Jordan Lake Nutrient Management

Introduction, Background, and Rules
Where Does Your Drinking Water Come From?

Does it come from here?
Had you Rather Swim In

This

Or This
Is Water Related Recreation Important to North Carolina?
Is There a Relationship to Clean Water in Our Culture?
Jordan Lake Facts

- Created from Haw River and New Hope Creek
- Original name: New Hope Lake
- Named for Senator B. Everett Jordan
- 13,940 acres, 200 miles of shoreline
- Elevation 216 feet, 113 feet above stream bed
- 245 billion gallons of water on a typical day
- The reservoir was developed and is managed by the United States Army Corps of Engineers
Jordan Lake Purpose

The Reservoir was commissioned for the purposes of flood control, downstream water quality, fish and wildlife conservation, recreation, and water supply. It was created in 1983 by the damming of the Haw River a short distance upstream of its confluence with the Deep River.

There are 9 recreation sites in the Jordan Lake State Recreation Area. From I-40 in Raleigh take the US 1 freeway south, through Cary to US-64 (just before Apex). Then follow US-64 west to the Jordan Lake Rec Area. For descriptions and information about available facilities, select the individual site from the following menu:

- Crosswinds Boat Ramp
- Crosswinds Campground
- Ebenezer Church
- New Hope Overlook
- Parkers Creek
- Poplar Point
- Robeson Creek
- Seaforth
- Vista Point

View Facilities Map (pdf format) of Jordan Lake SRA

Jordan Lake SRA - Campgrounds
Jordan Lake Swimming

Outdoor Recreation at Jordan Lake

Swimming at Jordan Lake

Jordan lake has several areas designated for swimming, including three public swim beaches and three campground beaches (beaches for use by campers only). Though Jordan Lake's swimming beaches have shower and changing areas as well as life jackets that can be borrowed free of charge, none of them are manned by life guards. No swimming is allowed in areas of the lake not specifically designated for swimming.

Camping at Jordan Lake

Jordan lake has five camping areas and has facilities for tent camping, RV camping, group camping and canoe/kayak camping.

Boating at Jordan Lake

There are 12 boat ramps on Jordan Lake, including four boat ramps that are open 24 hours a day (Ebenezer boat ramp, Robeson boat ramp, Farrington Point boat ramp and Poe's Ridge boat ramp). Canoes, kayaks, pontoon boats, jet skis, bass boats, water ski boats, and small sailboats are all commonly used on Jordan Lake. Boat rentals are available from Crosswinds Marina, which is Jordan Lake's only marina. Canoe and Kayak rentals can be arranged from a number of local outfitters, such as Frog Hollow Outdoors.
Jordan Lake Drinking Water

Town of Cary
Water Treatment

The Town of Cary produces drinking water from Jordan Lake at a treatment plant that it owns with the Town of Apex. Treatment capacity increased to 40 million gallons per day with expansion that was completed in 2002. The plant has been in compliance with regulatory standards since opening in 1993.

The water plant is six miles from Jordan Lake, which is part of the Cape Fear River basin. The lake was created to supply water regionally, control flooding, improve flow downstream, and provide recreation.

Annual Reports

Drinking Water Quality Report [text only html] – This brochure is mailed to all water customers as required by the U.S. Environmental Protection Agency. It summarizes test results and includes information on health effects. The report lists Town contacts and sources of additional information.

Water Treatment Lab Summary – This comprehensive laboratory report has test results for all parameters for finished water from the Cary/Apex Water Treatment Facility.

Treatment Process

The Cary/Apex Water Treatment Plant uses a relatively new process with special concrete treatment basins called Super Pulseator Flocculator Clarifiers for removing sediments from the water. Each can treat up to 8 million gallons of water a day.
Jordan Lake Wake Quality Problems

• Jordan Lake has been consistently rated as eutrophic or hyper-eutrophic since its impoundment in 1983.

• “Eutrophic” is an over-abundance of nutrients in the lake, primarily nitrogen and phosphorus, which may result in algal blooms and poor water quality.
Jordan Lake Problems

• The state began taking actions to address the nutrient problems early in the lake’s history.
• The Environmental Management Commission designated the Reservoir a Nutrient Sensitive Water the year of its impoundment (1983), and imposed phosphorus limits on wastewater dischargers.
• The lake did not respond to these controls.
Jordan Lake Swimming Area Closed

Posted: Jun 10, 1998

CHATHAM COUNTY — A beach at Jordan Lake is closed and the Chatham County Health Department doesn’t know when it will reopen.

The Vista Point Campground is closed because of an outbreak of shigellosis. Officials suspect contamination in the water and the soil may have made several children sick after swimming in the water.

It’s the first time the serious bacterial infection has been linked to Jordan Lake. Chatham County Health Department Director, Wayne Sharman, says the area is closed to protect the public. “The decision was made to close Vista Point Beach at Jordan State Park due to some confirmed cases of shigellosis related to some children that were camping.”

Fourteen year old Adam Edmonds was one of those kids who, two weeks ago, spent a fun weekend at Vista Point. But ever since then he’s been taking it easy, trying to recuperate from the bacterial infection. “I had a great time all weekend and when I got home I had a headache, and my back was hurting from sunburn. And then I woke up the next morning really cold. I had the chills. There are four other confirmed cases of shigellosis in young people who swam in the waters off Vista Point.”
Debris clogs Jordan Lake's coves

Raleigh man spearheads effort to clean up trash

Wade Rawlins - Staff Writer
Published: Thu, Sep 18, 2008 12:30AM   Modified Thu, Sep 18, 2008 04:55AM

PITTSBORO -- When Tom Colson spotted a great blue heron at Jordan Lake recently, he was first delighted, then horrified. The bird was standing on a mat of trash so thick it couldn't fish.

Colson, a Raleigh environmental consultant and hobby wildlife photographer, investigated more closely and found an even worse situation. Near where the Haw River flows into the lake, a half dozen shallow coves resemble floating landfills, collecting debris washed down the river over the years.

Volunteers Needed to Clean Up Lake

There is no land access, so volunteers with boats are especially needed.

What: Help clean up a section of Jordan Lake
Where: About a 45-minute paddle from the Robeson Creek Boat Ramp, Chatham County's Waste

Jordan Lake is popular with boaters, fishermen and swimmers. It's also a source of drinking water. Near the northern end of the lake, the towns of Cary and Apex draw water and pump it to residents' taps, and other communities such as Durham and Orange County may use it in the future. Although those communities have treatment plants that purify the water, the
Jordan Lake: 
Rules Developed to Reduce Nutrient Loading

• In 2006 the Department of Environment and Natural Resources began developing rules to reduce nutrient loading to Lake Jordan
• Rules published 2007, with a 90 day public comment period
• Rules approved November 2008
• Rules signed into law January 2009
Jordan Lake Rules

- Old/New Development
- Waste Water Treatment Plants
- Nutrient Management
- Agriculture
- Buffer Protection
Jordan Lake: Required Nutrient Load Reductions

• Nutrient Load Reductions required by the state of North Carolina from the 1997-2001 baseline period
  – Upper New Hope Sub Basin: 35% Nitrogen and 5% Phosphorus
  – Lower New Hope Sub Basin: 0% Nitrogen and 0% Phosphorus
  – Haw Sub Basin: 8% Nitrogen and 5% Phosphorus
Jordan Lake Rules

- Old/New Development
- Waste Water Treatment Plants
- Nutrient Management
- Agriculture
- Buffer Protection
Jordan Lake Nutrient Management Rule: Who Needs to Participate

• Applicators to any of the following lands:
  – Commercial cropland, including pastureland, regardless of acreage.
  – Commercial ornamental, floriculture, or greenhouse operations, regardless of acreage.
  – Golf courses, public recreational lands, road or utility rights-of-way, or other commercial or institutional lands that total at least five acres.

• Hired applicators who apply to a combined total of at least five acres per year.
Jordan Lake Nutrient Management Rule: What Do You Need to Do

- Attend nutrient management training
- Use a certified nutrient management plan written by a nutrient management planner
Jordan Lake Nutrient Management Rule: Who Does Not Need to Participate

- Homeowners are exempt if they fertilize their own lawns
- With the exception of homeowners, everyone who hires an applicator must ensure that the applicator has attended and completed the nutrient management class or applies pursuant to a nutrient management plan that has been approved by a designated technical specialist.
Jordan Lake Rules

- Old/New Development
- Waste Water Treatment Plants
- Nutrient Management
- Agriculture
- Buffer Protection
Jordan Lake Agriculture Rule: Who Is Covered?

- Applies to all commercial agricultural producers (crop and horticulture) and livestock producers with the following number of animals:
  - 5 horses
  - 20 cattle
  - 20 swine (unconfined) or 150 swine (confined)
  - 650 turkey or 3,500 chickens
  - 120 sheep or 130 goats
  - 20,000 lbs of any combination of species
Jordan Lake Agriculture Rule: What Has to Happen?

- Nitrogen and phosphorus reduction goals have been established and must be met at the subwatershed level.
- County Soil and Water District Offices will calculate nutrient reductions due to conservation practices.
Jordan Lake Rules

- Old/New Development
- Waste Water Treatment Plants
- Nutrient Management
- Agriculture
- Buffer Protection
Jordan Riparian Buffer Rules

• 50 foot vegetated buffer required
  Zone One = inner 30 feet, undisturbed vegetated area
  Zone Two = outer 20 feet, stable vegetated area

• Existing uses next to a stream that are present and ongoing are grandfathered and do not need buffers
Where Does the Jordan Lake Buffer Rule Apply?

• The riparian buffer applies to the following types of surface waters:
  – Intermittent streams
  – Perennial streams
  – Modified natural streams
  – Lakes
  – Reservoirs
  – Ponds

• Contact your DWQ Regional Office to determine if a surface water is subject to the riparian buffer rules
  • http://portal.ncdenr.org/web/wq/home/ro
Next Chapter
Jordan Lake Nutrient Management

How Pollutants Move and
Conservation Practices
Jordan Lake Nutrient Management

How Pollutants Move and Conservation Practices
Conservation Practices

• Just as a weed is a ‘plant out of place’, soil, fertilizer, or nutrients only become pollutants when they move off-site
• Nutrients are valuable resources when kept on the land
• Let’s review how to keep them on-site in row crops, pastures, and lawns...
North Carolina is Rainy!

- While water is necessary to grow crops, it also provides the transport mechanism for pollutants.
- Rainfall in NC is variable and unpredictable!
Erosion and Sedimentation

Sediment is the number 1 water pollutant in North Carolina and the United States....BUT

Nutrients are the major problem in Jordan Lake
How Does P Move?

Rainfall

Precipitation > Infiltration = Surface Runoff (Dissolved P)

Soil Erosion (Particulate P)

(Sedimentation)

Delivery

Infiltration & Percolation

P Leaching

Subsurface Lateral Flow
EPA Water Quality Criteria for Phosphorus

- 0.05 part per million (ppm)
  - stream that discharges into lake or reservoir
- 0.025 ppm
  - lake or reservoir
- 0.1 ppm
  - streams that do not discharge
- 0.01-0.03 ppm
  - to stop algal blooms
N Leaching Losses

<1 lb per acre per year

10 to 20 lb per acre per year

Water standard < 1 ppm
Row Crop Conservation Practices

- Nutrient management
- No-till/strip till
- Terraces and diversions
- Grassed waterways/ filter strips
- Water/sediment control basins
- Contour/strip farming
- Riparian buffers
- Cover crops/crop residue management
Nutrient Management

• Apply Nutrients at the right rate and time
• Apply Nutrients correctly (placement)
• Apply Nutrients using the right source

• Nutrient management improves
  • nutrient use efficiency
  • saves farmers money
No-till or Strip-till

- Reduces soil erosion
- Allows better rainfall infiltration
- Reduces trips across field
Terraces

- Serve as small dams on hillsides
- Designed to control runoff from 10 year 24 hour storm
- Designed to infiltrate water or discharge to a stable outlet
Grassed Waterways/Filter Strips

- Placed where water concentrates and flows off field
- Prevent erosion
- Slow water flow allowing infiltration, filtration
- Provide habitat, roadways
Water/sediment Control Basins

- Allows for:
  - Settling of total suspended sediments
  - Sediment deposition
  - Retention of runoff
  - Some nutrient removal
Strip Cropping

• Planting on contour creates ‘crop terraces’ that slow runoff
• Alternate cropping of strips maintains partial year-round cover
Streamside (Riparian) Buffers

- Filter runoff
- Purifies groundwater (denitrification)
- Stabilizes stream banks
- Provides terrestrial and aquatic habitat
Winter Non-Fertilized Cereal Cover Crops

• Should be planted as soon as possible after crop harvest
• Serve to protect soil from erosion, and can conserve nutrients and add organic matter
<table>
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<tr>
<th>Cover Crop Type</th>
<th>N Reductions (%)</th>
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<tbody>
<tr>
<td>Wheat</td>
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<td>Oats</td>
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<tr>
<td>Rye, Triticale</td>
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</table>
Pasture Conservation Practices

- Forage management
- Nutrient management
- Rotational grazing
- Alternative watering
- Riparian buffers
- Exclude cattle from streams
Forage Management

- Maintain proper pH
- Grass selection
- Do not overstock
- Repair bald spots and erosion
- Fertilize according to crop needs (N) and soil test results (P and K)
- Maintain appropriate grazing heights
Nutrient Management

• Manage fertilizer or organic amendments:
  – Rate
  – Source
  – Placement
  – Timing
  • Cool season grasses
  • Warm season grasses
Alternative Watering

- Provide an alternative to watering from streams or ponds
- Decreases soil erosion and maintains stable stream banks
- Provides year-round clean, freeze-proof water source
Cattle Exclusion from Streams
Riparian Buffers

- Stream bank protection
- Runoff filtration
- Reductions in groundwater nitrogen
- Stream habitat improvement
Natural Conservation Practices ???
Next Presentation
Jordan Lake Nutrient Management

How to Make Nutrient Decisions
Jordan Lake Nutrient Management

How to Make Nutrient Decisions
Why Do We Have Fertilizer Plans or Nutrient Management Plans?

- Provide nutrients for plant production
- Properly utilize manure or organic by-products as a plant nutrient source.
- Minimize loss of nutrients from agriculture and urban sources to surface and ground water.
- Improve or maintain the physical, chemical, and biological condition of the soil.
How Do We Know the Amount of Nutrient in the Soil Available for Plant Growth?

Soil Testing
Why Do We Soil Test?

• Maintain high yields or aesthetic quality
• Reduce costs
  – Unnecessary fertilizers just increase costs
• Protect the environment
• Routine monitoring can spot nutrient problems before they become nutrient deficiencies or toxicities
What Does Soil Testing Measure?

• Does NOT measure the total nutrient concentration
• DOES measure the plant available nutrient concentration in a soil sample
• Estimates the ability of the soil to supply nutrients to a crop
• DOES measure pH and acidity for accurate lime recommendations
## pH Measures Acidity

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<tr>
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<th>Optimum pH</th>
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<td>Soybeans</td>
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<tr>
<td>Pasture (Bermuda)</td>
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Soil Sampling Methods
Importance of Collecting a Representative Soil Sample

- One acre of soil, 6” deep, weighs about 2,000,000 pounds
- Weight of soil in box about 1 pound
- Weight of sample analyzed is about 2.5 grams (1/10 of an ounce)
Soil Sampling Depth

Field Crops

Pasture and Turf
and
Conservation Tillage

8 inches

4 inches
Soil Sampling

• Collect 15 to 20 cores – no more than 10 acres
• Sample different soil types and landscape positions separately
• Soil sample based on NC Cooperative Extension recommendations
Soil Sample Handling

• Obtain sampling boxes from NC Cooperative Extension offices
• Mix cores well in clean plastic bucket
• Fill box to line
• Send sample in for analysis as soon as possible
# Soil Sample Information

**NCDA&CS Agronomic Division Soil Testing Section**

Mailing Address: 1040 Mail Service Center, Raleigh NC 27699-1040  
Physical Address (UPS/FedEx): 4300 Reedy Creek Road, Raleigh NC 27607  
Phone: (919) 733-2655  
Web Address: [www.ncagr.gov/agronomi](http://www.ncagr.gov/agronomi)

## Sample Information

<table>
<thead>
<tr>
<th>Farm ID</th>
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<th>Sample Identification</th>
<th>Lime Applied Within Past 12 Months</th>
<th>You must specify a crop code to receive a recommendation (see reverse side of form)</th>
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**Sample Type**  
Routine samples only — no fee

**Mailing Address**  
3003 Mail Service Center, Raleigh NC 27699-1040

**Physical Address**  
4300 Reedy Creek Road, Raleigh NC 27607

**Phone Number**  
(919) 733-2655

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**Grower Information**  
Please print

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**Consultant/Other Recipient**

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<th>State</th>
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**Pack Samples Securely for Shipment.**

---

**Dedicated Farmer Joe**

4300 Reedy Cr. Rd  
Zebulon, NC 27590

highyieldjoe@gmail.com  
919-523-6000

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*Thank you for using agronomic services to manage nutrients and safeguard environmental quality. — Steve Troxler, Commissioner of Agriculture*
SOIL SAMPLE INFORMATION

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<table>
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<th>NUMBER OF SAMPLES</th>
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<th>LAB NUMBER (Leave blank)</th>
<th>SAMPLE IDENTIFICATION</th>
<th>LIME APPLIED WITHIN PAST 12 MONTHS</th>
<th>FIRST CROP</th>
<th>CODE</th>
<th>SECOND CROP</th>
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</table>

Thank you for using agronomic services to manage nutrients and safeguard environmental quality. — Steve Troxler, Commissioner of Agriculture
**Taking a Soil Sample**

A soil test is only as good as the soil sample!

Use iron or stainless steel tools. Sample dry soil in areas of 10 acres or fewer. Avoid combining soils of different types and/or treatment histories. Avoid fertilizing bands and corners or end-turn areas. For each sample, collect 20 or more cores at the appropriate depth (0-8” for plowed soils, 0-4” for no-till, sod & lawns). Mix cores in a plastic bucket, then fill the sample box.

DO NOT PUT SOIL IN PLASTIC BAGS.

---

**Filling out the Sample Information Form**

<table>
<thead>
<tr>
<th>LAB NUMBER</th>
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<th>LIME APPLIED WITHIN PAST 12 MONTHS</th>
<th>FIRST CROP</th>
<th>CODE</th>
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<td>Corn</td>
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<td>Bermuda Hay, E</td>
<td>043</td>
<td>Bermuda Hay, M</td>
<td>044</td>
</tr>
</tbody>
</table>

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**Sample & Grower Information** — Provide as much information as possible. Print neatly.

**Consultant/Other Recipient** — List name & contact information for anyone else who needs to know about the report.

**Sample Identification** — Print an identifier (use numbers and/or letters) for each sample on a separate line. The identifier should help remind you where the sample came from (Example: J1, S1). Make sure the sample identifiers on the boxes and on the information form are the same. Use pencil or waterproof markers.

**First Crop** — List the crop for which you want lime and fertilizer recommendations. Be sure to include the appropriate code from the list below (e.g., Bermuda hay/pasture establishment, 043).

A. Use Lawn (code 026) for all lawn grasses except Centipedegrass. Use one of the Fine Turf codes only for golf and athletic field turf.

B. Use Shrubbery (code 029) for all shrubs, except azalea, camellia, rhododendron and mountain laurel.

C. For all home garden vegetables, use code 024.

**Lime Applied Within Past 12 Months** — Provide the amount of lime applied in tons/acre, as well as the year and month of the last application, if made during the past 12 months. (50% is equivalent to one ton per acre.)

**Second Crop** — List the name of the crop that will follow the first one listed as First Crop. Include its code from the list below. This will enable us to make suggestions for this crop, assuming that the field is treated as suggested for the first year. List the second crop even if it will be grown the same year as First Crop.

---

**Crop Codes**

- **E** = establishment (1st year)
- **M** = maintenance
- **SG** = small grain

- **000** No Crop
- **001** Corn, grain
- **002** Corn, silage
- **003** Cotton
- **004** Small Grain
- **006** Milo (Grain Sorghum)
- **007** Peanut
- **010** Soybean
- **011** Sunflower
- **012** Tobacco, burley
- **013** Tobacco, flue-cured
- **014** Tobacco, greenhouse
- **015** SG silage/ Soybean
- **016** SG silage/ Corn silage
- **017** Kenaf
- **018** SG Soybean (double crop)

**Home Lawn & Garden**

- **020** Azalea
- **021** Camellia
- **022** Centipedegrass
- **023** Flower garden
- **024** Vegetable garden
- **025** Mountain laurel
- **026** Lawn
- **027** Rhododendron
- **028** Rose
- **029** Shrubbery
- **030** Berries/Fruit/Nuts
- **031** Tree, shade

**Christmas Trees**

- **034** Leyland cypress
- **035** Line-out/Seed Beds
- **036** Fir/Needle/Spruce/Hemlock, E
- **037** Fir/Needle/Spruce/Hemlock, M
- **038** Pine, White or Virginia
- **039** Blue Spruce/Red Cedar

**Roadside Areas**

- **046** Critical area
- **047** Roadside grass, E
- **048** Roadside grass, M

**Wildlife Areas/Food Plots**

- **066** Deer/Turkey
- **067** Upland game
- **068** Waterfowl
- **069** Fish pond

**Forage & Pasture (cont.)**

- **040** Alfalfa, E
- **041** Alfalfa, M
- **042** Common Bermuda/Bahia

**Commercial Hort Crops ONLY**

- **024** = all Home Vegetables
- **070** Asparagus, E
- **071** Asparagus, M
- **072** Raspberry/Blackberry, E
- **073** Raspberry/Blackberry, M
- **074** Beet
- **075** Bean, Peas
- **076** Beet, M
- **077** Broccoli/B. sprouts/CAiflower
- **078** Cabbage
- **079** Cabbage/Brussels Sprouts/Watermelon
- **080** Corn, sweet
- **081** Cucumber
- **082** Grape, E
- **083** Grape, M
- **084** Kale/Mustard/Spinach
- **085** Okra
- **086** Pea, southern
- **087** Pepper
- **088** Plant, vegetable
- **089** Potato, Irish
- **090** Sweet potato

**Commercial Hort Crops (cont.)**

- **100** Radish
- **101** Ripe/Canola
- **102** Raspberry/Blackberry, E
- **103** Raspberry/Blackberry, M
- **104** Squash/Pumpkin
- **105** Strawberry, E
- **106** Strawberry, M
- **110** Tomato
- **111** Tomato, greenhouse
- **115** Turnip
- **116** Vegetables, other

**Commercial Nursery & Flowers**

- **120** Dahlia
- **121** Gladiolus
- **122** Greenhouse
- **123** Gypsophila (Baby’s Breath)
- **124** Flower, bulbs
- **125** Flower, roots
- **126** Nursery container
- **132** Rhododendron/Ginseng/Native ornamentals

**Orchard, Fruit & Nut**

- **130** Apple, E
- **131** Apple, M
- **132** Peach, E
- **133** Peach, M
- **134** Apple, E
- **135** Apple, M
- **136** Pear, E
- **137** Pear, M
- **138** Pine, E
- **139** Pine, M
- **140** Orange, E
- **142** Orange, M
- **145** Fig, Prune, seed
- **146** Pine, seed

**Fine Turf**

- **150** Fairway/Athletic turf
- **151** Tee
- **152** Greens
Mail Address:
NCDA&CS AGRONOMIC DIVISION
SOIL TESTING SECTION
1040 MAIL SERVICE CENTER
RALEIGH NC 27699-1040

UPS or FedEx
NCDA&CS AGRONOMIC DIVISION
SOIL TESTING SECTION
4300 REEDY CREEK ROAD
RALEIGH NC 27607-6465

http://www.ncagr.com/agronomi/sthome.htm
Soil Testing Extractant

- NCDA&CS Uses the Mehlich-3 Extractant
- If you use a commercial lab for your soil testing, that lab must use Mehlich-3 Extractant AND the fertilizer recommendations must match NCDA&CS to meet legal requirements in the Jordan Lake River Basin
# Crop, Hay, and Pasture Soil Test

## Soil Test

### Alamance County

| Field | Sample | Last | Mo Yr | Crop or Year | Lime | N | P₂O₅ | K₂O | Mg | S | Cu | Zn | B | Mn | See Note |
|-------|--------|------|-------|--------------|------|---|------|-----|----|---|----|----|----|------|
|       | 126-2  |      |       | 1st Fes/OG/Tim, | 1T   | 120-200 | 0  | 70-90 | 0  | 0  | 0  | 0  | 0  | 0 | 12 |
|       |        |      |       | 2nd Fes/OG/Tim,  | 0    | 120-200 | 0  | 70-90 | 0  | 0  | 0  | 0  | 0  | 0 | 12 |

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Crop, Hay, and Pasture Lime Recommendations

### Soil Test

**3/15/2010**

SERVING N.C. RESIDENTS FOR

Alamance County

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Other Fertilizer Recommendations

**Nutrients**
- Phosphorus (P)
- Potassium (K)
- Sulfur (S)
- Manganese (Mn)
- Copper (Cu)
- Zinc (Zn)

**Fertilizer Rates**
- Determined based on yield response to fertilizer
- Strategy is to fertilize the crop, not the soil
- Fertilizer recommendations are in pounds per acre
- Lime recommendations are in tons per acre
Crop, Hay, and Pasture Phosphorus Recommendations

### Soil Test

**SERVING N.C. RESIDENTS FOR**

**Alamance County**

#### Field 1

<table>
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#### Test Results

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NCDA Index System

• Unique to North Carolina
• Used for phosphorus (P), potassium (K), manganese (Mn), zinc (Zn), copper (Cu), sulfur (S)
• Converts nutrients to common index value

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<tr>
<td>0-25</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>26-50</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>51-100</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>&gt;100</td>
<td>Very High</td>
<td>None</td>
</tr>
</tbody>
</table>
Zinc and Copper Can Be Toxic

Attention: This report was flagged with a "C" and/or "Z" to alert you that copper and/or zinc have accumulated in the soil and are approaching a level that could be detrimental to crop production. The C and Z symbols are printed on your report for soil test index levels of 2000 or more; for peanuts with zinc, the level is 300. This note is designed to be a "trigger" that allows enough time to either reduce the rate of application or find another field for application of biosolids and/or waste water. The CTL (critical toxic level) for Cu & Zn has been set at 3000 index; for peanuts with zinc, the level is 500. These levels are used by DENR as a benchmark to determine when application of waste products should be stopped. The CTL for copper and zinc was set to prevent levels from accumulating to the point where they become toxic to crops grown on a field.

David H. Hardy, Agronomist
March 23, 2010

<table>
<thead>
<tr>
<th>Field</th>
<th>Sample</th>
<th>Last</th>
<th>Applied</th>
<th>Recommendati</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mo. Yr</td>
<td></td>
<td>Crop or Year</td>
<td>Lime</td>
</tr>
<tr>
<td>ADD1</td>
<td></td>
<td></td>
<td>1st Corn Grain</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2nd Soybeans</td>
<td>0</td>
</tr>
</tbody>
</table>

Test Results

<table>
<thead>
<tr>
<th>Field</th>
<th>Sample</th>
<th>Last</th>
<th>Applied</th>
<th>Recommendati</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mo. Yr</td>
<td></td>
<td>Crop or Year</td>
<td>Lime</td>
</tr>
<tr>
<td>ADD2</td>
<td></td>
<td></td>
<td>1st Corn Grain</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2nd Soybeans</td>
<td>0</td>
</tr>
</tbody>
</table>
Soil Test Reports, Crops, and Nitrogen Recommendations

Based on crop code, not on test results

DO NOT USE THIS RECOMMENDATION FOR AGRICULTURAL CROPS!!!
Amount of Nutrients: Nitrogen

Yield Goal
How to Determine Nitrogen Rate Based on Realist Yield Expectations (RYE) for Agronomic Crops, Including Pasture and Hay

Nitrogen Fertilizer Rate = RYE * Nitrogen Factor

Realistic Yield Expectation based on soil type and crop

Nitrogen Factor based on soil type and crop
Step-by-Step: Determine Nitrogen Fertilizer Rate

- Find the predominant soil series for each field
- Find the realistic yield expectation and the nitrogen factor (see web site)
- Credit previous legumes
To Determine Your Predominant Soil Series for Your Fields

- Call your local Soil and Water Conservation District
- Check with your county GIS department
Step-by-Step: Determine Nitrogen Fertilizer Rate

- Find the predominant soil series for each field
  - Chewable
Step-by-Step: Determine Nitrogen Fertilizer Rate

- Find the predominant soil series for each field
  - Chewacla
- Find the realistic yield expectation and the nitrogen factor
Realistic Yield Database

http://www.soil.ncsu.edu/programs/nmp/yields/index.php#county

This web site is used to find Realistic Yield Expectation, Nitrogen Factor, and Nitrogen Fertilizer Rate based on Crop and Soil Series.
Step-by-Step: Determine Nitrogen Fertilizer Rate

- Find the predominant soil series for each field
  - Chewacla
- Find the realistic yield expectation and the nitrogen factor
  - RYE for Corn = 105 bu/ac
  - N Factor = 1.06 lb N/bu

Nitrogen Fertilizer = 105 bu per acre $\times$ 1.06 lb nitrogen per bu

= 111 lb nitrogen per acre
Step-by-Step: Determine Nitrogen Fertilizer Rate

- Find the predominant soil series for each field
- Find the realistic yield expectation and the nitrogen factor (see web site)
- Credit previous legumes
## Residual Nitrogen Credits for Legumes

<table>
<thead>
<tr>
<th>Legume</th>
<th>N Available (lb/A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soybean</td>
<td>15-30</td>
</tr>
<tr>
<td>Peanuts</td>
<td>20-40</td>
</tr>
<tr>
<td>Alfalfa</td>
<td>80-100</td>
</tr>
<tr>
<td>Hairy Vetch</td>
<td>80-100</td>
</tr>
<tr>
<td>Crimson Clover</td>
<td>60-75</td>
</tr>
<tr>
<td>Austrian Winter Pea</td>
<td>50-60</td>
</tr>
</tbody>
</table>
Step-by-Step: Determine Nitrogen Fertilizer Rate

- Find the predominant soil series for each field
- Find the realistic yield expectation and the nitrogen factor
- Credit legume
  - soybeans

\[
\text{Nitrogen Fertilizer} = 105 \text{ bu per acre} \times 1.06 \text{ lb nitrogen per bu} = 111 \text{ lb nitrogen per acre} - 15 \text{ lb nitrogen per acre (credit for legume)} = 96 \text{ lb nitrogen per acre}
\]
Nutrient Timing

Days after Emergence

Percent of Total or Maximum N Uptake

V6

V12

Tassel
Nutrient Timing

- Time nutrient application as closely as possible with crop nutrient uptake
- Split application (February 60%), September (40%)
- Do not apply nutrients to frozen, snow covered or saturated soil.

Apply organic materials within 30 days of the crop being planted or the crop breaking dormancy (for instance fescue)
Application Method: Fertilizer
Application Method: Organic Sources
Fertilizer Types

• Grades: N, P2O5, K2O (23-3-3)
• Homogeneous granular (ammoniated)
  – Premixed grades (27-3-3)
  – Uniform (10-10-10)
• Bulk Blend
  – Physical blend of basic materials:
    $\text{NH}_4\text{NO}_3$, DAP, KCl others
<table>
<thead>
<tr>
<th>Source</th>
<th>% N</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anhydrous</td>
<td>82</td>
<td>Pressurized Gas</td>
</tr>
<tr>
<td>Urea</td>
<td>46</td>
<td>Granular</td>
</tr>
<tr>
<td>Ammonium nitrate</td>
<td>34</td>
<td>Granular</td>
</tr>
<tr>
<td>UAN (urea-ammonium nitrate)</td>
<td>28-32</td>
<td>Liquid</td>
</tr>
<tr>
<td>Ammonium sulfate</td>
<td>21</td>
<td>Granular</td>
</tr>
<tr>
<td>Sodium nitrate</td>
<td>16</td>
<td>Granular</td>
</tr>
</tbody>
</table>
## Phosphorus Fertilizer Sources
### Physical Form and Analysis

<table>
<thead>
<tr>
<th>Source</th>
<th>% P$_2$O$_5$</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal super phosphate</td>
<td>16-22</td>
<td>Gran.</td>
</tr>
<tr>
<td></td>
<td>(11-12S)</td>
<td></td>
</tr>
<tr>
<td>Triple super phosphate</td>
<td>44-53</td>
<td>Gran.</td>
</tr>
<tr>
<td>Monoammonium phosphate (MAP)</td>
<td>48-62</td>
<td>Gran.</td>
</tr>
<tr>
<td></td>
<td>(11-13 N)</td>
<td></td>
</tr>
<tr>
<td>Diammonium phosphate (DAP)</td>
<td>46-53</td>
<td>Gran.</td>
</tr>
<tr>
<td></td>
<td>(18-21 N)</td>
<td></td>
</tr>
<tr>
<td>Ammonium polyphosphate (APP)</td>
<td>35-62</td>
<td>Liq.</td>
</tr>
<tr>
<td></td>
<td>(10-15 N)</td>
<td></td>
</tr>
</tbody>
</table>
### Potassium Fertilizer Sources

#### Physical Form and Analysis

<table>
<thead>
<tr>
<th>Source</th>
<th>% K₂O</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potassium chloride</td>
<td>60</td>
<td>Gran.</td>
</tr>
<tr>
<td>Potassium sulfate</td>
<td>50 (17)</td>
<td>Gran.</td>
</tr>
<tr>
<td>Potassium nitrate</td>
<td>(13) 44</td>
<td>Gran.</td>
</tr>
<tr>
<td>Potassium magnesium sulfate</td>
<td>22 (22,11)</td>
<td>Gran.</td>
</tr>
</tbody>
</table>
Granular Fertilizer Material: How to Determine Fertilizer Amounts?

• How much ammonium nitrate should be applied to supply 80 pounds N per acre to a field?
Calculate Granular Fertilizer for a Crop or Pastures

• Ammonium nitrate is 34% N or 0.34 pound N per pound of ammonium nitrate

• 80 pounds N per acre 0.34 pound N per pound ammonium nitrate

= 235 pound ammonium nitrate per acre
Calculate a Liquid Fertilizer: UAN

• UAN or Urea Ammonium Nitrate contains 30% N by weight (0.3 pounds per pound of UAN), and weighs 10.9 pounds lb per gallon
• So 10.9 pounds per gal x 0.3 pounds N per pound of 30%UAN = 3.3 pound N per gallon

• 80 pounds N per acre. 3.3 pounds per gallon 30%UAN
  =24.2 gal 30% UAN per acre
For Help On Nutrient Management, Call Your County Cooperative Extension Office

- Alamance (336) 570-6740
- Caswell (336) 694-4158
- Chatham (919) 542-8202
- Durham (919) 560-0525
- Guilford (336) 375-5876
- Orange (919) 245-2050
- Rockingham (336) 342-8230
- Wake (919) 250-1100