March/April 2015

Environmental Update

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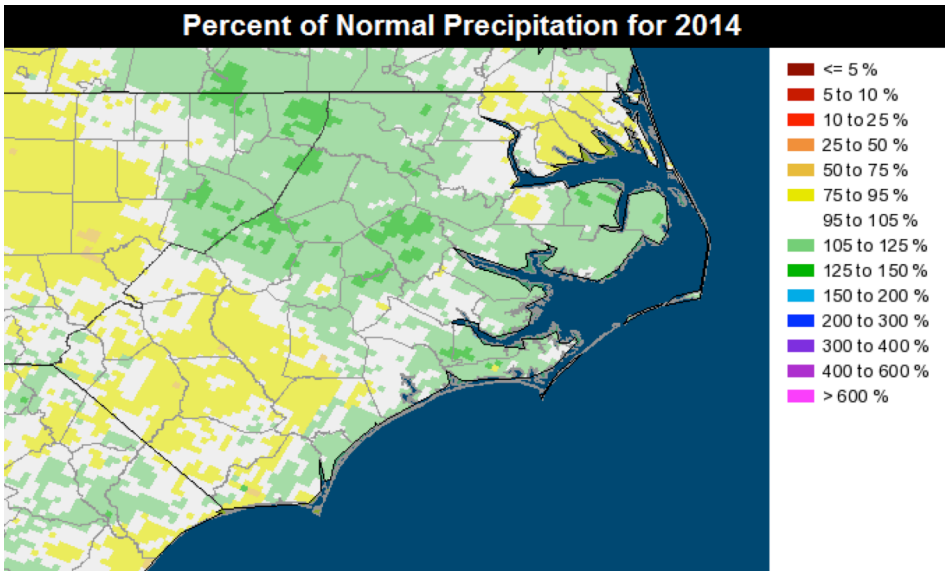
Is it spring yet??...

Before we get into the current expectations for 2015's weather, let's review 2014. Overall, it was a somewhat cool, slightly wet year for the NC coastal plain. With rainfall, much depended on location. For example, the northern third of Pender was slightly dry, the middle third was "normal", and the coastal third was slightly wet (see figure below). Throughout the coastal plain, there were fewer days than normal at or above 90°F, which contributed to it being a cooler than normal year. A more in-depth review of 2014 is available at the NC State Climate Office blog:

http://nc-climate.ncsu.edu/climateblog?id=114



Source: NC State Climate Office

What's expected for 2015? At this time, the National Weather Service is predicting equal chances of "above", "normal", and "below" for both precipitation and temperature during March, April, and May. This means it may be hot and wet, cold and dry, or any combination in between. They just don't know. The only exception is that the far northeastern band of counties has a slightly greater chance of experiencing above normal temperatures. The forecast graphs are available at:

http://www.cpc.ncep.noaa.gov/products/predictions/long_range/seasonal.php?lead=2

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Environmental Word Find: Soils II

Word List:

bedrock	dry	humus	nutrient	potassium	sod
blocky	erosion	leaching	parent	profile	soil (10 times!)
clay	fertility	loam	peat	relief	structure
CLORPT	fungus	massive	ped	runoff	texture
compost	granular	microbes	phosphorus	sand	tilth
decompose	groundwater	mottles	platy	silt	uptake
deficiency	horizon	nitrogen	pores	slope	wet

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s l o p e r a h c f e i l e r p g
e b w o e d g o e x t m y p d h n
f a v t n a h r a l u n a r g o i
d y t a l p t i o s w p y o a s h
l e s s b i l z h u m u s f l p c
i t f s l w i o e g n x s i r h a
o q l i o s t n s n s d o l b o e
s p t u c o a v o u i s w e y r l
e y a m k i s t p f l g l a w u t
r v n r y l e y m i t a l c t s n
u u i o e w l n o l k c o r d e b
t p n s i n t s c t z m s i g b r
c t f o s s t i e y p o e o l o l
u a c i f a o u d o i r r i d r i
r k o l e f m r s l f t o e g c o
t e x t u r e t e b i s p l x i s
s a t n e i r t u n s o i l c m y

Soil terms …

If you were scratching your head over some of the soil terms in the word search puzzle, never fear… explanations are here!

CLORPT: This is the mnemonic soil scientists use to remember the five **soil** forming factors: **climate**, **organisms**, **relief** (topography), **parent material**, and **time**.

Soils form faster in wetter, warmer **climates** than they do in drier, colder areas. Soil can form solely through freezing and thawing, but it takes an extremely long time. Warm, moist soils are much more biologically active. Soil **organisms** include everything from plant roots and burrowing animals to earthworms and microorganisms (microbes). Their activity; life cycle; and excretions, which include organic acids; enhance soil development.

The influence of **relief**, or topography, is easy enough to recognize. Materials on top of a **slope** can readily end up at the bottom. That's why the soil at the top of a mountain is very shallow (**bedrock** close to or at surface), but the soil can be very deep in the valley below. This is why valleys, and lowlands in general, are good farmlands.

There is a vast array of **parent material** out there. It includes everything from glacial till carved out of hillsides and deposited miles away, to granite mountains broken apart by repeatedly freezing and thawing then washing downhill. The deep soils of the NC coastal plain were formed as sedimentary deposits over time, the last ingredient in the soil formation recipe.

Time lets the process of weathering (freezing, thawing, eroding, etc.) occur. It takes time for a soil to develop the characteristics that distinguish it. There are young soils that have very few characteristics. An example would be freshly deposited material from a flood or mudslide. The longer a soil sits in place, the more time the other soil forming factors have available to develop distinguishing characteristics within the soil profile.

Mottles: These are splotches of contrasting color seen in the soil profile. Around here, we typically see either gray splotches in a reddish orange tan background, or reddish splotches in a gray background. The reddish color is caused by the presence of iron oxide. Think of it as soil rust! As long as oxygen is present in the soil, the iron stays put. If, however, the oxygen goes away, the iron changes form (chemically speaking, it is reduced from Fe^{+3} to Fe^{+2}) such that it becomes soluble and can move through the soil. As the iron leaves, the native color of the soil particles is seen. In eastern North Carolina, that color is gray.

For the color loss to occur, three conditions must be present:

- Electron acceptor
- Organic matter as food source (electron source) for microbes
- Microbes

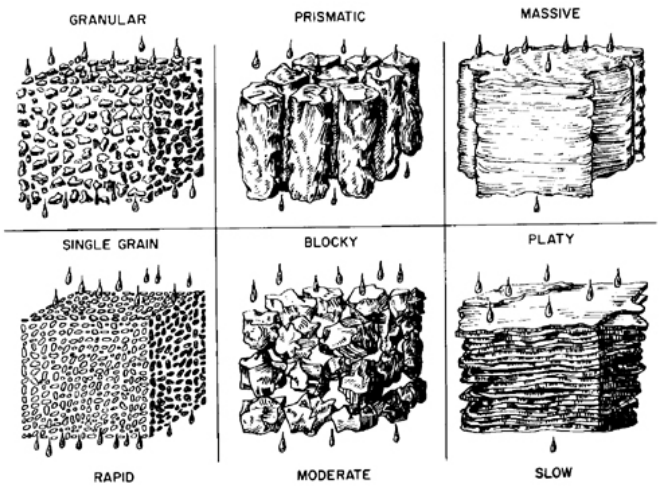
As the **microbes** eat the organic matter, they first use the oxygen present in the soil as an electron acceptor. Once that is depleted, they start using alternative electron acceptors in the following order (if present): nitrate, manganese, and then iron. If there is no organic matter in the soil, or the microbes are not present, the process will not occur. Soil scientists call the mottles that form "redoximorphic features". Soil scientists and environmental health professionals utilize these characteristics when they determine the seasonal high water table depth at a site.

Structure: Soil structure refers to its ability to form discrete clumps, which soil scientists refer to as aggregate particles. The aggregates are named according to how the soil clumps together. Common aggregates for eastern NC are **granular, platy blocky**, and **massive**. The soil structure gives an indication of how well water will move through it.

Single grain, like a pile of **sand**, can usually move water quickly. Soil with granular structure also moves water quickly. Granular looks somewhat like Grape Nuts cereal. You may have seen this on the surface where earthworms and ants have been active.

Many eastern NC soils are angular (sharp corners) or subangular (rounded corners) blocky. Platy looks like it sounds, flat layered aggregates. Wa-

ter moves slowly, because it has to take a long path around the layers to find edges. Massive doesn't have a path, so water moves extremely slowly.



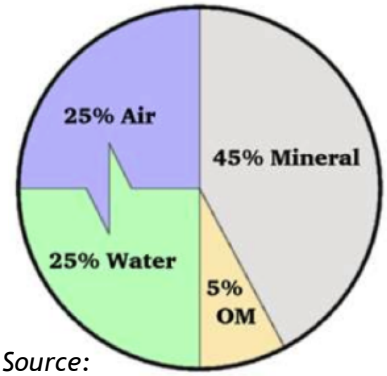
Source: http://www.ext.colostate.edu/mg/gardennotes/213.html

Ped: A ped is another name for a soil aggregate. A ped is persistent through periods of wetting or drying. The soil structure – or peds- can be destroyed, resulting in fragments or clods. Trying to work the soil when it is too wet is one way to destroy the structure and form clods. Have patience this spring!

Tilth: Tilth refers to the suitability of a soil to support root growth. The technical definition is the physical condition of the soil related to ease of tillage, fitness of seedbed, and obstruction to seedling emergence and root penetration. A soil with good tilth is friable (easily crumbled) and allows deep penetration of plant roots. A compacted soil can cause stunted, deformed roots - as with the carrots in the photo.

Credit: R. Michael Davis, University of California Statewide IPM Program

An ideal soil is roughly half solids and half pore space. The **pores** will contain a mix of water and air, the proportion of which changes with rain events and dry periods.



Source: http://onpasture.com/2013/05/13/the-abcs-of-soil-science/

The solid particles will be the **sand**, **silt**, and **clay**; plus the organic matter (including living and dead organisms) in the soil. For a heavy clay soil, the best way to improve it is to add organic matter. The organic matter acts as "soil glue" that over time – there's that "time" word again – allows the soil to form aggregates. Well-aggregated clay soils do drain!

Humus: As twigs, leaves, and other animal and vegetable matter pile up on the ground, over time and the action of organisms, this material will decay (**decompose**) and turn into a dark, rich, crumbly organic material. That's humus.

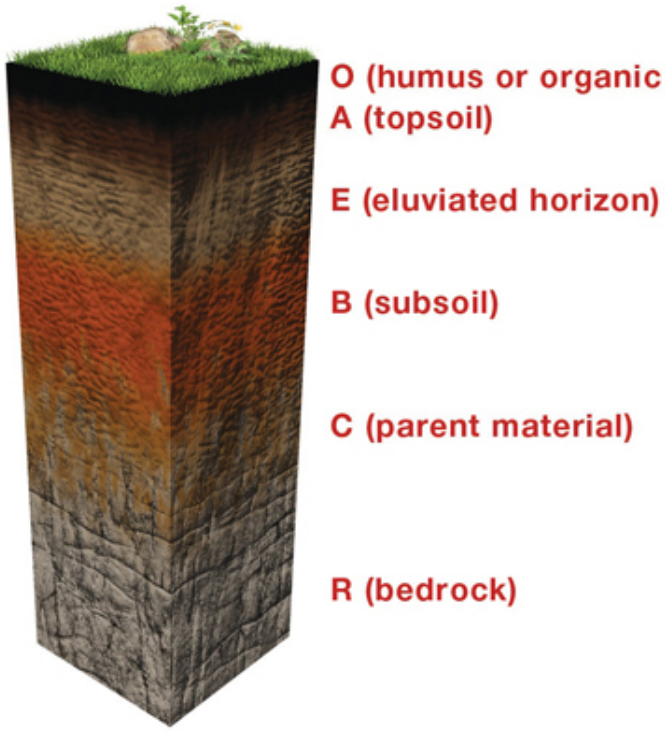
Humus is very beneficial to soils. First, it has the compounds that act as soil glue to help form the nice crumbly structure (tilth) and create aggregates (peds). Second, it binds plant nutrients (**nitrogen**, **phosphorus**, **potassium**, etc.) so they remain available to plant roots and don't leach away. Third, humus has a high water-holding capacity, so it helps protect plants from drought.

Nutrient: Nutrients are the "food" that plants use to grow. When you buy a bag of "10-10-10", that bag contains 10% nitrogen (N), 10% phosphorus (P), and 10% potassium (K). The rest is filler or "inert ingredients". Your soil test report from the NC Department of Agriculture & Consumer Services (NCDA&CS) tells you which types and how much of these and other nutrients you need to add, as fertilizer, for the plants you wish to grow. Getting those nutrients to stick around is important. While within the root zone, they are nutrients; once they leach below the root zone, they are groundwater contaminants.

Leaching: In agriculture, leaching is the process of water-soluble materials being moved downward through the soil profile due to rainfall, irrigation, or water table movement. Nitrate is very water-soluble and leaches easily. That is why it is not a good idea to apply extra nitrogen in the fall and expect it to still be there for your plants in the spring.

Profile: The soil profile is what the soil looks like – its layers – from the soil surface to some depth, typically 48-inches.

Horizon: The individual soil layers in a profile are called horizons. These horizons are formed by – you guessed it - CLORPT! An example soil profile, with its horizons, is shown below.



Source: Soil Science Society of America, http://www.soils4kids.org/about

Soil scientists use an alphabet system to identify each horizon in a profile. Each horizon is not always present. For example, the O and E horizon might be missing. The E horizon is one where minerals have been eluviated from it to a deeper horizon - typically the B horizon - where clays, iron, and other materials then accumulate. Eluviation is a fancy way of saying that dissolved or suspended materials move with water to another location. The R horizon may be very deep and not reached. Soils formed in deep sediments (such as from flood deposits), may be nowhere near their parent material.

In urban areas, profiles are often disturbed by human activities, such as by placing fill dirt in a location during development. Conversely, the humus and topsoil may be removed from a property during construction. This can leave the B horizon; which is low in both nutrients and organic matter, but higher in clay; as the soil surface. Getting a lawn and garden established can be quite challenging when this is the case.

Whew! The following descriptions didn't cover every word in the word search puzzle, but they did include most of them. Compost, erosion, groundwater, loam, runoff, and texture have been discussed in prior newsletter issues. Do you remember the texture triangle? It can be found in this issue: http://onslow.ces.ncsu.edu/files/library/67/EUpdate2012July.pdf

Why did we just go through all this information about soils? Well, 2015 just happens to be the International Year of Soil (IYS)! For more information, games, and educational material about the IYS, visit the Soil Science Society of America webpage: https://www.soils.org/iys. The Smithsonian's exhibit ***Dig It! The Secrets of Soil…*** will be at the NC Museum of Natural Sciences May 16 – August 16.

Rain Barrels …

The Onslow County Master Gardener Volunteers had a very busy day in February putting rain barrels together. The rain barrels are available on a first-come first-served basis until they are all sold. If you have any questions, contact us at (910) 455-5873.

Order form: http://onslow.ces.ncsu.edu/wp-content/uploads/2014/12/Rainbarrels2015-flyer-LH.pdf

Once you collect the rainwater, you can use it for

a variety of purposes. For example: filling your dog's water bowl, washing your car, and watering your plants or rain garden. Unless you have a very large cistern, the water won't last very long during a drought. It can, however, help keep prized plants happy during dry spells.

Pond workshop …

A pond workshop will be held on March 17 at the Sampson County Extension office in Clinton. The registration fee is $20. For more information, see the online brochure or contact Diana Rashash at (910) 455-5873.

Brochure:
http://onslow.ces.ncsu.edu/2015/02/management-of-ponds-for-municipalities-golf-courses-farms-and-residential-subdivisions-2/

2014 Extension Volunteer Recognition

During 2014, Onslow County Master Gardeners volunteered 5,577 hours of service to local citizens. Special recognition went to **Rebecca Ingram, John Burns, and Eleanor Wood** for 1000 hours of lifetime service each as Master Gardener volunteers. The members of the Discovery Garden Workday Crew, who meet on Wednesday mornings, were recognized for their dedication and contributions to the gardens – Tom Nicoll, Gary Gerard, Paul Leslie, Billy Spencer, Jay Schrader, and Tom Parker. Thank you gentlemen! **Tom Nicoll** was named the **2014 Master Gardener Volunteer of the Year** for his hard work and devotion to increasing the knowledge level of both other Master Gardeners and the public.

The Onslow County Agricultural Awards Banquet was held on February 17th. Several local farmers received awards for crop production contests:

Wheat Yield Champion: **George Pierce**. The runner-up was **Andrew Weston**.

Corn Yield Champion: **Donnie Riggs**. The runner-up was **Tim Huffman**.

Soybean Yield Champion: **Jeff Collins**.

The Onslow County Agricultural Hall of Fame Award was begun in 1984. Nominees are selected and voted upon by past award recipients. This year's inductee was **Mr. Timothy C. Huffman**, for **Master Farmer**. Congratulations Mr. Huffman!

Don't forget …

Help save paper, postage, and your tax dollars! This newsletter and the annual reader survey are available online at:

http://onslow.ces.ncsu.edu/content/Envedarchive

Thank you to the folks who have completed the online survey! For those who have not yet done so, please do. The information is very important.

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