Fall 2016

The weather seems to be on everyone's mind. Here in Athens we have had no significant rain for the past month and only a little over one inch in the past two months. Suffice it to say – things are bone dry. The lack of rain is hitting all the fields but perhaps the pastures are the worst.

Unfortunately, the near-term outlook doesn't promise much relief. Pam Knox, a climatologist with the Crop & Soil Science Department, says there is no end in sight. Rainfall in November is likely to be lower than normal and there is a good chance we will be moving into a "La Nina" pattern for the winter. When there is a La Nina, usually winters in south Georgia are drier and warmer. This may also be the case for north Georgia.
Pam points out that this is the fourth drought Georgia has experienced in two decades. At least some of the drought is driven by higher temperatures. Although we didn't experience that many days of record high temperatures this summer, the heat has been relentless. Athens had 108 days of 90 degrees or above this summer. Typically, we have 53. Night time temperatures are also higher. This increased water use by plants and helped deplete soil moisture.

Our weather pattern and these projections have several implications. First, winter is the season when we recharge our soil moisture, groundwater and surface water. If we do have lower rainfall this winter, we may not get the recharge we need for good water supplies

Contents

Upcoming Events

January 5-8, 2017 - SE Regional Conference Savannah, GA
January 10-Feb. 28, 2017 Small Ruminant Production - Carrollton, GA
January 27-28, 2017 - Southern SAWG Conference - Lexington, KY
February 17-18, 2017 - Georgia Organics Atlanta, GA
February 21, 2017 - Apple Grafting Workshop Cleveland, GA

Find more information on these events at
www.SustainAgGa.org

Also find basic principles of sustainable agriculture, Extension bulletins, research publications as well as archived copies of this newsletter.

next spring and summer. Also the La Nina weather pattern is associated with drought the following summer.

What does this have to do with sustainable agriculture? It seems to be we should all be thinking about water conservation, if you aren't already, both in your home and on your farm. This winter you should try to keep your soil covered either with a cover crop (if you can irrigate to get it started), other crop residue, or mulch. This will allow whatever rainfall you do get to infiltrate into the soil instead of being lost to runoff. If you are a vegetable grower, and you don't have irrigation, this winter would be a good time to consider putting it in. If you are using sprinklers, think about moving to drip irrigation, which is much more efficient. Dr. Dennis Hancock has drought management tips for pastures on the Drought Management webpage at georgiaforages.com.
I hope the experts are wrong on this one, but it never hurts to be prepared and water conservation is something we should make a consistent habit.

May there be showers of blessing!

As always, good growing.

Julia Gaskin
Sustainable Agriculture Coordinator
University of Georgia

Research

Cyanobacteria in the Georgia Piedmont

Cyanobacteria, or blue-green algae, are gaining public attention as severe blooms across the country are increasingly showing up in the news and causing harm to humans and animals. These small, single celled organisms are billions of years old and are responsible for the oxygenation of the Earth's atmosphere that allowed complex plants and animals, like ourselves, to exist. Excessive growth of cyanobacteria makes them nuisance species in today's world because they can create toxins that affect the liver, brain, kidneys, and skin. Symptoms can be acute or chronic, ranging from skin irritation to neurologic impairment and death.

Toxins produced by cyanobacteria threaten human health as they can taint drinking water supplies, irritate eyes, and are even detectable in fish caught from lakes with recurrent dense blooms. In animals such as cattle and domesticated pets, cyanobacteria can cause decreased ability to reproduce, feeding difficulties, behavioral confusion, and paralysis and death. The toxins also have the potential to bioaccumulate and negatively impact the populations and health of other aquatic species. As cyanobacteria overtake a waterbody, other primary producers are outcompeted and organisms, such as zooplankton and fish, that rely on those primary producers will lose their food source. Smothering cyanobacteria mats, such as in Figure 1, also limit sunlight necessary to sustain aquatic plant life and consume oxygen at such a rate that do not allow fish to survive.

Figure 1: Cyanobacteria bloom found on the shores of the Lake Oglethorpe dam.

Cyanobacteria thrive in warm, still, nutrient-rich water bodies common across the Georgia Piedmont (Figure 2). Farm ponds are especially at risk for cyanobacteria blooms due to their proximity to fertilized fields, and cyanobacteria blooms can result in livestock deaths if animals are exposed to the blooms. Research indicates there will be a continued shift in the frequency, severity, and location of cyanobacteria blooms. More extreme precipitation events allow nutrients to wash into waterbodies as surface run-off, and then prolonged periods of drought will create a still environment that concentrates nutrient levels due to increased evaporation. With these increasingly favorable cyanobacteria "ingredients" in mind, it is becoming ever important to understand the land management strategies and climate patterns that could trigger a bloom.

Figure 2: Cows stand near a cyanobacteria dominated farm pond in Watkinsville, GA.

In order to understand the spatial and temporal patterns of cyanobacteria blooms it is vital to explore landscape variables within watersheds that act as potential drivers for these blooms. Using Geographic Information Systems (GIS) and remote sensing techniques, we can delineate cyanobacteria-positive watersheds and determine common characteristics leading to blooms. Examples of landscape variables are displayed for the Lake Chapman watershed in Figure 3.

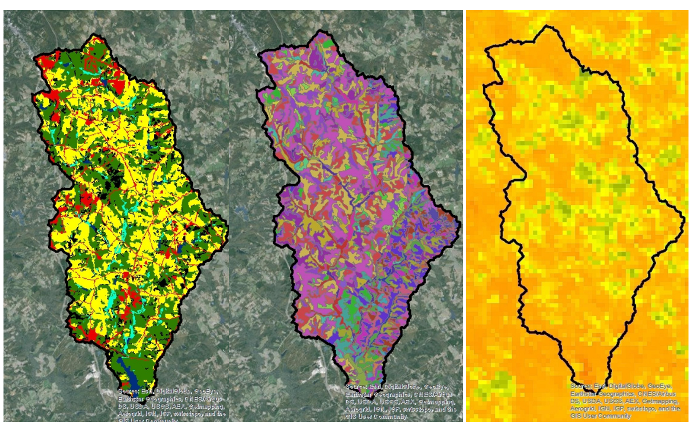
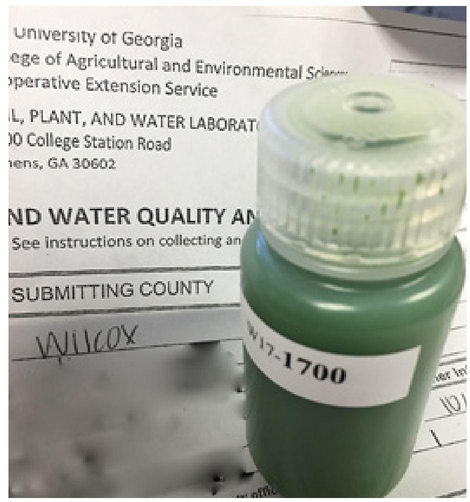


Figure 3: Left: USGS National Land Cover Database land use map for the Lake Chapman watershed (Red-Developed, Green-Forest, Yellow-Agriculture, Teal-Wetland, Blue-Water). Center: USDA SSURGO Soils map for the Lake Chapman watershed. Right: Feburary 2016 NASA MODIS Enhanced Vegetation Index values for the Lake Chapman watershed. Green shades indicate healthy vegetation.

This analysis is part of many cyanobacteria-related projects going on at the UGA campus. Dr. Susan Wilde runs the Nuisance Aquatic Species Lab (NASL) that receives cyanobacteria samples from around the southeast and examines them for species types and potential toxicity. The Agriculture and Environmental Service Laboratory and UGA County Extension agents coordinate sample collection, and shipping for nutrient and algal screening. The pond water quality and algae analysis submissions form can be found at http://aesl.ces.uga.edu/water/PondAlgaeForm.pdf?2. A water sample and submission form example can be found below.



A water sample and submission form to be processed at the Nuisance Aquatic Species Lab (NASL).

Dr. Deepak Mishra (Department of Geography) runs a remote sensing lab that is working on new techniques to utilize satellite data to more effectively monitor cyanobacteria outbreaks. There is also a community-science project called CyanoTRACKER (http://www.cyanotracker.uga.edu/) that is run collaboratively through the Department of Geography and the Department of Computer Science. This project uses social media to collect cyanobacteria reports and streamline the monitoring process.

Together these projects are building capacity between academics and end-users to best understand and manage the complex anatomy of cyanobacteria blooms. Cyanobacteria blooms should be taken seriously, and a few simple best practices can prevent cyanobacteria toxicity risks. Never let livestock or pets in or around a waterbody that is experiencing a cyanobacteria bloom as its toxicity is unknown. Seek alternative methods for water supplies if the waterbody is frequently affected by cyanobacteria blooms. Try not to apply excess nutrients to fields, especially phosphorus. A fertilizer calculator is provided by the UGA Extension Office at http://aesl.ces.uga.edu/soil/fertcalc/. Finally, report all cyanobacteria blooms to an extension agent, CyanoTRACKER, or the NASL. These organizations will help determine the severity of the cyanobacteria bloom and provide guidance and recommendations on how to proceed. Reporting cyanobacteria blooms strengthens research which will in turn increase these organization's ability to help those experiencing blooms.

Dr. Susan Wilde
Warnell School of Forestry and Natural Resources
Sam Weber
Geography M.S. Candidate

Growers Corner

Poultry Production Systems for Meat Birds

Poultry can be defined as domesticated birds grown for meat or eggs and can render an economic return. Chickens were first brought to America by the English in 1607, and used mainly to provide eggs and for cock fighting. Over the years, the way poultry was produced gradually changed as the population increased and the demand for an inexpensive source of animal protein increased. Traditional backyard flocks and small flocks gave way to a complex integrated poultry production system that can efficiently supply the demand for poultry meat and poultry products.

The past several decades, has seen a revival of past practices of backyard flock production and the addition of alternative production methods including organic meat production. Over the years, there has been an increased demand for organic and naturally produced poultry products mostly due to the perception that these products are safer, tastier and healthier. In the United States, organic poultry broiler production increased from 1.9 million birds in 2000 to more than 10.4 million in 2005. There has also been an increase in the number of persons wanting to grow their own birds for meat and eggs, not necessarily as organic or natural poultry. Even with these growing trends, the demand for "conventional" broiler meat has continued to rise as the population centers across the world continue to grow.

Conventional Poultry Production

Ninety-nine percent of the total poultry production in the United States is done in conventional housing systems, where commercial broiler birds are raised for 6 to 8 weeks to achieve an average market weight of 5.5 to 8.5 pounds. These birds are typically Cornish White or White Rock species that have a high feed conversion and growth rate. The birds are raised in environmentally controlled houses and are fed a balanced commercial feed that contains antimicrobials and dietary supplements.

Twenty-eight thousand birds in a conventional poultry house.

Pasture Poultry Production

Pasture-raised or Free Range, refers to birds that have been grown outdoors exposed to fresh air, grass and insects. Some form of shelter is usually provided so that the birds can come in from the elements. Some pasture flocks are raised in lightweight movable pens, called "tractor houses." These pens are moved daily or weekly (sometimes with a tractor), depending on the availability of pasture space. In this system, the grass is supplemented with commercial feed and they have access to whatever insects they can find in their enclosure that day. Pastured poultry is not regulated and birds typically require up to 10 weeks to reach market weight.

Large backyard flock with alternative housing.

Organic Poultry Production

Certified Organic is defined and regulated by the USDA National Organic Program. The rules for certified organic meats are complex, but the animal must be fed certified organic feeds and antibiotics as well as other man-made synthetic substances cannot be used to enhance growth. Pre-biotics, pro-biotics and vaccines are allowed to replace antibiotic growth promoters. In addition to feed, living conditions and breeder sources are important factors when obtaining organic certification. Birds organically raised should have unrestricted access to the outdoors for exercise, fresh air and sunlight, except during inclement weather. Currently, there are no certified organic hatcheries in the US, therefore, non-organic chicks must be managed and grown under organic conditions after the second day of hatch.

Consumer demand for a more natural product without additives to enhance growth, has been one of the drivers for non-conventionally produced food. Many consumers think organically grown poultry products are safer and more nutritious than those grown under conventional conditions. The United States Department of Agriculture has defined organic foods as different from conventional products in growing, handling and processing but not in safety and nutrition.

Natural Poultry Production

Natural poultry are not subject to the strict standards of certified organic poultry. However, they must not use growth promoters and should never be fed animal by-products. Natural poultry also should not be given antibiotics except for ionophores used for coccidiosis control.

As you can see, there are a number of different poultry production systems used in the United States. Hopefully, this article will help you understand the various types of production and what labels mean.

Claudia S. Dunkley Ph. D
Extension Poultry Scientist
University of Georgia

Education

Natural Dye Garden for Textiles

Most of us have never bothered to think of how clothing was made and dyed before modern chemistry and industrial production. Before the invention of chemical dyes in the mid- 1800s, clothing was dyed with plant and animal materials for more than 5,000 years.

Traditionally, dye plants were an important part of every major economy. For example, when the Spanish colonizers discovered native Mesoamericans dyeing their clothing magenta with a tiny black insect called cochineal, the dye stuff was quickly brought back to Europe on treasure fleets and became one of the most valuable goods during this time. The basic process of dyeing a natural fiber has changed very little over the past 5,000 years.

Here are rudbeckia, marigolds, and coreopsis flowers after harvest--they give colors from bright gold to orange to green.

In general, dyeing fiber with natural materials is like making a big pot of tea. The dye stuffs or extract is brought to a boil and then stabilized— cotton can boil but wool must remain at a simmer, otherwise it will felt. The mixture is 'cooked' down with the fiber for an hour. It is a good idea to let the fiber soak in the dye pot overnight to achieve a deeper and more saturated hue. Natural dyes can be mixed and matched for endless color possibilities. Some common natural dyes are marigold, which produces a bright gold; coreopsis, which produces a burnt orange; and most famously indigo, which produces a deep blue. In the Southeastern United States, there is a rich history of indigo farming during the 1700s; indigo was one of the first crops planted in the English colonies and found its greatest success in states like South Carolina, Georgia, and Tennessee.

Hopi Black Dye sunflower seeds give a beautiful deep purple color.

Last year, the UGArden Student Learning and Demonstration Farm added a dye garden to the vegetables, small fruits, herbs and mushrooms already produced. This gives students a chance to grow and process flowers that were traditionally used as dyes. We started the garden with marigolds, madder, elecampagne, coreopsis, false indigo, orange cosmos, Hopi black dye sunflowers, and rudbeckia. These produce a rainbow of colors – gold, red, blue, burnt orange, blue, orange, purple, and yellow. These plants are also easy to grow and provide both beauty and pollinator habitat. Large student volunteer groups, such as the UGA Rotaract Club and students from David Berle's Organic Gardening class, helped establish the plants, weed the plot, and harvest the flowers.

These are solar dye experiments with orange cosmos, marigolds, and coreopsis.

The dye garden was very prolific. Every day we harvested many more flowers than we could dry in the UGArden Herb Room and kitchen. This was a good thing to enable us to continue dyeing long after the growing season. As part of our outreach program with the Americorps VISTA volunteer (which is me), the dried flowers were used to conduct natural dye workshops with middle and high schoolers in the Athens area. Since these facilities did not have kitchens where we could boil the dyes with the fabric, we took an alternate route - 'solar dyeing'. This method entails putting the flowers in clear glass containers with the wool and water, kind of like a 'sun tea'.

The containers are put in the sun for about a week and the warmth from the sun allows the fiber to accept the dye from the flowers. Most of the students could not believe how quickly the colors started to show from the warmth of the sun. We chose coreopsis, orange cosmos, and marigolds to demonstrate the varieties of yellows and oranges you can get from flowers!

This cowl is made with wool that was dyed with the Hopi black dye sunflowers. The yarn was dip-dyed to create stripes.

Our dye garden is a good educational project and may help students better understand natural dyes, their history and how to use them. There is a resurgent interest in natural dyes with several small companies looking to reintroduce natural fibers and dyes in the larger textile industry.

Berea Susan Antaki
MS in Textiles, Merchandising, and Interiors Candidate
The University of Georgia

Extension

"We Don't Need No 'Nother Dust Bowl!"

Three seventh grade boys rush pass me so fast the air whooshes in my ears. They stop at the gate to the animal yard sandwiched between the 6th grade hall and the 7th and watch our small goat herd eat the Austrian winter pea they have brought.

Three students. Four goats. A pile of Austrian winter pea that was part of our spring cover crop.

Athens, Georgia, home of rock bands and the University of Georgia Bulldogs, home to a median home value of $137,300, with values up 5.2% and predicted to rise another 4.3%. And Athens, Georgia, home to the fourth highest poverty rate in our state at 37.8% and home to 39% of children in our county living in poverty.

Our students come from a wide variety of life experience. Some do go hungry each night. Some have literally been homeless while others vacation in faraway states, even foreign countries. Ask any teacher, and they will acknowledge the difficulty of teaching to such variety.

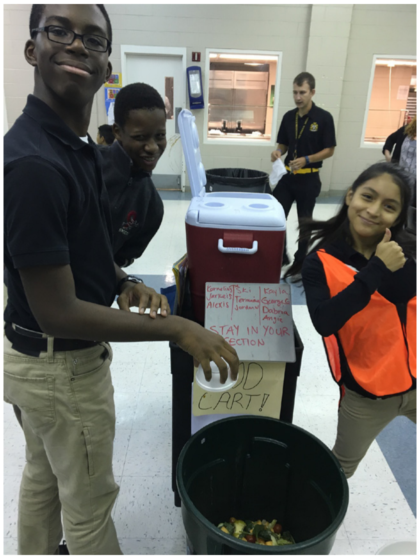
And yet, one arm of our school that sweeps in every one of our students is the school garden.

The school garden does not pigeon-hole kids. It is a new world for the vast majority of our students and consequently, no student has a history with it, no student an upper hand or a disadvantage in the garden. And administration, teachers, custodians, cafeteria staff, parents, students, the school district, all of us agree on this, that the school garden is middle ground and it is valuable ground.

Ag Science Students setting up drip tube irrigation at Hilsman Middle School.

The school garden, and its spinoffs including the school animal yard, cafeteria composting system, and school greenhouse, accomplish the nearly impossible. It shapes our students' thoughts, their view of the world even, with real life consequences to their actions and inaction with absolute objectivity. What happens in the garden when we do not weed? What is the outcome of proper transplantation of our fall starts by the in-line emitter of our drip tube? How does the soil benefit from cover crops? What is the weight of our trashcan in the cafeteria for our custodians when we do not compost? When we do? What happens to the apple in the compost pile? What will the goats eat if we forget to feed them?

In Athens-Clarke County we now have four middle schools each with a school garden, a school compost program, an Agriculture Science program, Family and Consumer Science program, and an Americorps VISTA (Volunteer in Service to America) service member who acts as the school gardener. The Americorps VISTA service members at the four CCSD middle schools, are coordinated by the School Garden Coordinator Wick Prichard who is housed in the Athens-Clarke County Extension Office. Wick's position is built on the historic model of 4-H in our state's schools but with a focused eye on specifically teaching youth skills in sustainable agriculture and entrepreneurism. Working with Americorps VISTA, a national program dedicated to fighting hunger, Wick Prichard and the Americorps VISTA service members have been able to mobilize volunteers from the Athens-Clarke County community to participate in work days at the school gardens, donate resources including tools and grants, and even dine at the Kitchen Garden Corps restaurant in the summer, a farm to table program run completely by middle-schoolers.



Students running compost, recycling, and food collection station at Hilsman Middle School cafeteria.

We have mounds of data detailing the work that has been completed by our middle school students in and because of the school garden over the past four years. During September alone in the Clarke County School District the four schools collected 2,264 pounds of compost, 1,643 pounds of recycling, 1,092 apples, 769 bananas, 357 oranges, and 383 peaches among other items such as pears and packages of carrots and raisins. This food in turn reduces waste for the National School Lunch Program as food is redistributed to hungry students instead of being directed to the

Ag Science students completing putting in a post for a shade structure at Clarke Middle School.

landfill or put into the school on-site compost pile. This food also cuts costs for the school district when it is used in family and consumer science food labs.

And we have experience after experience telling us that school gardens are a crucial arm of our schools and our communities. On a soil conservation test, we have entire classes of students doing well because they were able to remember and reference the measures they put to work in their garden, the cover crops, the mulch, and the compost. We have students, as their year-long project, choosing to volunteer to work in a pre-school garden in another town. We have a student after school being the first to discover a new birth, wrapping the wet goat kid in his arms and toting it to a warm room for the night. And we have one student at the compost pile, declaring, "we don't need no 'nother dust bowl!"

We do not just have a school garden. We have a school farming community.

Wick Prichard
School Garden Coordinator
University of Georgia

Upcoming Events!

Journeyman Farmer Certificate Program

If you've had the first step of training in Small Farm Business:

Small Ruminant Production Training
Carroll County-Jan. 10-Feb. 28th
Tues. 6 - 8:30 p.m.

TO REGISTER: Carroll County Extension Office
Phone: (707) 836-8546
E-Mail: uge2045@uga.edu

Small Fruit and Vegetable Training
DeKalb County - Jan. 11-Feb. 22
Wed. 6 - 8 p.m.

TO REGISTER: DeKalb County Extension Office
Phone: (404) 298-4080

Small Fruit and Vegetable Training
Dougherty County - Jan. 17, 19, 24, 26 from 9-3 p.m.

TO REGISTER: Dougherty County Extension Office
E-Mail: morganjl@uga.edu

UGA extension