Pastures and pH

Emily Herring
Pender County Livestock Agent
Soil Samples- What’s the right way?

Materials Needed:

- Plastic Bucket (any size)
  - CLEAN!
- Soil Probe or Shovel
  - Stainless Steel or Chrome-plated
- Soil Boxes & Soil Sheet (from Extension Office)
- Pen
- TIME !!!

*Avoid brass or galvanized tools*
Taking the Sample

- Observe area to be sampled
- No more than 10 acres per box
- Keep like soils together
  - Example: wet spot in field, sandy ridge,
  - Fence row, or tree line
- Use soil probe to collect cores
  - 8 inches for establishing
  - 4 inches for maintaining (root zone)
- Take 15 random samples per site
- Dump like samples in bucket & mix
- Write info on box, fill up to fill line (2/3 box)
- Fill out/attach sheet to box and mail together
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) 733-2865 Web Address: www.ncagr.gov/agronomi

SAMPLE INFORMATION

SAMPLE TYPE circle preference(s):
Routine Sample Analysis (no fee)
Heavy Metals Test ($25 per sample)
Test for regulated sites only — not applicable for homeowners!

SAMPLE INFORMATION

FARM ID

NO. OF SAMPLES 2

PAYMENT AMOUNT
(for Heavy Metals only)

GROWER INFORMATION (please print)

LAST NAME First Name Phone

ADDRESS

CITY STATE ZIP

CONSULTANT/OTHER RECIPIENT

DATE REC'D

LAST NAME First Name Phone

ADDRESS

CITY STATE ZIP

emailadd@email.com

Results are available online. Please check this box if you do not need a printed report mailed to you.

LAB NUMBER
(Leave blank)

SAMPLE IDENTIFICATION

LIME APPLIED WITHIN PAST 12 MONTHS

Tons/Acre Month Year

You must specify a crop CODE to receive a recommendation (see reverse side of form)

FIRST CROP CODE

SECOND CROP CODE

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

http://agronomy.agr.state.nc.us/NewPALS/default.aspx
Basics of Soil Report

- **Purpose:** Prevent fertility from being a yield-limiting factor (used for all crops)

- **Tests 22 factors of soil:**
  - Soil acidity & level of nutrients vs nutrients needed by plant grown

  **Lime** – Tenths of Tons per acre needed
  (anything below 0.3 tons/acre soil test indicates no lime is needed)

  **Nitrogen** (N) - pounds/acre needed
Interpreting Soil Test Reports

- HM% - organic matter in soil
- W / V - (weight per volume) soil texture
- CEC – Cationic Exchange Capacity
  extent soil can hold nutrients
- pH- acidity in soil

P, K, Mn, S, Zn & Cu – index 0 to 100
0 to 25 and below...low fertility
25 to 50 Medium
50 to 100 high
250+ could be detrimental to crop
(applying too many nutrients!)
Table 2.2  Target pH based on soil class

<table>
<thead>
<tr>
<th>Soil Class</th>
<th>pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mineral (MIN)</td>
<td>6.0</td>
</tr>
<tr>
<td>Mineral-Organic (M-O)</td>
<td>5.5</td>
</tr>
<tr>
<td>Organic (ORG)</td>
<td>5.0</td>
</tr>
</tbody>
</table>

* Some crops grown on mineral soils require a target pH of 6.5. See Table 2.3 for the target pH of a specific crop.
# Soil Test Report

**Serving N.C. Residents for Over 60 Years**

**Received:** 03/05/2009  **Completed:** 04/08/2009  **Links to Helpful Information**  **Pender County**

## Agronomist Comments

### Field Information

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Last Crop</th>
<th>Mo</th>
<th>Yr</th>
<th>T/A</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>BE15A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Applied Lime

<table>
<thead>
<tr>
<th>Crop or Year</th>
<th>1st Crop: Berm Hay/Pas,E</th>
<th>2nd Crop: Berm Hay/Pas,E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lime</td>
<td>1.7T</td>
<td>0</td>
</tr>
<tr>
<td>N</td>
<td>60-80</td>
<td>60-80</td>
</tr>
<tr>
<td>P2O5</td>
<td>70-90</td>
<td>70-90</td>
</tr>
<tr>
<td>K2O</td>
<td>0-20</td>
<td>0-20</td>
</tr>
<tr>
<td>Mg</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>S</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ca</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Zn</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mn</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>See Note</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>

### Test Results

#### Soil Class

**HM% 3.10**

**W/V 1.07**

<table>
<thead>
<tr>
<th>CEC 8.4</th>
<th>BS% 77.0</th>
<th>Ac 1.9</th>
<th>pH 5.8</th>
<th>P-I 31</th>
<th>K-I 70</th>
<th>Ca% 58.0</th>
<th>Mg% 15.0</th>
<th>Mn-I 28</th>
<th>Mn-Al(1) 26</th>
<th>Mn-Al(2) 26</th>
<th>Zn-I 567</th>
<th>Zn-Al 567</th>
<th>Cu-I 57</th>
<th>S-I 44</th>
<th>SS-I 0.2</th>
<th>NO3-N 0.0</th>
<th>NH4-N 0.0</th>
<th>Na 0.2</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Last Crop</th>
<th>Mo</th>
<th>Yr</th>
<th>T/A</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>BE15B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Applied Lime

<table>
<thead>
<tr>
<th>Crop or Year</th>
<th>1st Crop: Berm Hay/Pas,E</th>
<th>2nd Crop: Berm Hay/Pas,E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lime</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>N</td>
<td>60-80</td>
<td>60-80</td>
</tr>
<tr>
<td>P2O5</td>
<td>60-80</td>
<td>60-80</td>
</tr>
<tr>
<td>K2O</td>
<td>0-20</td>
<td>0-20</td>
</tr>
<tr>
<td>Mg</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>S</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ca</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Zn</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mn</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>See Note</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>

### Test Results

#### Soil Class

**HM% 4.32**

**W/V 1.06**

| CEC 9.7 | BS% 75.0 | Ac 2.4 | pH 5.8 | P-I 35 | K-I 78 | Ca% 56.0 | Mg% 15.0 | Mn-I 18 | Mn-Al(1) 31 | Mn-Al(2) 31 | Zn-I 174 | Zn-Al 218 | Cu-I 56 | S-I 47 | SS-I 0.3 | NO3-N 0.0 | NH4-N 0.0 | Na 0.3 |

---

Reprogramming of the laboratory-information-management system that makes this report possible is being funded through a grant from the North Carolina Tobacco Trust Fund Commission.

*Thank you for using agronomic services to manage nutrients and safeguard environmental quality.*

- Steve Troxler, Commissioner of Agriculture
Lime is the “anti-acid” for soils

pH \downarrow \text{ Lime} \uparrow

NC soils - acidic (low pH) and need lime.
- general rule every 3 years
- 3 to 6 months before planting
- incorporate (mix into soil)

Amount Needed = crop needs (target pH), soil type & current soil fertility
Benefits of liming

- Promotes healthy root development, enhances plant’s ability to survive dry weather
- Supplies needed Ca and Mg
- Promotes more efficient use of phosphorus supplied by fertilizer
- Improves use of some herbicides
The Need for Lime

- Factors that decrease soil pH
- Rainfall – leaching of nutrients from soil (decrease in Ca and Mg that lime supplies)
- Plants utilize nutrients from soil
- Decay of crops or animal waste in field
- Use of fertilizers and nitrogen

<table>
<thead>
<tr>
<th>Soil Acidity</th>
<th>Nitrogen</th>
<th>Phosphate</th>
<th>Potash</th>
<th>Fertilizer Wasted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremely Acid 4.5ph</td>
<td>30%</td>
<td>23%</td>
<td>33%</td>
<td>71.34%</td>
</tr>
<tr>
<td>Very Strong Acid 5.0ph</td>
<td>53%</td>
<td>34%</td>
<td>52%</td>
<td>53.67%</td>
</tr>
<tr>
<td>Strongly Acid 5.5ph</td>
<td>77%</td>
<td>48%</td>
<td>77%</td>
<td>32.69%</td>
</tr>
<tr>
<td>Medium Acid 6.0ph</td>
<td>89%</td>
<td>52%</td>
<td>100%</td>
<td>19.67%</td>
</tr>
<tr>
<td>Neutral Acid 7.0ph</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>0%</td>
</tr>
</tbody>
</table>
Target pH

- Target pH - pH your plant needs
- Some crops can not tolerate low pH

- Bermudagrass – 6.5 Est. 6.5 Maint.
- Fescue – 6.5 Est. 6.0 Maint.
- Rye – 6.0
Types of Lime

Calcitic Lime and Dolmitic Lime

- Calcitic- Calcium Carbonate
- Dolmitic – Calcium Carbonate and magnesium carbonates
- Example: dolmitic lime is used when soils are Mg deficient (most of NC)

- What about gypsum?
Particle Size of Lime

- 20-30 mesh is the largest
  - Reacts slowly
  - May not ever reach target pH
- 100 mesh is the smallest
  - Reacts quickly
  - Highest pH reached
- Best method is to have a range in particle size
NC Lime Law

- Ag Lime- 90% passes through 20 mesh
- Dolomitic Lime- 35% passes through 100 mesh
- Calcitic- 25% must pass through 100 mesh
- No specific CCE; label specifies lime needed to give 90% CCE standard ag lime

Agriculture Lime
Calcium Carbonate Equivalent 80%
Passing 20 mesh screen 90%
Passing 100 mesh screen 30%
(2250 pounds of this material equals 1 ton of standard agricultural liming material)
Lime Application

- Can be applied any time
- Not very water soluble
  - Moisture is important in chemical reaction
- Apply full rate if you incorporate into soil
- If surfaced applied apply up to 1.5 tons every 6-9 months until full rate is applied
- Extremely low pH; consider renovating pastures
- Avoid long term no-til unless you have adequate pH
Too Much Lime?

- pH and availability is interrelated
- Iron, Manganese, Zinc, and sometimes Copper
- More difficult to correct

"Hey, wait a minute! This is grass! We've been eating grass!"
Managing High pH

- If high pH
  - Sample 0-4 inches; 4-8 inches; 8-12 inches
  - If lower pH exists in top 12 inches, deep tillage can be recommended
  - But caution; could bury fertile topsoil
- Consider alternative crops/plants
- Apply organic matter like pine bark/pine needles
- Apply elemental S (90% S)
Using Elemental Sulfur

- Caustic=Protect eyes and skin
- Powder or granular products
- Slow to react
- Mix with soil for best results
- Rate is determine by trial and error
- Apply and resample in 3 months
After liming my pasture turns yellow?

- After application of lime; plants turn yellow
  - Low manganese is usually the problem
  - Lime increase pH therefore reducing availability of manganese
  - Apply manganese to fields to get increase in productivity in crop.
  - Yield will pay off in the long run to cover cost of lime and manganese.
Common Weeds of Pastures
Common Weeds of Pastures
Common Weeds of Pastures
Common Weeds of Pastures
Common Pasture Weeds
Common Pasture Weeds
Common Pasture Weeds
Common Pasture Weeds