutrients and prevent them from joining with hydroxides and carbonates and forming unavailable solids. Then, somehow, the plant root is able to get ahold of and absorb the metal ion. Chelated iron and chelated iron/zinc products are sold at some nurseries. But they can be quite expensive. Some fertilizers contain a chelating agent. Look at the labels on some products like Peters and

Miracle-Gro. The ingredient to look for is EDTA.

IMPROVING THE PHYSICAL CONDITION:

First, let's make a distinction between two terms that are commonly confused: Soil Texture vs. Soil Structure.

Soil texture refers to the relative amounts of sand, silt, and clay in the soil. Sand is the largest particle, and clay is the smallest. Silt is intermediate in size. Soils with a high sand content drain well and have lots of air for plant roots and microorganisms. But they may drain too well, and they do not hold onto nutrients very well. Clay soils hold nutrients and water well, but they don't drain as well and when wet do not have much air present. "Coarse" soils are high in sand and "fine" soils are high in clay content.

Many of the soils in the Valley are loams. Loams contain from 10-40% clay with the rest being silt and sand. There are many soils in the Valley that contain in their name the term "loam". There are sandy loams, loamy sands, silty clay loams, clay loams, and loamy clays. For example, the soil at our home west of Harlingen is mapped as Raymondville Clay Loam.

Soil texture is something that you can't really change much. You're pretty much stuck with whatever soil texture you have, unless you order some large truckloads of topsoil. Even then you are not likely to end up with anything more than just a thin veneer on top of your existing soil.

Soil structure is the arrangement of the particles in the soil. They may be aggregated into little chunks that allow air and water to pass through easily, or they may be tightly packed, which does not allow for aeration or water penetration. The purpose of adding most soil amendments is to improve the soil structure,

The most important soil amendment to add, whatever your soil texture, is compost. Incorporating organic matter into a clay soil will improve the drainage and aeration, and in a sandier soil it will improve the water holding capacity and also increase the amount of nutrients that it will hold. It will also provide food for beneficial soil organisms. Compost products can be purchased in sacks from any nursery. Commercially available compost is cheapest for the amount you get if you buy it in

bulk. There are several businesses in the Valley that supply it by the yard or by the truckload.

The cheapest way is to make it yourself. Save all of the stuff when you trim your plants and rake up leaves. Throw in the table scraps. Be creative. You can also cruise around and load up the leaves that others have raked and set out by the road in plastic bags.

If you work a truckload of compost into your soil, you'll notice that in a few months it seems like it's almost all gone. People have told me that they worked a huge amount of compost into their soil and it was nice and loose and dark and wonderful. The next year their soil appears to be pretty much like it was before. The same thing happens with that huge pile of stuff you started composting. After some time it ends up being a little bitty pile. What happened to the compost?

The soil organisms ate it. Here's how it works. Wood is mostly cellulose. Cellulose is long chains of glucose. Glucose is a simple sugar. Some of the microbes broke the cellulose apart. Then, they and their microbe colleagues ate the glucose. Some of what they ate they used to reproduce: to make more organisms. The rest they broke apart as their food source. When they did that, the glucose was turned into carbon dioxide and water. Almost all of the carbon dioxide escaped into the air. The water mostly stayed in the soil as, well, water. The small amount of compost that remains is a diverse mixture of compounds collectively known as humus.

Let's look at what the soil organisms are and what they do for the soil. A healthy soil will contain 6,000 pounds or more, dry weight, of soil organisms per acre foot. An acre foot is the volume of soil on one acre one foot deep. The larger organisms are earthworms and various soil insects. There are also several hundred pounds per acre foot of smaller worms called nematodes. Some nematodes are root parasites but most do no harm to plants. Fungi and bacteria are the most abundant organisms, collectively weighing up to a couple of tons in a healthy soil. There are also lots of one celled little protists and algae.

And what are they all doing down there? They are eating and breathing and burrowing and pooping and reproducing and dying and being born and then eating and breathing and burrowing and pooping and reproducing and dying and being born some more. The results of

all of that activity include: The large hard packed soil particles get broken into smaller, crumbly soil particles. Air spaces, or pores, form where none were before. Plant and animal matter gets broken down and the nutrients inside get released. There are a whole lot of organisms and these organisms contain all of those nutrients that plants need. The soil organisms serve as a reservoir of nutrients. The soil becomes a better place for plant roots to grow and absorb what they need.

The amount of nitrogen in the soil also increases. Nitrogen gas is the most abundant gas in the air we all breathe. It is about 80% of the air. A fertilizer plant makes ammonium by pulling nitrogen gas out of the air and converting it into ammonium. In your healthy active soil there are certain bacteria that pull nitrogen gas out of the air and convert it into ammonia. So, you get free nitrogen fertilizer added to your soil.

And your soil then contains humus. And humus is good. Humus is what's left of a bunch of wood and leaves after the soil microbes have eaten all that they can eat. Much of humus is the breakdown products of lignin, the stuff in wood that makes it hard. Humus is good for soil because it holds onto nutrients real well, but will let them go into the soil water very gradually. And, it doesn't tend to disappear the way most of your other compost does. But, because it's so good, and because it also takes a long time to form, it can be pretty expensive to buy.

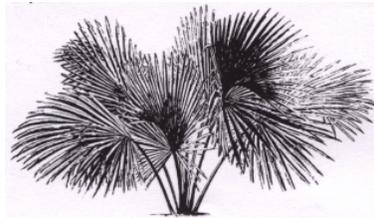
Adding some organic material to your soil that is mostly undecomposed wood and/or bark or dry dead leaves may result in preventing your plants from growing. It's because of those soil organisms that have been eating almost all of your compost. They are using some of that material to make more organisms. And, the first thing they are going to run out of is nitrogen. Wood, bark, and dead leaves contain hardly any nitrogen at all. There is a lot of carbon, which they need to make more organisms. But they are going to suck up almost all of the nitrogen that is in the soil. Remember, they have first shot at everything. So, your plants are not going to get any of the nitrogen, and they will have to shut down as far as growth goes. This is called "nitrate depression". This is especially pronounced when materials such as sawdust are worked into a soil.

parts of plants have much more nitrogen relative to the amount of carbon present. That is what you should keep in mind. In soil science it's referred to as the carbon:nitrogen ratio. Soft green stems and green leaves have carbon:nitrogen ratios around 10-12:1. Wood and corn stalks have carbon:nitrogen ratios of 150-200:1.

I hope that the reader can see that improving the soil structure also improves the soil fertility. And raising the levels of nutrients, and the consequent increase in the numbers and activity

of the soil organisms, improves the soil structure. Plants will grow and thrive in a soil that has good physical structure and high levels of nutrients. If you believe that your soil is not any good, well, there is hope. You can improve it.

Mike Heep is a Science instructor at UT-Pan Amrican, and along with his wife Clare, owner of Heep's Native Plant Nursery in Harlingen, TX.



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Nature Happenings Lower Rio Grande Valley, Texas

For a comprehensive calendar of Nature Happenings go to RGV Nature Coalition at www.rgvnaturecoalition.org Scroll down to and click on Nature Events Calendar on right side

Sabal Palm Grove Sanctuary— Native plant presentation and tour by Joseph Krause – every weekday at 10 a.m. Pre-registration required – call (956) 541-8034. Or go to www.tx.audubon.org/centers/sabal

Laguna Atascosa NWR— Nature BIKE RIDES on Saturdays from 8 a.m. - 10:30 a.m. and Nature WALKS on Sundays from 8 a.m. - 10 a.m. Call for details: (956) 748-3607.

Santa Ana NWR— Tram Tours of the park. Fees: \$3 for adults and \$1 for 12 years-old and under. Guided Nature WALKS are available. Call for details: (956) 784-7500.

Edinburg Scenic Wetlands and World Birding Center — Bird Walks Saturday 9:30 a.m. Native Plant Landscaping. 714 Raul Longoria Rd., Edinburg, TX (956) 381-9922.

Bentsen-Rio Grande Valley State Park & World Birding Center — Butterfly Walk every Wednesday, 1:30-3:30 p.m. **Tram Tours** Tuesday 9-11 a.m. **Bird Walks** 8:00-10:00 a.m. 2800 Bentsen Palm Drive, Mission, TX (956) 584-9156.

Quinta Mazatlan - McAllen Wing of the World Birding Center— Thursday “Evening Explorations” February and March. 6:00 p.m. to 7:00 p.m. \$3.00. 600 Sunset Ave., McAllen, TX (956) 688-3370.

Frontera Audubon, Weslaco Texas - Bird Walks led by Cliff Stewart every Wednesday 9:00 a.m. Meet on the deck of Frontera’s Visitor’s Center. Frontera is a fifteen-acre nature preserve located at 1101 South Texas Boulevard in Weslaco, TX. Entry fees \$3.00 adult and \$1.00 child. (956) 968-3275.

Valley Nature Center, Weslaco, Texas - Natural History Series. February and March. Every Saturday at 10 a.m. Fee: \$3.00. 301 S. Border Avenue, Weslaco TX. Call (956) 969-2475 to register and for more info.

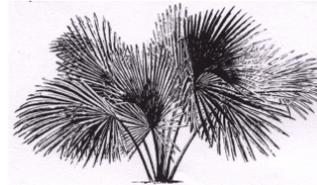
11th Annual Texas Tropics Nature Festival at Quinta Mazatlan from March 29 - April 1. Call (956) 688-3370 or McAllen Chamber of Commerce at (956) 682-2871 for scheduled events.

The Sabal is the Newsletter of the Native Plant Project and conveys information on the native habitat, and environment of the Lower Rio Grande Valley Texas. Co-editors: Gene Lester and Eleanor Mosimann. You are invited to submit articles for *The Sabal*. They can be brief or long. Articles may be edited for length and clarity. Black and white line drawings -- and colored photos or drawings -- with or without accompanying text are encouraged. We will acknowledge all submissions. Please send them, preferable in electronic form - either Word or WordPerfect - to: Native Plant Project, P.O. Box 2742, San Juan, TX 78589 or contact **Gene Lester at 956-425-4005, or g-el1951@sbcglobal.net**

See *The Sabal* and our 5 handbooks on our website:
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Regular \$15 per year Contributing \$35 per year Lifelong \$250 one time fee per individual. Members are advised of meetings, field trips, and other activities through *The Sabal*. Dues are paid on a calendar year basis. Send checks to Native Plant Project, P.O. Box 2742, San Juan, Texas 78589.

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Comments/ suggestions/ speaker recommendations should be sent to: Native Plant Project, P.O. Box 2742, San Juan, TX 78589 or contact G. Lester (956) 425-4005; g-el1951@sbcglobal.net

Native Plant Project Meetings – March 27, 2007. **Board meeting** at 6:30 p.m.; **General meeting** at 7:30 p.m. Nick Hoelscher, past president of NPP and resident scholar of horticulture at Valley Garden Center in McAllen, will present our annual wildflower program. This year our roadsides should be dazzling after our recent rains. Nick's gorgeous photos capture all the beauty that is waiting around the bend.

Board and General Meetings 2007:

January 23	April 24	September 25
February 27	May 22	October 23
March 27		November 27

SUMMARY OF THE MINUTES OF THE BOARD MEETING - February 27, 2007

Board members will be acquiring photographs of five native plant species to be featured on a new display board for up-coming nature festivals. The Board decided that there were not enough members available to work a booth at the McAllen Nature Festival this year. Mosimann sent a calendar of speakers for up-coming NPP meetings to the 25 largest RV parks in the area.

Native Plant Project
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