Recertification Training for Certified and Trained Fertilizer Applicators

Rory Maguire (rmaguire@vt.edu)
Mike Goatley (goatley@vt.edu)

How is today’s webinar going to work?
- After completion of this training, you will be directed to go to this website: http://vaturf.org/webinars.html
- There, you will receive documentation guidelines that will direct you to http://vaturf.org/test.html
- On this test page, all registered attendees will be asked to enter three code words and their (attendee) names.

How is today’s webinar going to work?
- Upon successful logins of the test information, you will automatically be directed to a webpage where you can download the attendance form.
- You will have until 7 p.m. tonight (2/17) to login and print your forms.
- It is then your responsibility to submit the forms to VDACS at https://oars.va-vdacs.com/Account/LogOn%2c?prog=CFA
  WHILE THERE IS NO FIRM DEADLINE FROM VDACS RE: SUBMISSION, WE ENCOURAGE YOU TO DO THIS ASAP!

Questions during the presentation?
- We hope there are!
- And Dr. Maguire and I are going to try to engage you from time to time with a question just to keep you awake!
- There will be both a chat box and question box. The question box is a good vehicle to record and address questions.
- If you are having any IT questions during the presentation, contact Dr. Jim Owen at 757.363.3904

Upon nearing completion of today’s recertification training
- We will again review the steps to complete to submit your training.
- But we will NOT review the code words!
- Be sure that if there are multiple participants at your site that all are accounted for regarding the recertification process.

Soil Testing & Plant Analysis

Rory Maguire and Steve Heckendorn
Virginia Tech
Soil Testing Lab Manager
Soil Testing:

- Used to estimate nutrient availability in the soil and to provide fertilizer and lime recommendations.
- Available through Virginia Cooperative Extension and private laboratories.

Questions

- Last year my soil had 55ppm phosphate, this year it was 70ppm after I didn’t fertilize. What’s wrong with your soil testing?!
- Your lab has QA/QC, what’s that?
- What is variability? What are sources?
- What is a representative sample?
- What is a subsample?
- How many subsamples do I take from a yard, to get a representative sample?

Components of Soil Testing

- Sample collection
- Analysis
- Interpretation
- Recommendations & Reporting

Questions

- Sampling instructions say to remove “thatch”, what is that?
- It’s dry this year and hard to get down to 6”. I don’t want to break my probe, is 4” enough?
- Stratification? Speak English!
- What is the scale up factor – from soil testing to fertilizing an acre?
- All this variability, do I need insurance fertilization?

Components of Soil Testing

- Sample collection
- Analysis
- Interpretation
- Recommendations & Reporting

Lab’s web site

www.soiltest.vt.edu

www.pubs.ext.vt.edu/452/452-129/452-129.pdf

Soil Sampling For The Home Gardener

Joseph B. Bunting, Extension Specialist, Virginia Tech
Stephen J. Darrow, Extension Specialist, Virginia Tech

A soil test can provide information on the proper amount of lime and fertilizer to apply to your lawns, gardens and other areas of your landscape. When gardeners apply only in the spring and fail to do so in the summer and of the approximate size, sufficient data must be made.
The greatest potential for error in soil testing is in taking the sample.

Why do we need to collect a good soil sample?

- A half to one pound sample must represent, on the average, 2 million lbs of soil per acre being sampled.

Samples must be representative of the area being sampled, thus:

- One sample should represent just one management unit.
- Separate landscape into uniform areas no larger that 10 acres.

Samples must be representative of the area being sampled, thus:

- Take separate samples from areas that differ significantly if they can and will be managed as different management units.
- Avoid areas that are not representative of the entire area, such as old fence rows and other odd spots, including areas influenced by pets, chemicals or other man-made activities.

Soil Testing: Sampling Tools

- A sampling tube or auger (trowel or spade can be used).
- A clean plastic container.
- Laboratory’s soil sample containers.
Samples **must** be representative of the area being sampled, thus:

- Take 10 or more subsamples per sample area
- For large acreage, a minimum of 5 cores (subsamples) per acre should be collected within a uniform area

**Sampling Depth**

- Turf – 2 to 4”, excluding any thatch. **Do not remove grass/roots/any soil**
- Gardens – 6 to 8” or tillage depth
- Trees and shrubs – 6” remove any mulch or surface debris

**Zig-Zag “Pseudo-Random” Pattern**

- Contains roots and soil, therefore more than thatch

**How important is depth?**

- Top 2” organic, then sand below
Nutrient Stratification – grass or no-till

Good vs bad?

Samples ready for drying?

Additional Guidelines: Soil Sampling

- Sample before plant establishment!
- Areas should be tested every three to five years
- Do not wait until the last minute. Fall is a good time to sample
- Recommendations are only as good as the sample collected and information supplied.
“Writeable” Forms Available Online at www.soiltest.vt.edu under “Fees and forms”

Soil Testing Lab, Virginia Tech

Name & Sample ID on box = what’s on form

Soil Testing Lab, Virginia Tech

Drying Samples

- If a soil sample is wet, then
  - Allow it to air-dry
  - Do not oven-dry

Soil Testing Lab, Virginia Tech

Certified Crops Advisors Sample Exam Question

The most precise component in a soil testing program is normally:

- A. sampling
- B. laboratory analysis
- C. extrapolation
- D. interpretation and recommendations

Soil Testing Lab, Virginia Tech
Soil Testing: Analysis of Samples

- Extractants will vary from one lab to another!!!
- Using different extracts will result in different numbers being reported for the same nutrient!

Components of Soil Testing

- Sample collection
- Analysis
- Interpretation – Sufficient, Low, etc.
- Recommendations – Fertilizer and Lime Needs

Virginia Cooperative Extension

Fertilizer Types and Calculating Application Rates

Introduction
Crop production has increased dramatically over the last few decades, much of which has been due to the increased use of fertilizer. Nitrogen (N), phosphorus (P), and potassium (K) are essential nutrients for plant growth and development. The correct rate of fertilizer is crucial to achieve optimal crop yield and profitability.

Calculating Nutrient Requirements
The first step in applying the correct rate of fertilizer is determining crop nutrient requirements. It is essential to understand the specific needs of the crop being grown and the soil's nutrient status. Soil tests can provide the necessary information to determine the fertilizer requirements. Typically, nitrogen, phosphorus, and potassium are the nutrients that require the most attention. Applications of N, P, and K may be required.
What's Needed to Make a Lime Recommendation

- Crop Code sets Target pH - where you want to be.
- Soil (water) pH tells where you are.
- Amount of Exchangeable/Residual Acidity (Buffering Capacity of Soil) tells how much lime is needed to get from WpH to TpH

More Clay = \( \uparrow \text{CEC} = \uparrow \text{Exch. Acidity} \)

Cation Exchange Capacity (CEC) & Base Saturation

- CEC: Total exchangeable cations a soil can adsorb
- Expression: charge per unit mass
  - meq/100g, sometimes see cmol/kg which is the SI (metric) unit, luckily 1 cmol/kg = 1 meq/100g
- Range for minerals and organic matter (pH dependent):
  - Kaolinite: 2 - 15
  - Chlorite: 10 - 40
  - Montmorillonite: 80 - 150
  - Allophane: 5 - 350
  - Vermiculite: 100 - 200
  - SOM: 150 - 300

Base Saturation: % of total CEC occupied by basic cations (Ca, Mg, K, Na)

Normal Range of CEC

<table>
<thead>
<tr>
<th>US Soil Types</th>
<th>CEC (meq/100g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light colored sands</td>
<td>1-5</td>
</tr>
<tr>
<td>Dark colored sands</td>
<td>10-20</td>
</tr>
<tr>
<td>Light colored loams and silt loams</td>
<td>10-20</td>
</tr>
<tr>
<td>Dark colored loams silt loams</td>
<td>15-25</td>
</tr>
<tr>
<td>Dark colored silty clay loams and silty clays</td>
<td>30-40</td>
</tr>
<tr>
<td>Organic soils</td>
<td>50-100</td>
</tr>
</tbody>
</table>

But in Virginia:

- Coastal Plain <3 meq/100g
- Piedmont 4-8 meq/100g due to high Kaolinite

Reserve acidity - buffer pH

<table>
<thead>
<tr>
<th>K(^+)</th>
<th>Ca(^{2+})</th>
<th>H(^+)</th>
<th>Target pH 6.2</th>
<th>Buffer pH 6.25</th>
<th>Lime rec. 0.75 ton/ac</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low CEC pH 5.5</td>
<td>50% base sat</td>
<td>K(^+) Ca(^{2+}) K(^+) K(^+) K(^+)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High CEC pH 5.5</td>
<td>50% base sat</td>
<td>K(^+) Ca(^{2+}) K(^+) K(^+) K(^+)</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Soluble Salts Test $2 Not Normally Needed

- Container Grown
- Band fertilizer too close to the seed
- Drought
- Salts from external source (over-fertilize, groundwater, VDOT, cleaning chemicals)
- Ocean salt from storm surges and brackish waters
Soil Organic Matter Test

$4

- Not normally needed
- Farmers use to adjust herbicide rates
- To know more precisely the amount – to verify contract specifications
- To compare levels at different times
- Requested most on garden samples

Other Reported Values

| Soil Test Lab, Virginia Tech |

Using Results from other Soil Testing Laboratories

- Results from other labs must be converted to Virginia Tech values so that recommendations can be made based on VALUES recommendations.

www.soiltest.vt.edu

MANMH: p. 180-185
Tissue Testing

- Most commonly used to diagnose nutritional problems related to poor growth or color, or to monitor the effectiveness of fertilizer practices on growing plants.
- Not a substitute for soil testing.
- Most effective when used in conjunction with a regular soil testing program.

VCE’s web site → www.ext.vt.edu or pubs.ext.vt.edu/
Recertification Training for Certified and Trained Fertilizer Applicators

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Goatley presentation topics
- Basis for timing of fertilizer applications
- Example fertility programs
- Basic principles in calibration
- Using a Safety Data Sheet (SDS)
- Fertilizer Product Formulation Properties
- Risk Minimization Tactics for Handlers
- Product Stewardship: Transportation, Storage, Emergency Planning & Response, Spill Management, and Disposal

Seasonal Growth Patterns: Warm-Season Turfgrasses

Seasonal Growth Patterns: Cool-Season Turfgrasses

Fertilizer Labels: Required Sections

The five required components of a fertilizer label are the:

1. Brand
2. Grade
3. Guaranteed Analysis
4. Net Weight
5. Name and Address of the Registrant or Licensee

Does this 32-4-4 fertilizer contain slow release N, and if so, what % of the N is slow release?

5.6% WIN + 5.7% slowly available N = 11.3%;
11.3% ÷ 32% = 35.3% slow release N

It contains both WIN and slowly available N, it can be used at the 0.9 lbs N/1000 sq ft application level without further restrictions or the no more than 2.5 lbs N/1000 sq ft application level if the per month release restrictions are met and the annual N is reduced.
What is ‘calibration’?

• By definition, calibration means to “alter or regulate so as to achieve accuracy or conform to a standard”

• We calibrate spreaders and sprayers to ensure that we are accurately delivering a specific amount of nutrient to a known area that conforms to standard nutrient management recommendations.

Once calibrated, always calibrated?

• No!

• Expect spreader calibrations to change due to:
  – Equipment wear
  – Changes in operator pace, stride, etc.
  – Possible changes in product formulation, size of granules, etc.

• Record calibration settings for specific machines and products

• Periodically recalibrate to ensure accurate delivery

What is the importance of ‘calibration’?

• A properly calibrated machine ensures accurate delivery of nutrients, thereby:
  – Promoting turf and landscape plant health
  – Protecting the environment
  – Improving the efficiency (in time, labor, and cost) of the application.

Fertilizer Applicator Recertification Webinar
Things that must be considered for calibration

- Consistent and repeatable speed of application.

Uniform distribution

Pressure for spray applications must be appropriate and consistent

Width of application
And always pay attention to where product ends up… anything on hardscape is likely in the stormwater.

Training resources...
- detailing the calibration of all the standard spreaders and sprayers used in turfgrass management are available at the FACT training link on the Virginia Cooperative Extension website: www.ext.vt.edu

...plus (OSHA Requirements)

Safety & Health Module: Topics
- For users of “weed-and-feed” products:
  - Pesticide Applicator Certification
  - Using a Pesticide Label
  - Safety Data Sheets (OSHA) vs. Pesticide Product Labels (EPA)

Safety Data Sheet (SDS)

Using a SDS: Sections
1. Product / Supplier Identification
2. Hazard(s) Identification
3. Composition
4. First Aid Measures
5. Fire-fighting Measures
6. Accidental Release Measures
7. Handling and Storage
8. Exposure Controls/Personal Protection
9. Physical and Chemical Properties
10. Stability and Reactivity
11. Toxicological Information
12. Ecological Information*
13. Disposal Considerations*
14. Transport Information*
15. Regulatory Information*
16. Other Information
**OSHA Signal Words**

- OSHA uses a signal word to indicate and alert product users to the relative level of severity of hazard
- This agency regulates the signal word on all SDSs (and on labels of non-pesticide products)
- OSHA uses only two signal words:
  - DANGER
  - WARNING

**OSHA Pictograms**

And when you are using spray wands or backpack sprayers, it is likely there are additional PPE requirements to be met.

**Using a SDS: Sections**

1. Product / Supplier Identification
2. Hazard(s) Identification
3. Composition
4. First Aid Measures
5. Fire-fighting Measures
6. Accidental Release Measures
7. Handling and Storage
8. Exposure Controls/Personal Protection

**Using a SDS**

Fertilizer Product Formulation Properties
RISK = TOXICITY X EXPOSURE

Risk if toxicity is high but exposure is zero:
Risk ? = 1,000,000 X 0

Risk if toxicity is zero but exposure is high:
Risk ? = 0 X 1,000,000
Fertilizer Applicator Recertification Webinar

**Risk Management Tactics: Reduce Toxicity**

Risk Management Tactics: Reduce Exposure

- Proper use (right time, correct rate)
- When handling:
  - Work carefully
  - Use engineering controls
  - Wear protective clothing

**Risk Management Tactics: Engineering Controls**

Product Stewardship:
- Transportation, Storage,
- Emergency Planning & Response,
- Spill Management, and Disposal

**Transportation**

- Contain and secure cargo.
- Maintain vehicles.
- Carry emergency response materials.
- Protect fertilizer products—especially those packaged in bags—from the elements.
- Carry identifying and emergency response information (label on container or package, SDS; contacts).
- Know what to do in case of a spill that happens during transport or at a job site.
- Never leave potentially hazardous (or valuable) materials unattended or unsecured.

**Storage Basics**

- Secure
- Labeled (identification / warning sign)
- Dry (protected from flooding and high humidity)
- Moderate temperature (protected from extreme heat and cold)
- Well ventilated
- Self contained
Emergency Planning & Response

Spill Management

• Protect yourself and others while taking these spill response steps:

  • Control
  • Contain
  • Clean Up

Spill Remediation: Emergency Situations

• If you have a spill that is a “real” emergency—either because of the amount released or the location of the accident—call for help!

Incident Reporting

• Depending on the materials involved and the release site/situation, you may need to notify
  — Virginia Department of Emergency Management
  — Virginia Department of Agriculture & Consumer Services / Office of Pesticide Services

What to do now?

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