Soil Testing & Plant Analysis

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Soil Testing Lab
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Soil Testing:

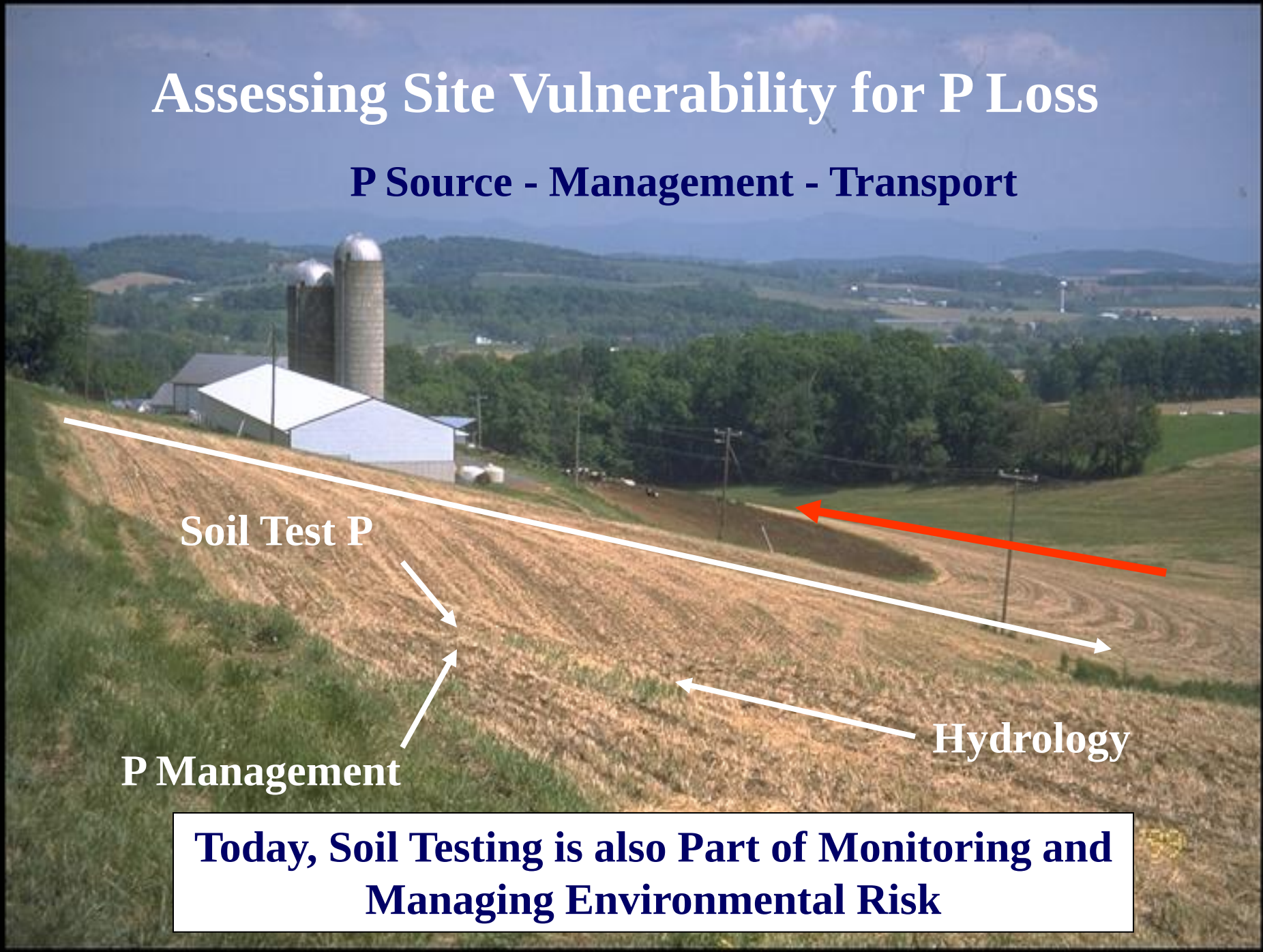
Virginia Cooperative Extension
A partnership of Virginia Tech and Virginia State University www.ext.vt.edu
VirginiaTech Invent the Future
VSU Virginia State

- **Used to estimate nutrient availability in the soil and to provide fertilizer and lime recommendations.**
- **Available through Virginia Cooperative Extension and private laboratories.**
- **Routine Soil Test Analysis --**
  - **Soil pH plus plant available levels of P, K, Ca, Mg & various micronutrients and estimated CEC.**

Soil Testing Lab, Virginia Tech

1940’s & 50’s - Increased availability of fertilizers spur soil testing as a management tool to measure deficiencies.

Soil Testing Lab, Virginia Tech


Assessing Site Vulnerability for P Loss
P Source - Management - Transport
Soil Test P
P Management
Hydrology
Today, Soil Testing is also Part of Monitoring and Managing Environmental Risk

Components of Soil Testing

- **Sample collection**
- **Analysis**
- **Interpretation**
- **Recommendations & Reporting**

Summary of Sampling Instructions

Back of Form→

↓On Sample Box↓

INSTRUCTIONS FOR SAMPLING SOIL

1. EQUIPMENT NEEDED: SAMPLING TUBE, SPADE, TROWEL, OR AUGER AND CLEAN PLASTIC PAIL.
2. SAMPLES SHOULD BE MADE UP OF AT LEAST 5 SUBSAMPLES OR CORES FROM EACH ACRE REPRESENTED BY THE SAMPLE. SAMPLE TO PLOW DEPTH IN CROP LAND AND THE TOP 2 TO 4 INCHES IN PASTURE OR SOD. MIX SAMPLE THOROUGHLY IN THE PAIL BEFORE THE SAMPLE CARTON IS FILLED WITH SOIL. SAMPLE SHOULD NOT REPRESENT MUCH OVER 10 ACRES.
3. IF THERE ARE VISIBLE DIFFERENCES IN SOILS OR CROP GROWTH IN A FIELD, A SEPARATE SAMPLE SHOULD BE TAKEN FROM EACH UNIFORM AREA. DO NOT TAKE SUBSAMPLES FROM ERODED SPOTS, BACK FURROWS OR SMALL DEPRESSIONS. LARGE AREAS IN A FIELD THAT HAVE BEEN MANURED, LIMED, FERTILIZED, OR OTHERWISE TREATED DIFFERENTLY SHOULD BE SAMPLED SEPARATELY.

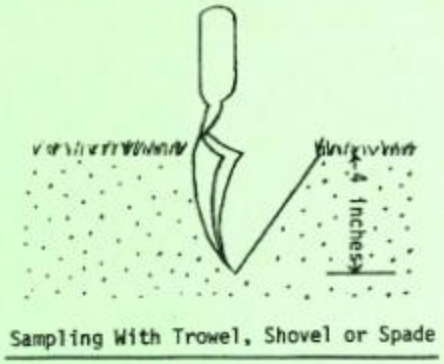
Important:
For test results to be meaningful, use extreme care when taking soil samples. Each sample represents many tons of soil in your lawn or garden. Test results cannot be any more accurate than the sample submitted to the laboratory. **Do not** take samples when the soil is extremely wet.

Sampling Instructions:
Divide your lawn or garden into sampling areas. Each area should be uniform in the kind of soil and in the past fertilizer and lime treatments it has received. An example would be separate samples (areas) for front and back lawns. For **shrubs and trees,** select an area from the trunk to the outer edges of the branches. Take a separate sample from each area as shown in the diagram below.

Use the following procedure for each sampling area:

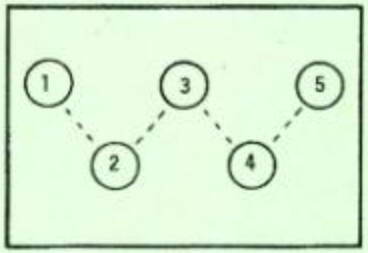
A – Take samples with a trowel, shovel, spade, or auger. Make a vertical cut 4" deep for lawns, or to plowing depth for gardens, and push the soil aside. Then cut a thin slice from the side of the opening that is of uniform thickness, approximately 2" in width, and extending from the top of the ground to the depth of the cut. Scrape away or discard any surface mat of grass or litter and place the slice of soil into a clean bucket or other container. Follow this sampling procedure in 10 or more different locations within each sampling area, each time placing the resulting soil in the same container, giving you a composite sample.

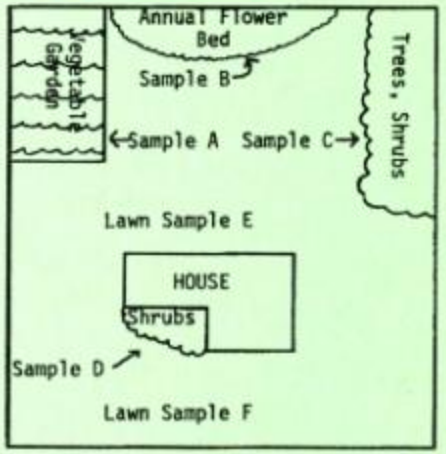
B – Thoroughly mix the soil from the composite sample and then fill the sample box to the top with the mixture. Fill in the information requested on the side of the sample box, including sample number, complete the other side of this sheet, and send sample, sheet, and payment directly to the Soil Testing Laboratory.



Sampling With Trowel, Shovel or Spade

How To Take Composite Samples of Each Bed or Section





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www.soiltest.vt.edu

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The greatest potential
for error in soil testing
is in taking the sample

Why do we need to collect a good soil sample?

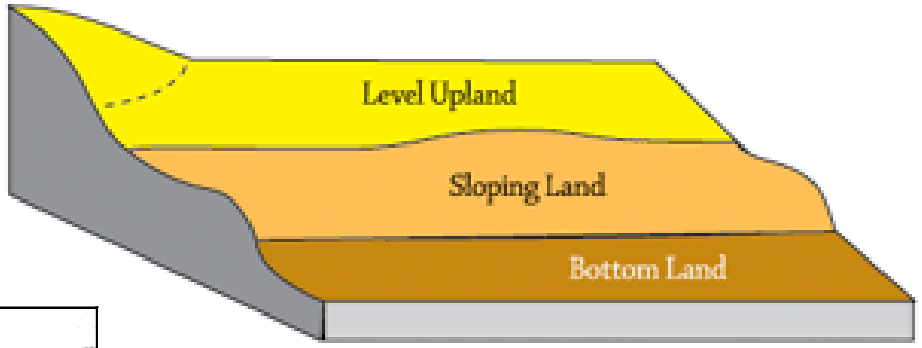
- **A half to one pound sample must represent, on the average, more than 10 million lbs of soil in the field being sampled**

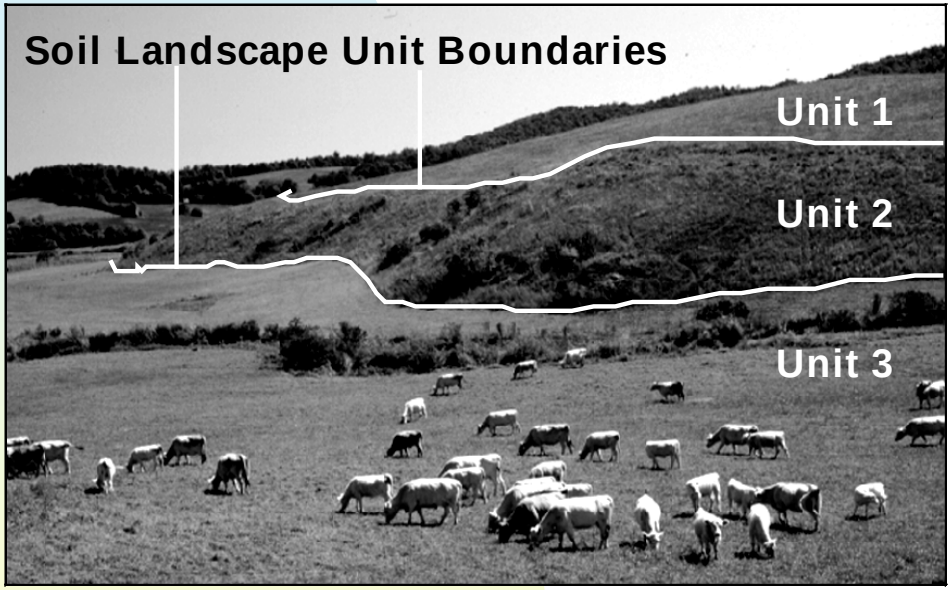
MANMH: p. 157

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

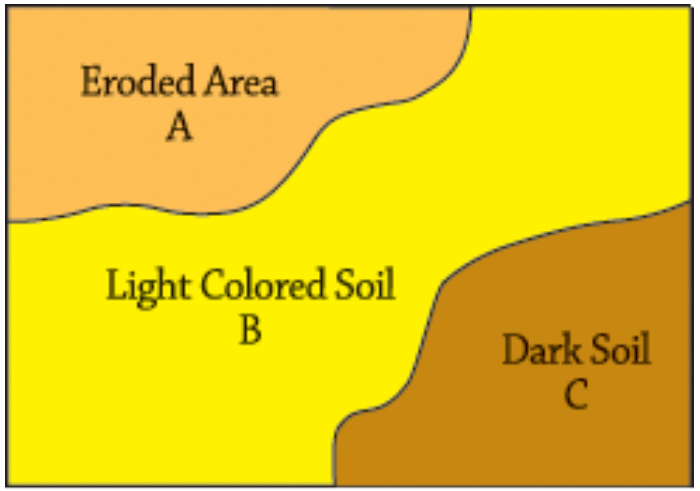
- **One sample should represent just *one* management unit**
- **Separate fields into *uniform* areas no larger that 10 acres**

Landscape Position



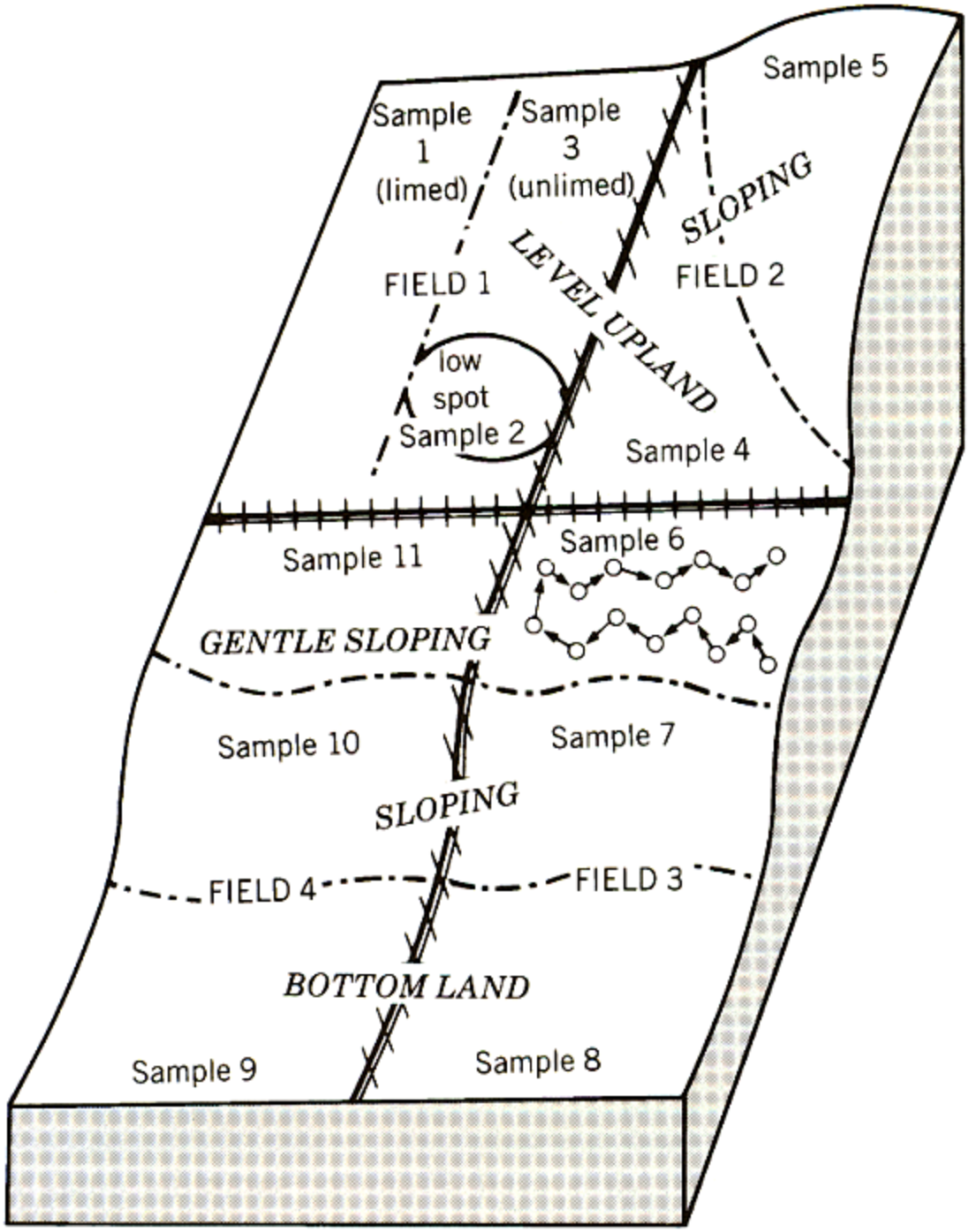


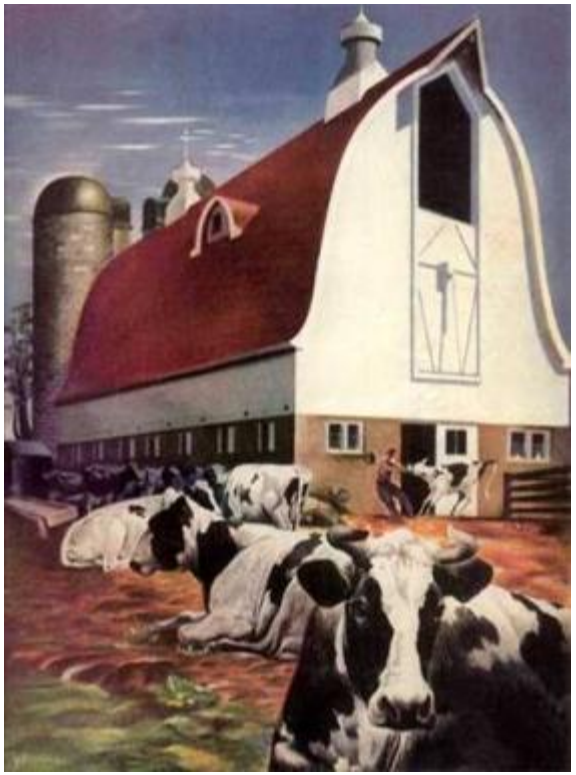
Soil Color



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 old fence rows, ditches, dead furrows and other spots that are *not* representative of the *whole* field.**





MANMH: p. 153

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Soil Testing: Sampling Tools

- **A sampling tube or auger (trowel or spade can be used)**

- **A clean *plastic* container**
- **Laboratory's soil sample containers**

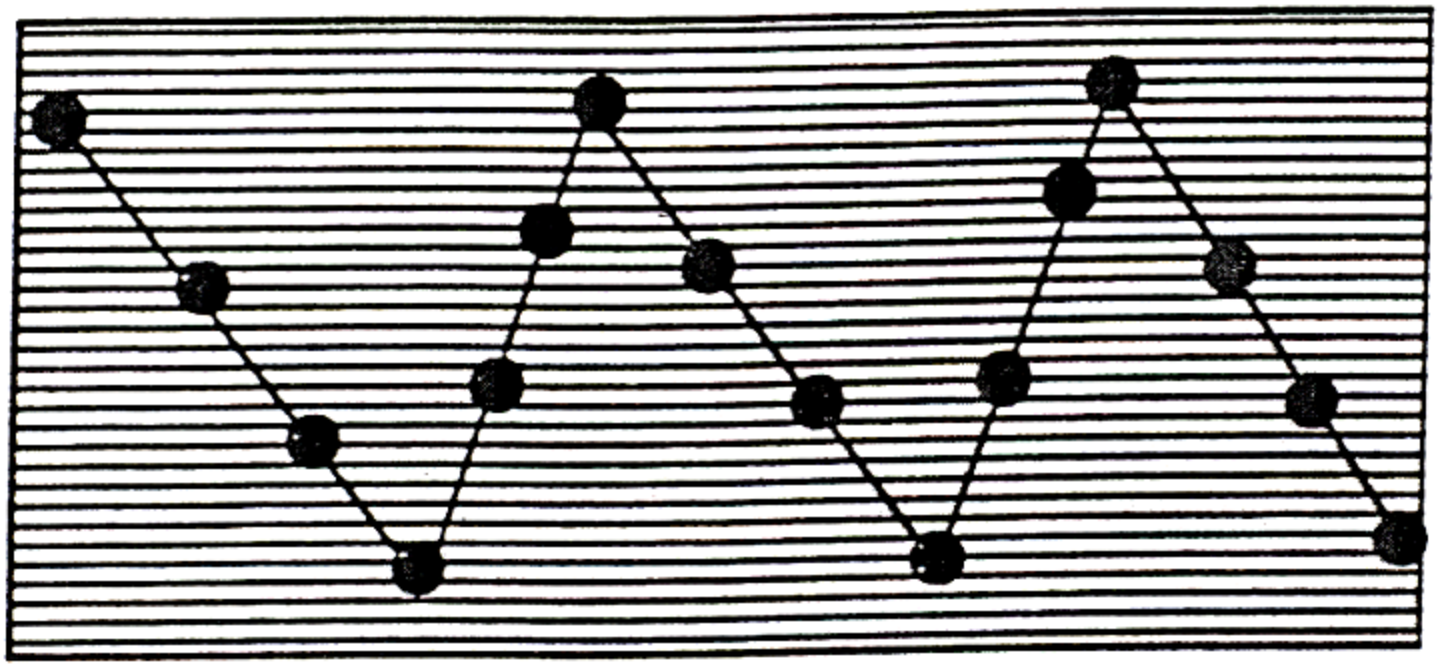
Sampling with a spade or garden trowel

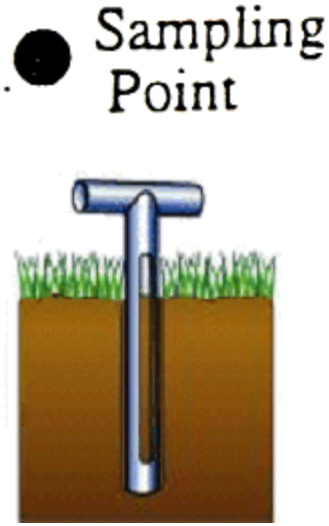
Soil Testing Lab, Virginia Tech

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

- **A minimum of 2 to 5 cores (subsamples) *per acre* should be collected within a uniform area**

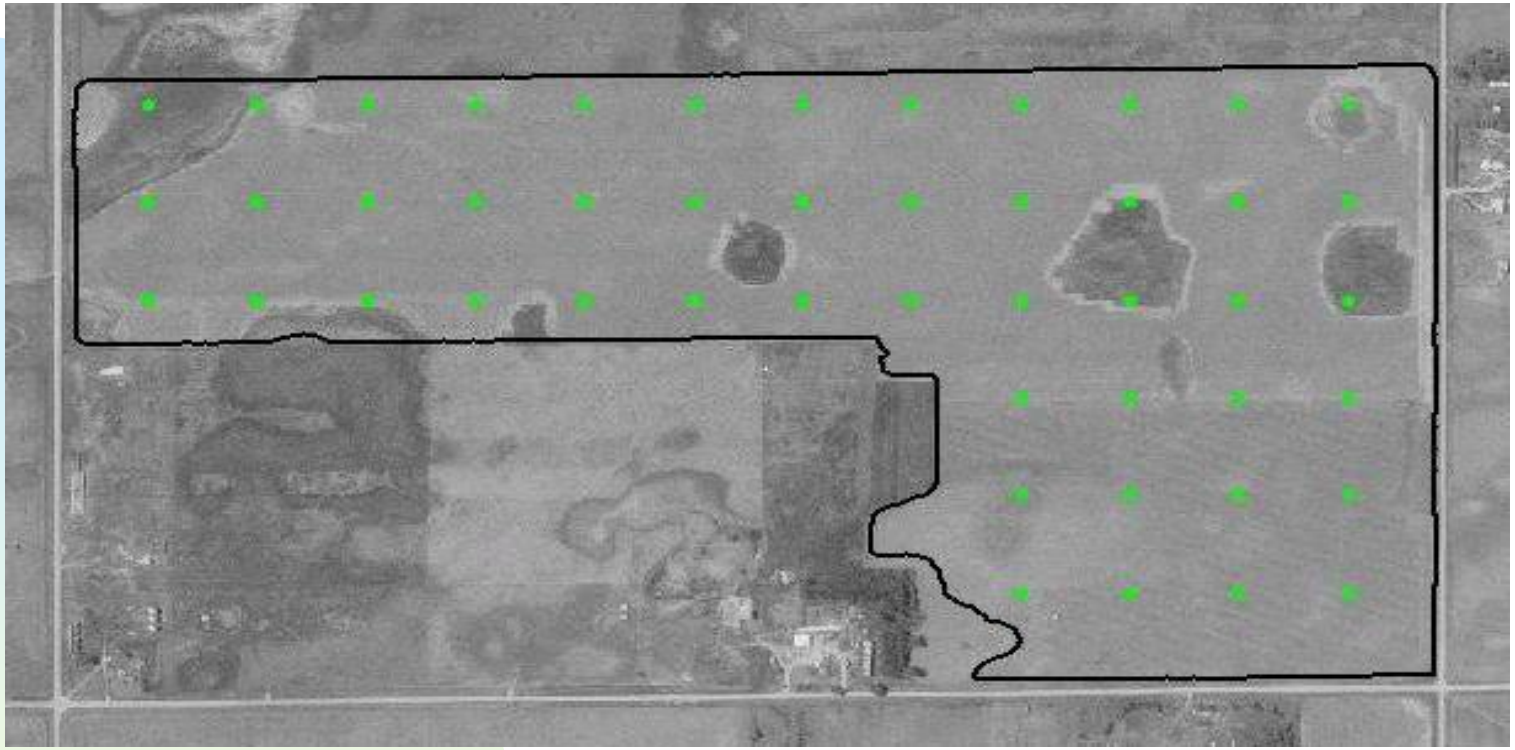
Zig-Zag “Pseudo-Random” Pattern

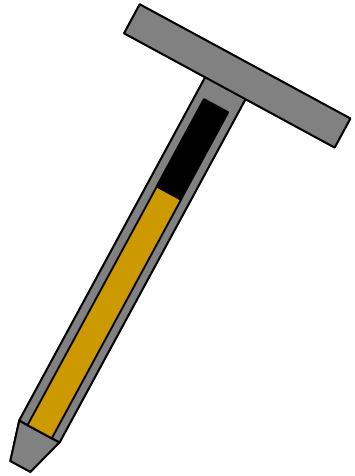




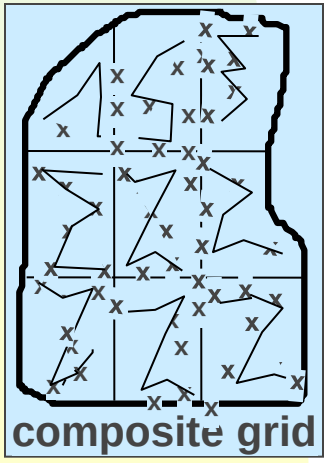
MANMH: p.158

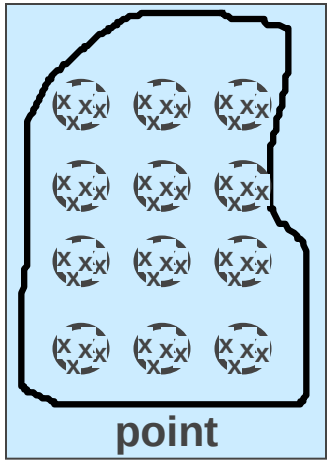
Single-Core Grid Sampling





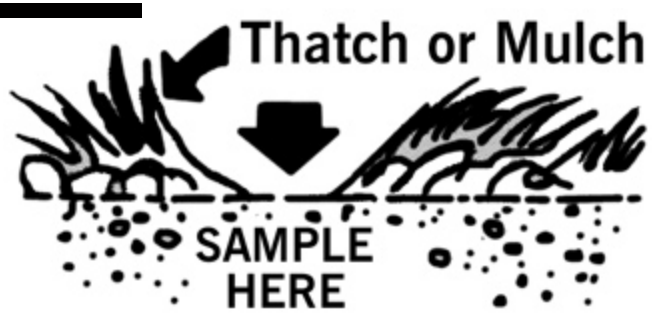
Sampling Point



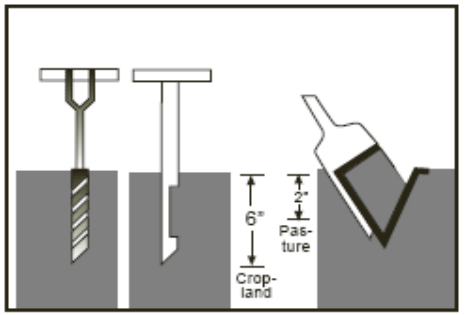


Grid or Systematic Patterns

Sampling Depth



- **Cultivated fields – to the depth of plowing/cultivation**

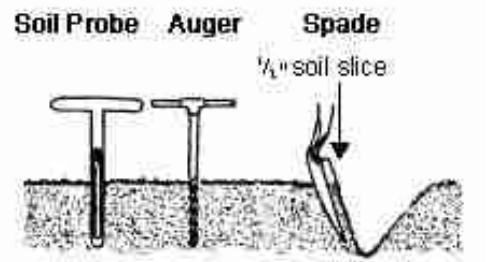


- **Pasture, Semi-permanent Hay, and No-Till Crop Fields – to 2 to 4” depth**

Soil Testing Lab, Virginia Tech

Additional Guidelines: Soil Sampling

- **Sample between rows.**
- **All fields should be tested at least once every three 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.**



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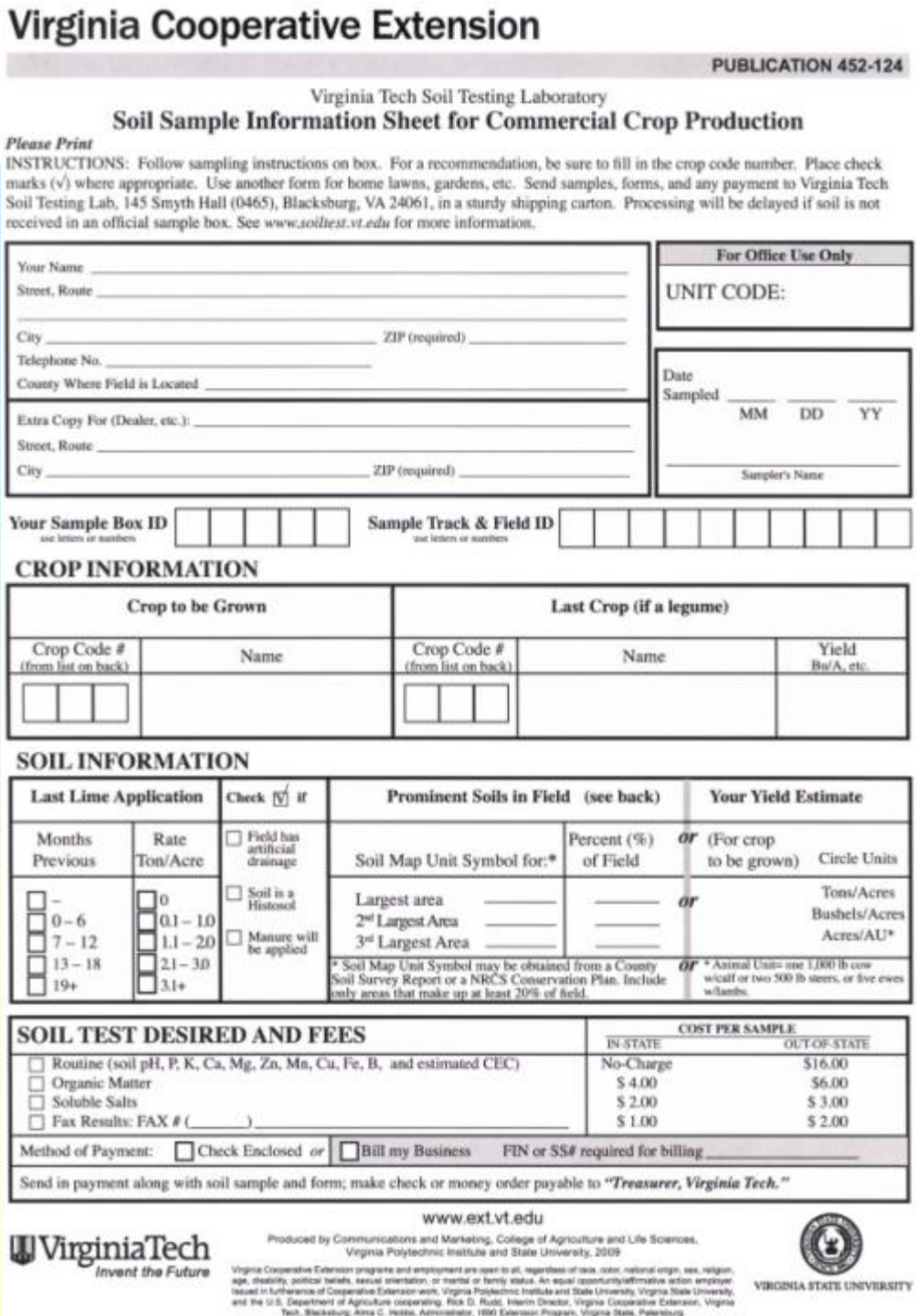
Garbage In ► Garbage Out



Virginia Cooperative Extension

PUBLICATION 452-124

Virginia Tech Soil Testing Laboratory

Soil Sample Information Sheet for Commercial Crop Production

Please Print

INSTRUCTIONS: Follow sampling instructions on box. For a recommendation, be sure to fill in the crop code number. Place check marks (√) where appropriate. Use another form for home lawns, gardens, etc. Send samples, forms, and any payment to Virginia Tech Soil Testing Lab, 145 Smyth Hall (0465), Blacksburg, VA 24061, in a sturdy shipping carton. Processing will be delayed if soil is not received in an official sample box. See *www.soiltest.vt.edu* for more information.

Your Name _____
Street, Route _____
_____
City _____ ZIP (required) _____
Telephone No. _____
County Where Field is Located _____

Extra Copy For (Dealer, etc.): _____
Street, Route _____
City _____ ZIP (required) _____

For Office Use Only
UNIT CODE:

Date Sampled ____ ____ ____ (MM DD YY)
_____ Sampler's Name

Your Sample Box ID (use letters or numbers) ☐☐☐☐☐

Sample Track & Field ID (use letters or numbers) ☐☐☐☐☐☐☐☐☐☐

CROP INFORMATION

Crop to be Grown		Last Crop (if a legume)		
Crop Code # (from list on back)	Name	Crop Code # (from list on back)	Name	Yield Bu/A, etc.
☐☐☐		☐☐☐		

SOIL INFORMATION

Last Lime Application		Check ☑ if	Prominent Soils in Field (see back)		Your Yield Estimate	
Months Previous	Rate Ton/Acre		Soil Map Unit Symbol for:*	Percent (%) of Field	*or* (For crop to be grown)	Circle Units
☐ –	☐ 0	☐ Field has artificial drainage	Largest area _____	_____	*or* _____	Tons/Acres
☐ 0 – 6	☐ 0.1 – 1.0	☐ Soil is a Histosol	2nd Largest Area _____	_____		Bushels/Acres
☐ 7 – 12	☐ 1.1 – 2.0	☐ Manure will be applied	3rd Largest Area _____	_____		Acres/AU*
☐ 13 – 18	☐ 2.1 – 3.0		* Soil Map Unit Symbol may be obtained from a County Soil Survey Report or a NRCS Conservation Plan. Include only areas that make up at least 20% of field.		*or* * Animal Unit= one 1,000 lb cow w/calf or two 500 lb steers, or five ewes w/lambs.	
☐ 19+	☐ 3.1+					

SOIL TEST DESIRED AND FEES	COST PER SAMPLE IN-STATE	COST PER SAMPLE OUT-OF-STATE
☐ Routine (soil pH, P, K, Ca, Mg, Zn, Mn, Cu, Fe, B, and estimated CEC)	No-Charge	$16.00
☐ Organic Matter	$ 4.00	$6.00
☐ Soluble Salts	$ 2.00	$ 3.00
☐ Fax Results: FAX # (_____) _____	$ 1.00	$ 2.00

Method of Payment: ☐ Check Enclosed *or* ☐ Bill my Business FIN or SS# required for billing _____

Send in payment along with soil sample and form; make check or money order payable to *"Treasurer, Virginia Tech."*

www.ext.vt.edu

VirginiaTech *Invent the Future*

Produced by Communications and Marketing, College of Agriculture and Life Sciences, Virginia Polytechnic Institute and State University, 2009

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VIRGINIA STATE UNIVERSITY

Please fill out the following form.

"Writeable" Forms Available Online at www.soiltest.vt.edu

under "Why and how to test your soil"

Soil Testing Lab, Virginia Tech

Fertilizer Recommendations in Virginia Consider:

- **Crop to be grown**
- **Previous crop**
- **Previous crop's yield**
- **Major soils in the field**
- **Field yield estimate (VALUES)**
- **Soil test level for nutrient analyzed**
- **Recent Lime Applications**

Soil Testing Office

Soil Testing Lab, Virginia Tech

Virginia Cooperative Extension

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Your Name _____

Street, Route _____

_____

City _____ ZIP (required) _____

Telephone No. _____

County Where Field is Located _____

Extra Copy For (Dealer, etc.): _____

Street, Route _____

City _____ ZIP (required) _____

For Office Use Only

UNIT CODE:

Date Sampled _____ _____ _____
MM DD YY

_____
Sampler's Name

Your Sample Box ID
use letters or numbers

Sample Track & Field ID
use letters or numbers

Soil Testing Lab, Virginia Tech

CROP INFORMATION

Crop to be Grown		Last Crop (if a legume)		
Crop Code # (from list on back)	Name	Crop Code # (from list on back)	Name	Yield Bu/A, etc.
☐☐☐		☐☐☐		

SOIL INFORMATION

Last Lime Application		Check ☑ if	Prominent Soils in Field (see back)			Your Yield Estimate	
Months Previous	Rate Ton/Acre		Soil Map Unit Symbol for:*	Percent (%) of Field	*or*	(For crop to be grown)	Circle Units
☐ –	☐ 0	☐ Field has artificial drainage	Largest area _____	_____	*or*		Tons/Acres
☐ 0 – 6	☐ 0.1 – 1.0	☐ Soil is a Histosol	2nd Largest Area _____	_____			Bushels/Acres
☐ 7 – 12	☐ 1.1 – 2.0	☐ Manure will be applied	3rd Largest Area _____	_____			Acres/AU*
☐ 13 – 18	☐ 2.1 – 3.0		* Soil Map Unit Symbol may be obtained from a County Soil Survey Report or a NRCS Conservation Plan. Include only areas that make up at least 20% of field.		*or*	* Animal Unit= one 1,000 lb cow w/calf or two 500 lb steers, or five ewes w/lambs.	
☐ 19+	☐ 3.1+						

SOIL TEST DESIRED AND FEES

	COST PER SAMPLE IN-STATE	COST PER SAMPLE OUT-OF-STATE
☐ Routine (soil pH, P, K, Ca, Mg, Zn, Mn, Cu, Fe, B, and estimated CEC)	No-Charge	$16.00
☐ Organic Matter	$ 4.00	$6.00
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☐ Fax Results: FAX # (_____) _____	$ 1.00	$ 2.00

Method of Payment: ☐ Check Enclosed *or* ☐ Bill my Business FIN or SS# required for billing _____

Send in payment along with soil sample and form; make check or money order payable to ***"Treasurer, Virginia Tech."***

CROP CODES *(Insert crop number and name on front of form)*

Field Crops

Corn:
- Grain, No Till #1
- Grain, Conventional #2
- Silage, No Till #3
- Silage, Conventional #4
- Irrigated #20

Sorghum:
- Grain #5
- Silage #22

Canola #21
Wheat #6
Barley #7
Barley Silage-Corn Silage Rotation #23
Oats #8
Rye, Grain or Silage only #9
Double-Crop Rotations:
- Small Grain – Grain Sorghum #12
- Small Grain – Soybean #11

Soybeans #10
Peanuts #13
Corn-Peanut Rotation #19
Cotton #14
Tobacco:
- Flue-Cured #15
- Dark-Fired #16
- Sun-Cured #17
- Burley #18

Forage Crops – Maintenance

Hay:
- Alfalfa or Alfalfa with Grass #37
- Tall Grass with Clover #38
- Tall Fescue/Orchardgrass #44
- Bermudagrass #47

Pasture:
- Fescue/Orchardgrass - Clover #40
- Native or Unimproved #42
- Bermudagrass #46

Stockpiled Tall Fescue #45
Switchgrass #48

Commercial Vegetable Crops

Asparagus – Nonhybrid Strains #50
Asparagus – New Hybrid #51
Bean, Lima #52
Beans, Snap #53
Broccoli, Cauliflower #54
Cabbage #55
Brussels Sprouts, Collards #56
Cucumbers #57
Muskmelons #58
Onions, Bulbs #59
Onion, Scallions #60
Peas #61
Peppers #62
Potatoes, White #63
Potatoes, Sweet #64

Commercial Turf Production

Sod Production:
- Kentucky Bluegrass, Fescue #90
- Bermuda, Zoysia #91

Fruit Crops

Grapes #94
Apples # 95
Peaches #96
Strawberries #97
Blueberries #98
Blackberries, Raspberries #99

Commercial Forest Tree

Hardwood:
- Establishment #105
- Maintenance #106
- Nursery, Black Walnut #107

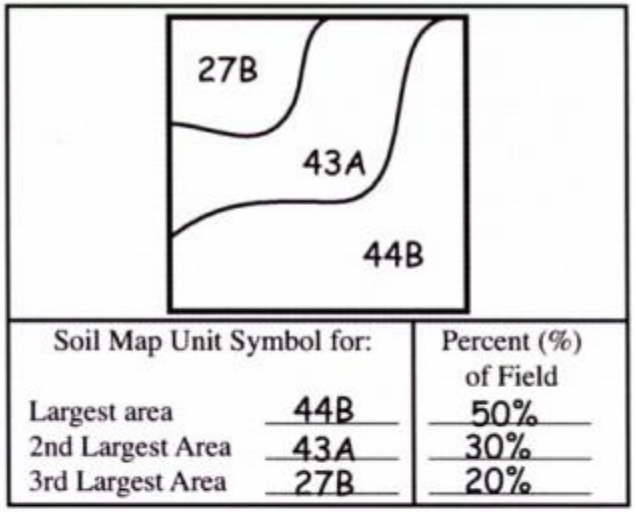
Pine:
- Establishment #109
- Maintenance #110
- Nursery #111

Christmas Trees:
- Frazer Fir, Norway Spruce, Hemlock #113
- White Pine, Virginia Pine, Scotch Pine #114
- Blue Spruce, Red Cedar #115
- Nursery #116

Forage Crops – Establishment

Alfalfa, Alfalfa-Grass #30
Tall Fescue/Orchardgrass without or with Clover (Red/Ladino) #31
Bermudagrass #34
Sorghum-Sudan, Millet, Sudan #35
Small Grains with Winter Annual Legumes for Hay or Grazing #36
Wildlife/Erosion Control Mixture #32

Pumpkins #65
Spinach #66
Squash #67
Sweet Corn – Fresh Market #69
Sweet Corn – Processing #70
Tomatoes – Fresh Market #71
Tomatoes – Process, Multiple Harvests #72
Tomatoes – Process, Single Harvest #73
Watermelons #74



Soil Map Unit Symbol for:		Percent (%) of Field
Largest area	44B	50%
2nd Largest Area	43A	30%
3rd Largest Area	27B	20%

Example: Obtaining soil information

Providing Soils Information

Fertilizer recommendations are based on potential crop yield. Since yields vary from soil to soil, information on your soils will enable the Soil Testing Lab to make a customized recommendation for your field. Soil information may be obtained from a County Soil Survey Report (*http://soils.usda.gov/survey*) or a NRCS Conservation Plan. Locate your field on the appropriate map and indicate on the front of this form 1) the major Soil Map Unit Symbols in the field, 2) the approximate percent (%) of the field each soil occupies, and 3)the county the field is in. See example above. ***Please note:*** Soil Map Unit symbols are requested rather than the soil name because the symbols give information on soil series, soil type, slope phase, and degree of erosion, all of which affect projected crop yield.

When Soil Maps Are Not Available

If your county hasn't been mapped, or if you don't have a soil map for your farm, please provide a yield estimate for your field as follows: average the *three* highest yields achieved over the last *five* crop years the particular crop was grown in the field (i.e., exclude the two lowest crop yields before calculating the average).

Virginia Tech Soil Testing Laboratory

Soil Sample Information Sheet for Home Lawns, Gardens, Fruits, and Ornamentals

Please Print

INSTRUCTIONS: See other side for sampling instructions. For a recommendation, be sure to fill in the **plant code number.** Place check marks (√) where appropriate. Use another form for commercial crop production. Send samples, forms, and payment to Virginia Tech Soil Testing Lab, 145 Smyth Hall (0465), Blacksburg, VA 24061, in a sturdy shipping carton. Processing will be delayed if soil is not received in an official sample box. See *www.soiltest.vt.edu* for more information.

Your Name _____

Street, Route _____

_____

City _____ ZIP (required) _____

Telephone No. _____ County _____

Extra Copy For (Dealer, etc.): _____

Street, Route _____

City _____ ZIP (required) _____

Date sampled: _____

Office Use only

Extension Unit Code:

SAMPLE IDENTIFICATION

Your Sample Box Number or Name (Up to 5 digits)

☐☐☐☐☐

PLANT TO BE GROWN

Insert Plant Code # from list at right

☐☐☐

SOIL INFORMATION

Last Lime Application	
Months Previous	Pounds per 1,000 sq ft.
☐ –	☐ 0
☐ 0 – 6	☐ 10 – 50
☐ 7 – 12	☐ 51 – 100
☐ 13 – 18	☐ 101 – 150
☐ 19+	☐ 151+

PLANT CODE LIST

Lawn: Kentucky Bluegrass, Fescue, or Ryegrass

201 Establishing New Lawn
202 Maintaining Lawn, Repair of Bare Spots

Lawn: Bermudagrass, Zoysiagrass, or St. Agustine

203 Establishing New Lawn
204 Maintaining Lawn, Repair of Bare Spots

Garden

210 Vegetable Garden
211 Flower Garden
212 Roses

Acid-Loving Shrubs

240 Azaleas
241 Andromedas
242 Camellias
243 Laurel
244 Rhododendron

Non-Acid-Loving Shrubs and Trees

245 Shrubs - Lilac, Forsythia, Boxwood, etc.
246 Trees - Pine, Maple, Oak, etc.

Fruits

220 Apples
221 Blackberries
222 Blueberries
223 Currants
224 Gooseberries
225 Grapes
226 Nectarines
227 Peaches
228 Pears
229 Plums
230 Quince
231 Raspberries
232 Sour Cherry
233 Strawberries
234 Sweet Cherries

House Plants

250 Potted House Plants

SOIL TESTS DESIRED AND FEES	COST PER SAMPLE IN-STATE	COST PER SAMPLE OUT-OF-STATE
☐ Routine (soil pH, P, K, Ca, Mg, Zn, Mn, Cu, Fe, B, and estimated CEC)	$ 10.00	$16.00

Virginia Tech

Drying Samples

- If a soil sample is wet, then
  - Allow it to air-dry

  - Do **not** oven-dry

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 – Analysis Prep

Soil Testing – Nutrient Extraction

Soil Testing: Analysis of Samples

- **Chemical extractants are used to extract a plant nutrient in quantities related to plant requirements**
- **Selection depends on the reactions that control nutrient supply and availability in the soil**

Soil Testing Lab, Virginia Tech

Soil Testing: Analysis of Samples

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

MANMH: p. 161-162

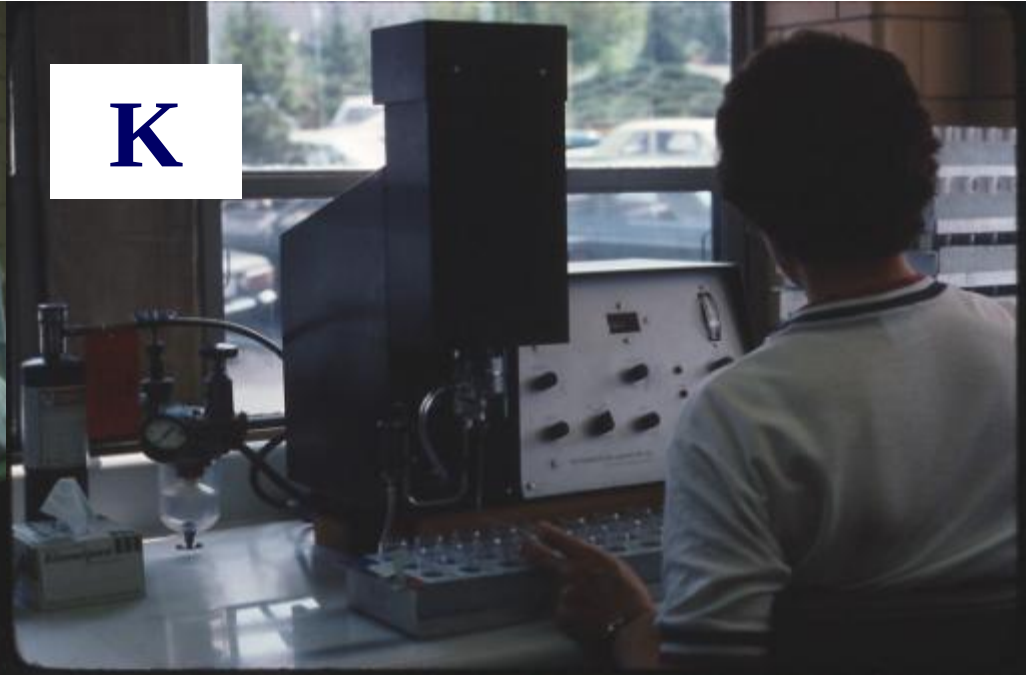
Selected Common Soil Test Extractants

Extractant	Composition	Nutrient	Source
Mehlich I	0.05 M HCl + 0.0125 M H_2SO_4	P	Fe/Al & Ca bound
Mehlich III	0.015 M NH_4F + 0.2 M CH_3COOH + 0.25 M NH_4NO_3 + 0.001 M EDTA+ 0.013 M HNO_3	P	Fe/Al & Ca bound
Bray P_1 *or* Weak Bray	0.03 M NH_4F + 0.025 M HCl	P	Fe/Al bound
Bray P_2	0.03 M NH_4F + 0.1 M HCl	P	
Olson	0.5 M $NaHCO_3$	P	Ca bound
Ammonium Acetate	NH_4OAc	K	Exchangeable

First Soil Fertility Test

50 B.C.

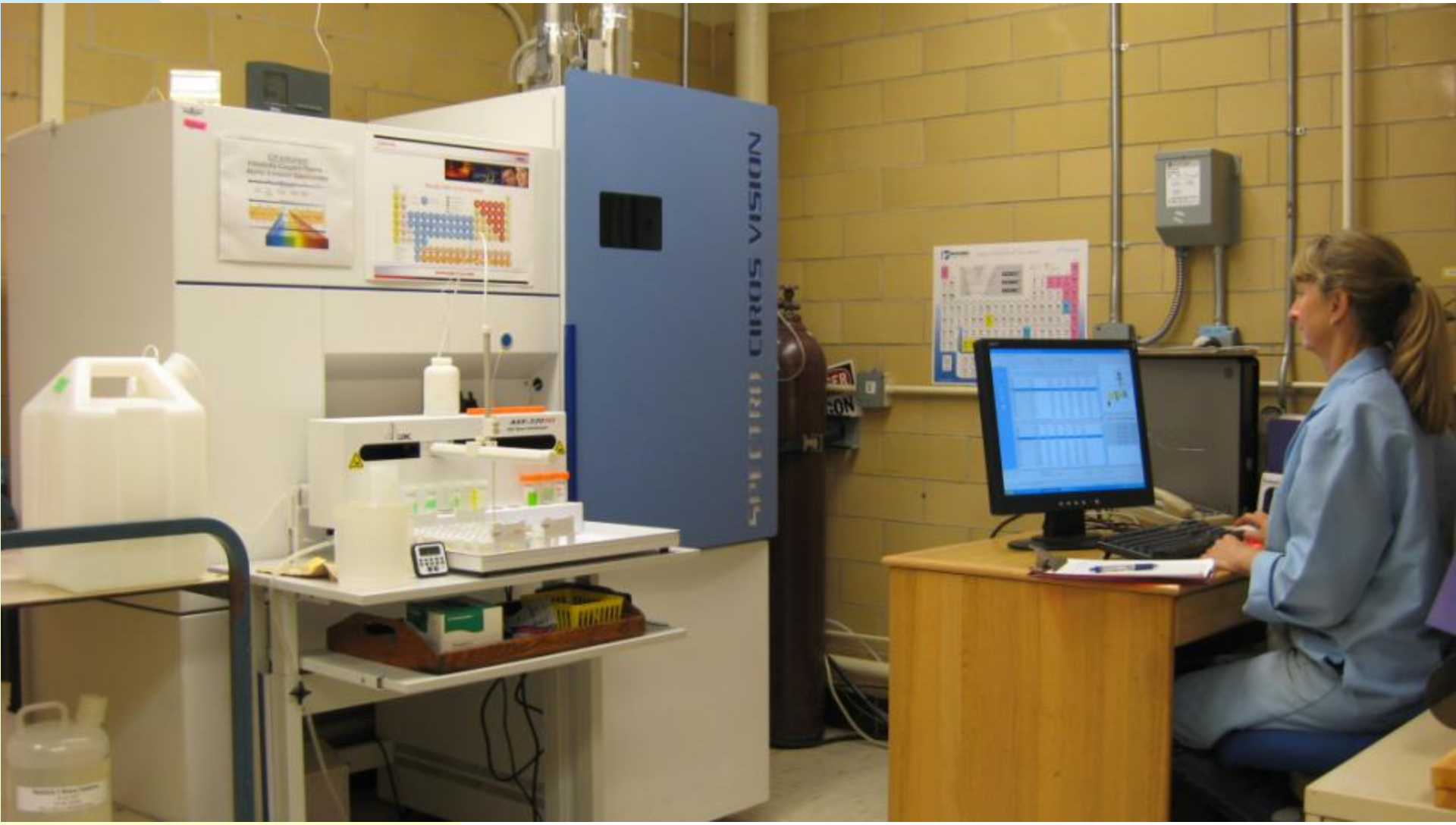
Columella recommended the **Taste Test** to measure acidity and salinity of soils.



↑ Atomic Absorption Spectrometer ↓Colorimeter ↑ Flame Photometer

1960's & 70's technology allowed for this kind of quantitative analysis

Soil Testing – Nutrient Analysis



Soil Testing Lab, Virginia Tech

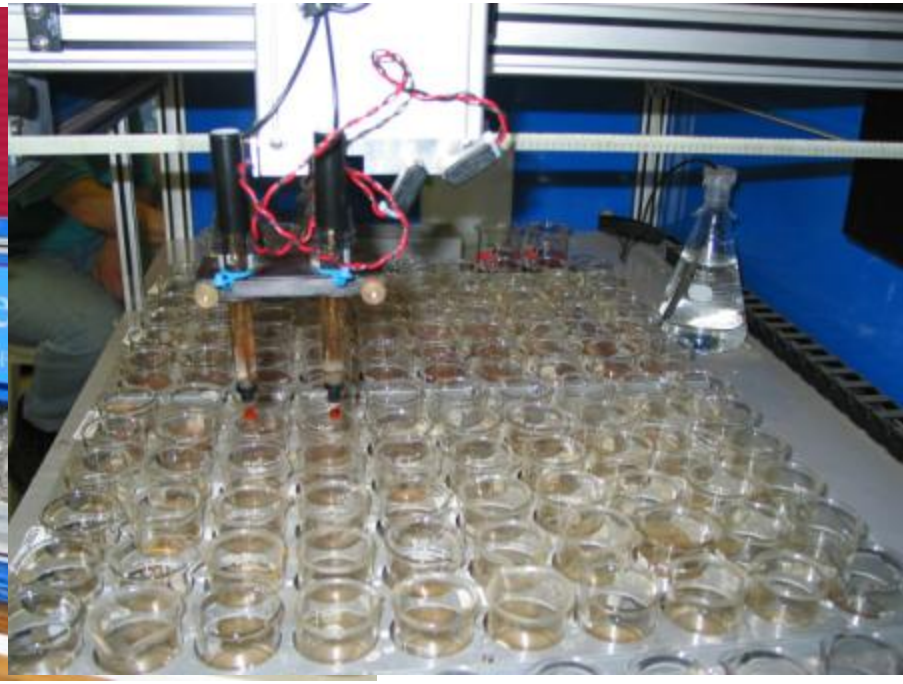
Nutrient Analysis by ICP-AES

Soil Testing Lab, Virginia Tech

pH Analysis in the 1970's

Soil Testing Lab, Virginia Tech

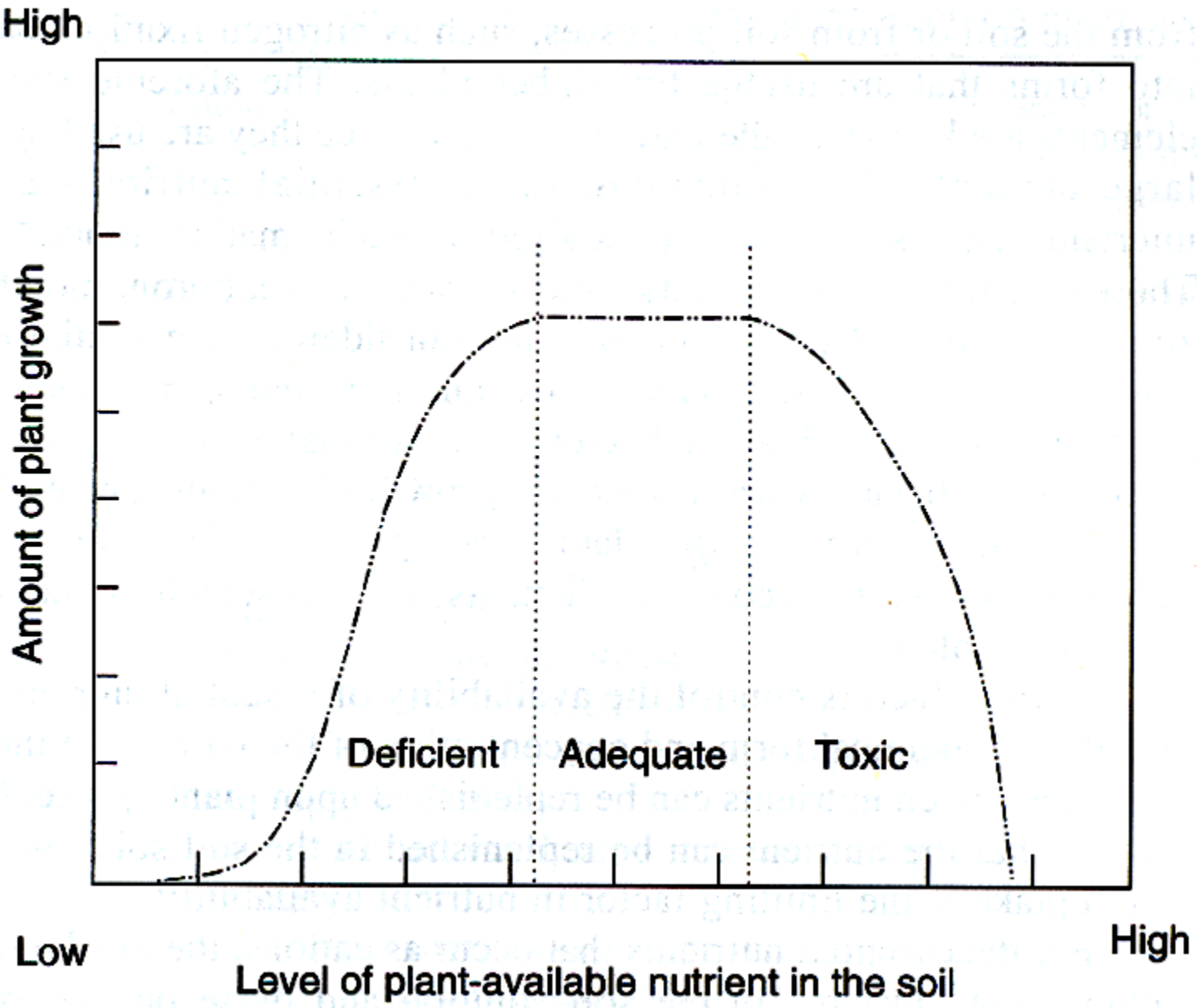
Soil Testing – pH Measurement



Soil Testing Lab, Virginia Tech

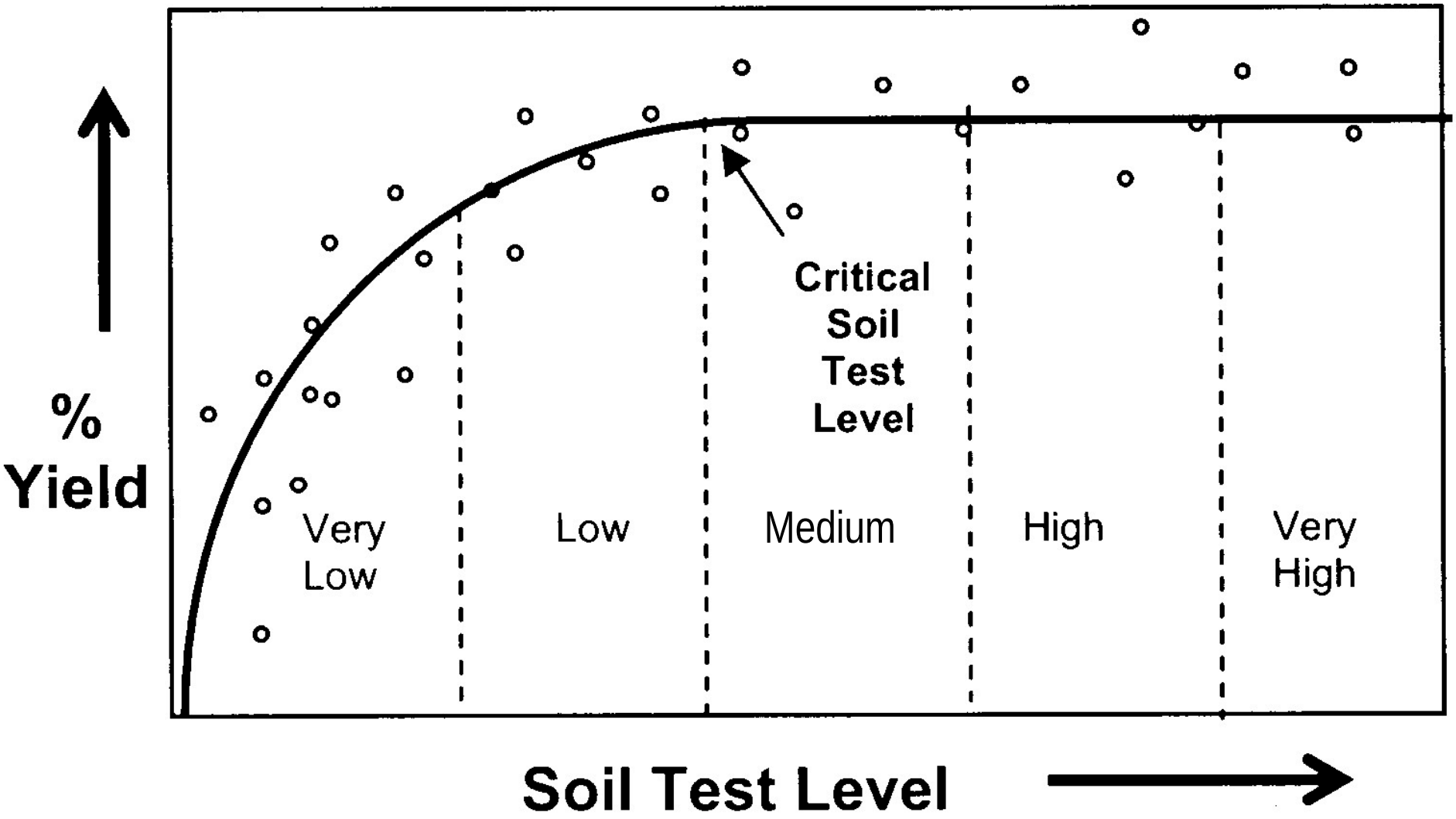
Components of Soil Testing

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



Soil Testing Lab, Virginia Tech

Calibration Curve



MANMH: p. 164-165

Soil Testing Lab, Virginia Tech

VA Tech fertilizer Recommendations for corn for grain production

Soil Test Rating	Fertilizer Recommendations, lb/A		
	N	P_2O_5	K_2O
L	1 lb of N/bu of expected yield	80 - 120	80 - 120
M		40 - 80	40 - 80
H		20 - 40	20 - 40
VH		0	0

Soil Testing Lab, Virginia Tech

P & K Recommendations: VT STL

- **Phosphorus:**
  - **L+, L, L- (<12 lb/a) – Critical Level**
- **Potassium:**
  - **L, L- (<56 lb/a) – critical value**
  - **Loamy sands and deep sandy loams, K will tend to leach and accumulate in the subsoil. Plant roots can reach this K and in some situations L or L- K in the plow layer may not reflect a K problem**

Ca & Mg Recommendations: VT STL

- **Calcium:**
  - **L^- - deficient for peanuts**
  - **L^- - may not be deficient for other crops, but pH is normally too low for optimum growth**
- **Magnesium:**
  - **L^- - critical level for coastal plain soils**
  - **L^-, L – critical level for Piedmont & Appalachian soils**
  - **Apply dolomitic limestone if pH is low**
  - **If pH is optimum, apply 30 lbs Mg/A**

Micronutrient Recommendations: VT STL

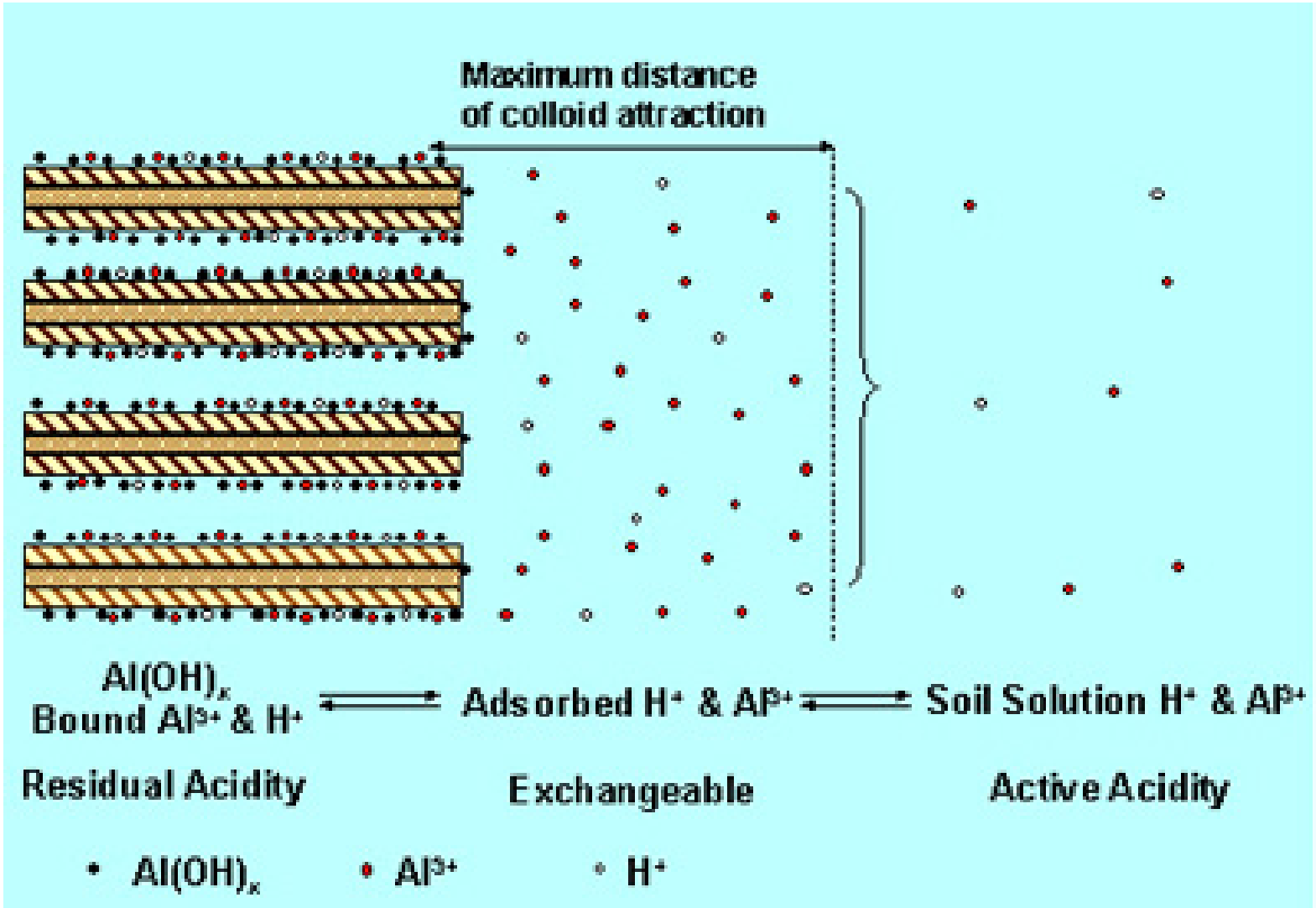
- **Manganese:**
  - **ppm Mehlich-1 extractable Mn**
  - **Soil pH**
- **Zinc:**
  - **ppm Mehlich-1 extractable Zn**
  - **Soil pH**
  - **Ext. Mehlich I P (lb/A)**

What's Needed to Make a Lime Recommendation

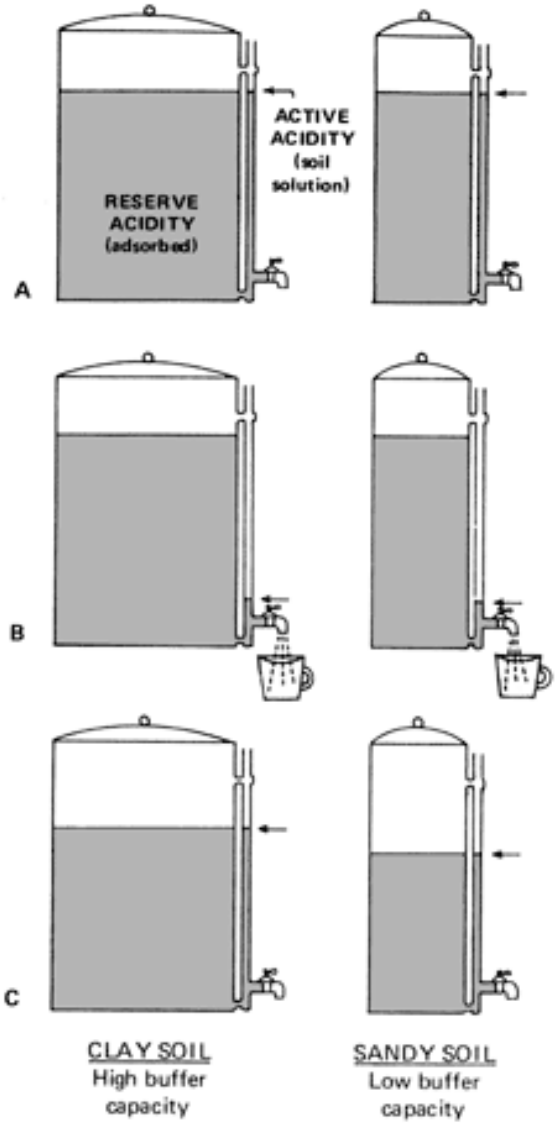
- **Crop Code sets Target pH - where you want to be.**
- **Soil (water) pH tells where you are.**
- **Amount of Exchangeable/Residual Acidity (Buffering Capacity of Soil) tells how much lime is needed to get from WpH to TpH**

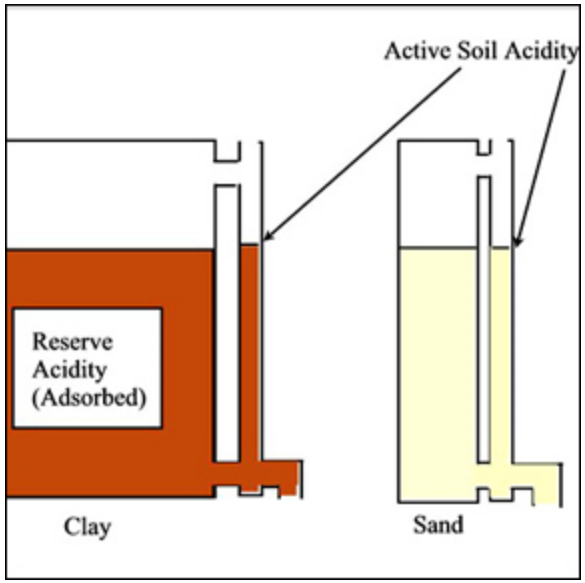
More Clay = ↑ CEC = ↑ Exch. Acidity

MANMH: p. 49


Maximum distance
of colloid attraction
Al(OH)x
Bound Al3+ & H+
Adsorbed H+ & Al3+
Soil Solution H+ & Al3+
Residual Acidity
Exchangeable
Active Acidity
Al(OH)x
Al3+
H+

MANMH: p. 69-70


ACTIVE ACIDITY (soil solution)
RESERVE ACIDITY (adsorbed)
A
B
C
CLAY SOIL
High buffer capacity
SANDY SOIL
Low buffer capacity


Active Soil Acidity
Reserve Acidity (Adsorbed)
Clay
Sand

VNMS&C: p. 44

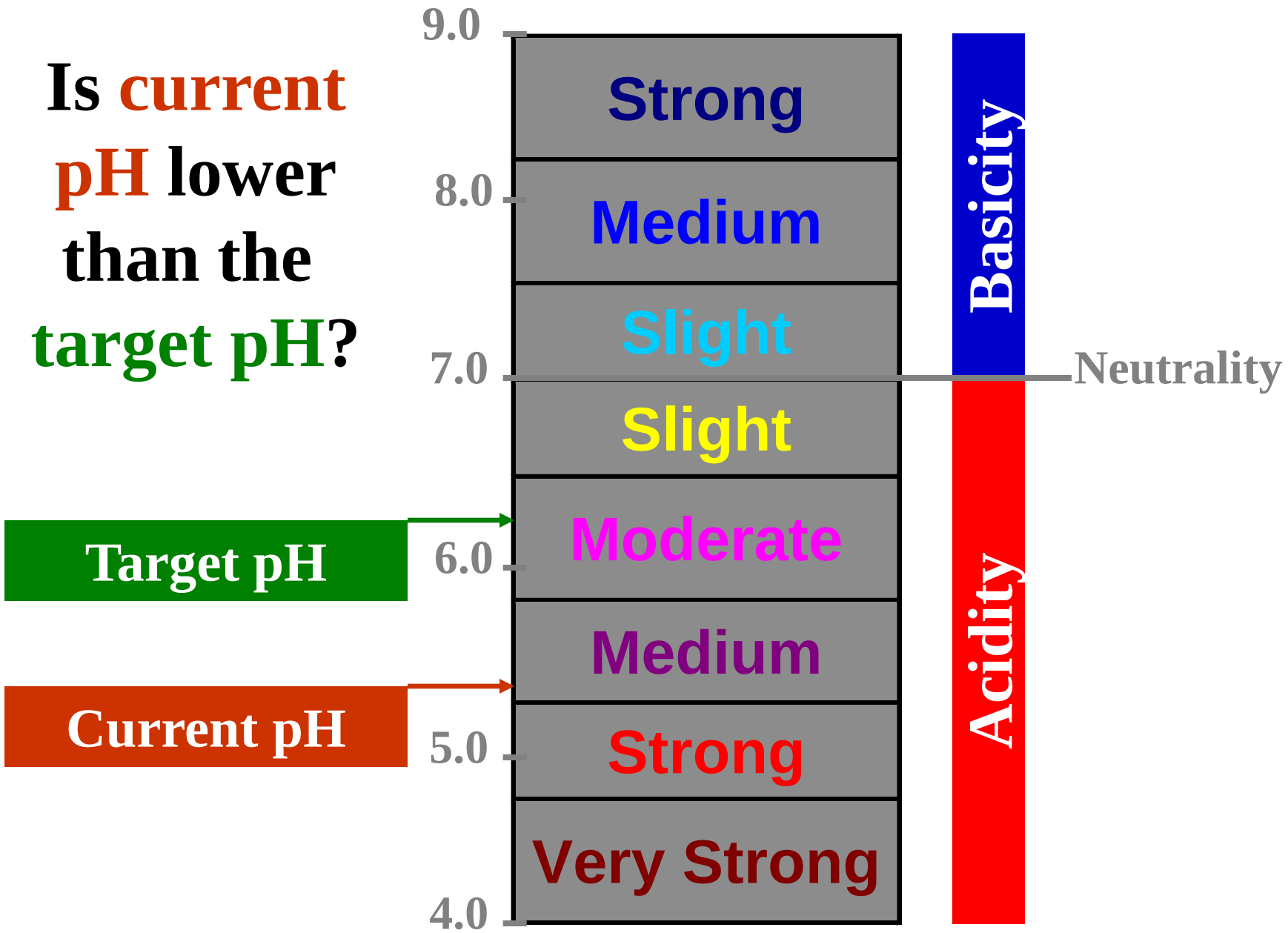
Lime Recommendations

BpH of Unlimed Soil	Target pH 5.2	6.2	6.8
	------ lime, T/A -----		
6.60	0.00	0.00	0.00
6.30	0.00	0.75	1.25
6.00	1.00	2.75	3.50
5.70	3.00	4.50	5.50
5.40	4.75	6.50	7.75

VT Lime Recommendations are Based on the Following Factors:

- 1. Crop to be Grown (sets target pH)
- 2. Soil [water] pH (plays a small role)
- 3. Soil Buffer pH (measures total acidity / buffering capacity of soil)
- 4. Credit For Previous Lime Application

Is current pH lower than the target pH?



MANMH: p. 47

Mehlich Buffer Solution

- **Developed in North Carolina** (Mehlich, 1976)
- **Buffers** – Sodium Glycerophosphate / Glacial Acetic Acid / Triethanolamine
- **Salts** –
  Barium or Calcium Chloride
  and Ammonium Chloride

Soil Testing Lab, Virginia Tech

Important to Know the Method!

- Different buffer solutions (Initial pH):
  - Mehlich (6.6 pH)
  - Woodruff (7.0 pH)
  - SMP (7.5 pH)
  - Sikora (7.7 pH)
  - Adams-Evans (8.0 pH)

Note that a lot of other buffer readings will be higher than Mehlich BpH's starting pH. So if a BpH is > 6.6, then it is probably not a Mehlich buffer value.

WATERS AGRICULTURAL LABORATORIES, INC.

Soil Analysis Report

Ship To:
WATERS AGRICULTURAL LABORATORIES
257 NEWTON HWY/P.O. BOX 382
CAMILLA, GA 31730

Mehlich1 ≈ VT

P.O. Box 382
Newton Highway
Camilla, Georgia 31
(912) 336-7216
(912) 336-7967 FA

Grower:

Date Received: 03/14/00

Date Processed: 03/16/00

FIELD ID:

Lab Number	Your Sample Identification	Phosphorus lbs./A	Potassium lbs./A	Magnesium lbs./A	Calcium lbs./A	pH Soil	pH Buffer	Sulfur lbs./A	Boron lbs./A	Zinc lbs./A	Manganese lbs./A	Iron lbs./A	Copper lbs./A	Organic Matter %	CEC	% Base Saturation (Computed) K	Mg	Ca
721101CC	4	201 V	346 V	449 V	3,567 V	6.6	7.70			10.1 V	72 V			13.6		3.3	13.7	65.4
721103CC	11	153 V	265 H	255 V	3,422 V	6.5	7.65			9.6 H	43 H			12.8		2.7	8.3	67.1
722455CC	JDC	48 M	84 M	64 L	711 A	6.5	7.85			2.8 L	9 L			3.4		3.2	8.0	53.0
722457CC	OV1	131 H	137 M	58 L	663 M	5.7	7.75			2.5 L	9 L			4.1		4.3	5.9	40.7
722462CC	OV3	214 V	141 M	76 L	834 A	6.4	7.80			1.9 L	10 L			4.2		4.3	7.6	49.9
722469CC	G7	37 L	131 M	92 M	494 M	5.5	7.65			6.6 A	20 M			4.6		3.7	8.4	26.9
722470CC	G10	50 M	137 M	225 V	1,473 V	6.1	7.70			21.1 V	19 L			7.2		2.4	13.0	51.2
722472CC	100	157 V	108 M	34 L	309 L	5.5	7.80			1.7 L	7 L			2.7		5.2	5.3	29.1
722482CC	53	15 L	227 A	83 M	417 M	5.8	7.70			3.7 M	12 L			4.1		7.1	8.5	25.6
722483CC	84	97 A	166 A	46 L	215 L	4.9	7.75			2 L	10 L			2.9		7.2	6.5	18.3

Soil Fertility Recommendations (lbs./Acre)

* = Maintenance Recommendation

Lab Number	Your Sample Identification	Recommendations Crop	Recommendations Yield	Lime Tons/Acre	Gypsum Tons/Acre	Nitrogen	Phosphorus	Potassium	Magnesium	Sulfur	Boron	Zinc	Manganese	Iron	Copp
721101CC	4	NO CROP					*	*							
721103CC	11	NO CROP					*	*							
722455CC	JDC	NO CROP					*	*							
722457CC	OV1	NO CROP		1.0			*	*							
722462CC	OV3	NO CROP		0.0			*	*							
722469CC	G7	NO CROP		1.0			*	*							
722470CC	G10	NO CROP		0.5			*	*							
722472CC	100	NO CROP		1.0			*	*							
722482CC	53	NO CROP		1.0			*	*							
722483CC	84	NO CROP		1.5			*	*							

Lime Prediction Equations – Mehlich Buffer

VA Tech Soil Testing Lab. Tons/acre

Target pH	Prediction Equation
5.2	Lime Rate = (59 – 9.54 BpH) * 0.5
5.8	Lime Rate = (63 – 9.98 BpH) * 0.5
6.2	Lime Rate = (66 – 10.30 BpH) * 0.5
6.5	Lime Rate = (72 – 11.18 BpH) * 0.5
6.8	Lime Rate = (75 – 11.52 BpH) * 0.5

Virginia Cooperative Extension

Soil Test Report

Augusta County Office
County Government Center
POB 590
Verona, VA 24482-0590
540-245-5750

Virginia Tech Soil Testing Laboratory
145 Smyth Hall (0465)
Blacksburg, VA 24061
www.soiltest.vt.edu

SEE ENCLOSED NOTES:
1 3

OWNER
PHARMER JOE
123 RURAL RD

PENDROSS, VA 23648

COPY FOR
MY FERTILIZER DEALER
P O BOX 111
ROCKFORD, VA 23648

SAMPLE HISTORY

Sample ID	Field ID	LAST CROP		LAST LIME APPLICATION		SOIL INFORMATION				
		Name	Yield	Months Prev.	Tons/Acre	SMU-1 %	SMU-2 %	SMU-3 %	Yield Estimate	Productivity Group
OCF11	4463	Orchardgrass/Fescue-Clover Pasture (40)		18+		40B2 100				III

LAB TEST RESULTS (see Note 1)

Analysis	P (lb/A)	K (lb/A)	Ca (lb/A)	Mg (lb/A)	Zn (ppm)	Mn (ppm)	Cu (ppm)	Fe (ppm)	B (ppm)	S.Salts (ppm)
Result	9	95	1408	209	1.2	10.3	0.3	4.4	0.5	
Rating	L+	M-	M+	H+	SUFF	SUFF	SUFF	SUFF	SUFF	

Analysis	Soil pH	Buffer Index	Est.-CEC (meq/100g)	Acidity (%)	Base Sat. (%)	Ca Sat. (%)	Mg Sat. (%)	K Sat. (%)	Organic Matter (%)
Result	5.7	6.21	5.6	20.1	79.9	62.5	15.3	2.2	3.6

FERTILIZER AND LIMESTONE RECOMMENDATIONS

Crop: Orchardgrass/Fescue-Clover Pasture (40)

Lime, TONS/AC		Fertilizer, lb/A		
Amount	Type	N	P205	K20
1	AG	50	40	50

825. If stand contains less than 25 per cent clover, apply 40-60 lbs N/A.

131. If additional production is needed later on, apply 40 to 60 lbs/A of N during the grazing season. If you are planning to overseed a legume into the stand, omit the N recommendation.

122. P2O5 and K2O recommendations are for annual application. However, rates can be doubled and applied every other year if desired.

Other Reported Values

SAMPLE HISTORY

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Amount	Type
1	AG

Fertilizer, lb/A		
N	P205	K20
50	40	50

Soil Testing Lab, Virginia Tech

Note 1: Explanation of Soil Tests

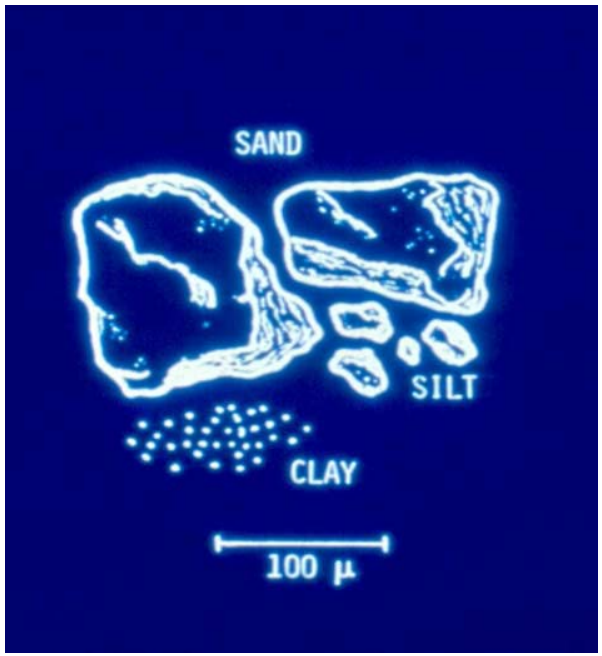
- **Methods and Meanings – Calculated and Reported Value**

- Estimated Cation Exchange Capacity (**Est-CEC**) gives an indication of a soil's ability to hold some nutrients against leaching. This reported CEC is an estimation because it is calculated by summing the Mehlich 1 extractable cations (Ca + Mg + K), and the acidity estimated from the Buffer pH and converting to units commonly used for CEC. This value can be erroneously high when soil pH or soluble salts level is high.

MANMH: p.47

Soil Components

- Sand
  - No Electrical Charge (Neutral)
- Silt
  - No Electrical Charge (Neutral)
- Clay
  - ***Negative*** Electrical Charge



Est.-CEC suggests ballpark clay content of soil.

MANMH: p.49

Note 1: Explanation of Soil Tests

- **Methods and Meanings – Other Calculated and Reported Values**

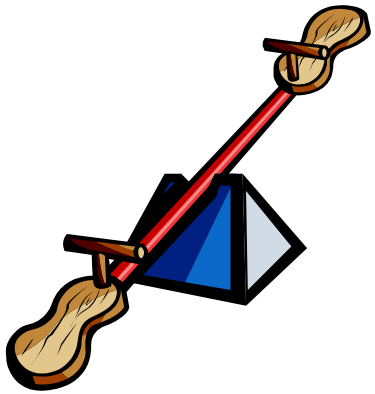
- The percent **Ca, Mg, or K Sat**uration refers to the relative number of CEC sites that are occupied by that nutrient and is a way of evaluating for any gross nutrient imbalance.

MANMH: p.49

“Balancing the Soil”

As in the Basic Cation Saturation concept , is the approach a soil should contain a certain percentage of each of the basic cations, to be “balanced”.

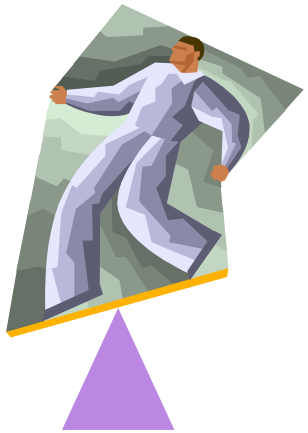
(e.g., 65-75% Ca, 10-12% Mg, 2-5% K)



~~"Balancing the Soil"~~

- **VT subscribes to the "sufficiency level" concept and not the "basic cation saturation" idea.**

- **The "Balancing" approach has not stood up well under scrutiny.**



MANMH: p.65

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122. P2O5 and K2O recommendations are for annual application. However, rates can be doubled and applied every other year if desired.

Common Conversions

$P \times 2.3 = P_2O_5$ $\quad P_2O_5 \quad 2.3 = P$

$K \times 1.2 = K_2O$ $\quad K_2O \quad 1.2 = K$

$NO_3^- \quad 4.4 = NO_3^-\text{- N}$ $\quad NO_3^-\text{- N} \times 4.4 = NO_3^-$

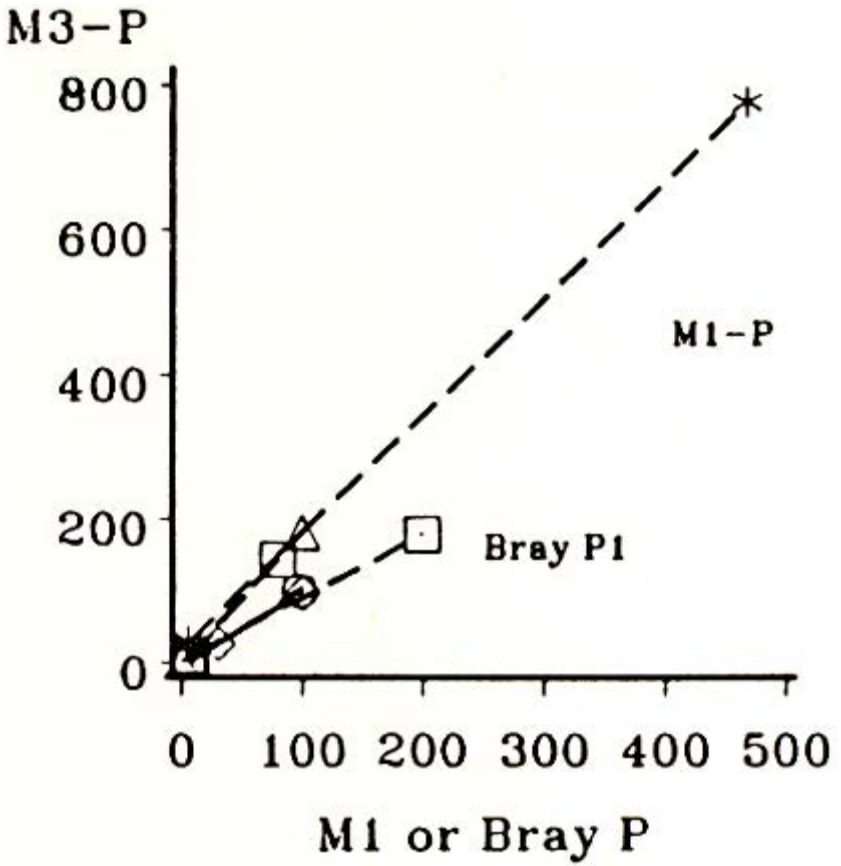
ppm x 2 = lb/A $\quad$ lb/A $\quad$ 2 = ppm

Labs report values in different forms and units!

MANMH: p. 163

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.**



J. T. Sims (1989)

VNMSC: p. 40

Converting P to VA Tech Values from

- **A&L Eastern Labs**, Richmond, VA - *al-labs-eastern.com*
- **Agri Analysis**, Leola, PA – *www.agrianalysis.com*
- **AgroLab**, Milford, DE – *www.agrolab.us*
- **Brookside Labs**, New Knoxville, OH - *www.blinc.com*
- **Logan Lab**, Lakeview, OH - *www.loganlabs.com*
- **Spectrum Analytic,** W.C.H., OH - *www.spectrumanalytic.com*

- **If phosphorus ≤ 205 ppm M-III P:**

  Mehlich-3 P ppm X 0.458 - 3.26 = Mehlich-1 P ppm

  (M-1 P ppm x 2 = M-1 P lb/A)

- **If phosphorus ≥ 206 ppm M-III P:**

  Mehlich-3 P ppm X 0.945 - 103.5 = Mehlich-1 P ppm

(M-3 P_2O_5 lb/A x 0.44 = M-3 P lb/A) **(M-3 P lb/A x 0.50 = M-3 P ppm)**

Va Nut Mgt Stds & Criteria p. 41 & 42

Converting K to VA Tech Values

- **A&L Ag. Lab.**
  - **<u>Potassium</u>:**
    A&L's K ppm X 0.71 = Va Tech K ppm
- **Brookside Ag. Lab.**
  - **<u>Potassium</u>:**
    Brookside's K lb/A X 0.36 = Va Tech K ppm
- **Spectrum Analytic Lab.**
  - **<u>Potassium</u>:**
    Spectrum's K lb/A X 0.31 = Va Tech K ppm
    (Spectrum's K ppm X 0.625 = Va Tech K ppm)

VNMSC: p. 42

Soil Analysis Report

Spectrum Analytic Inc.
P.O. Box 639 - 1087 Jamison Road
Washington C.H., OH 43160
www.spectrumanalytic.com

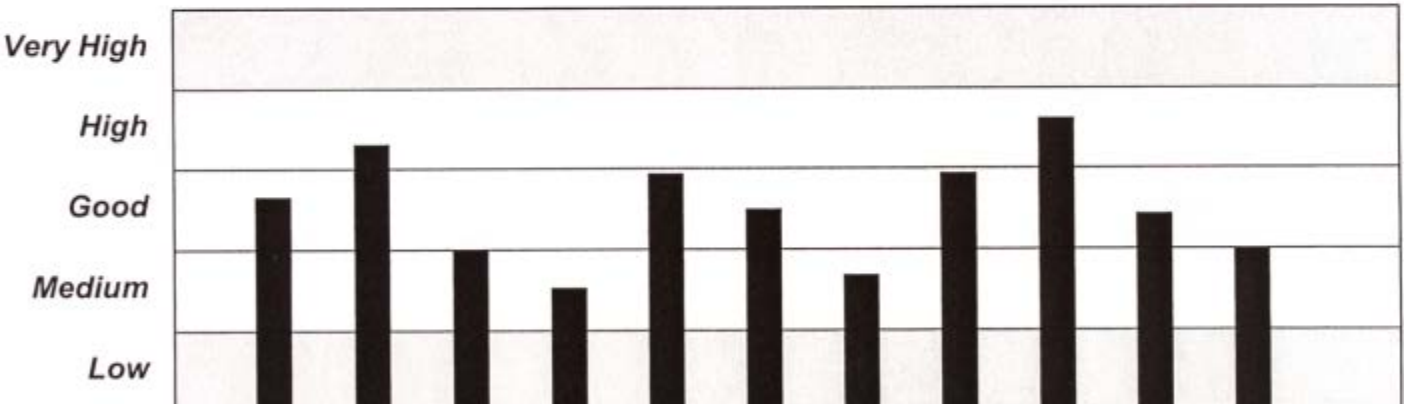
ABC FERTILIZER
RR # 1
HOMETOWN, VA 12345

Prepared For	Sample Information			
Account - 23412	Sample	MC2N	Sampled	03-20-2001
A[redacted] B[redacted]	Lab Number	Y18759	Tested	03-20-2001
	Acres			

Analysis		Result	Optimal
Soil pH		6.6	6.2-6.8
Buffer pH			
Organic Matter	%	1.9	
CEC		10.4	
K Saturation	%	3.1	2.0-4.0
Mg Saturation	%	8.6	10-20
Ca Saturation	%	68.3	50-70
K/Mg Ratio		1.2	
Ca/Mg Ratio		13.3	
Phosphorus	lbs/A	139	70-110
Potassium	lbs/A	250	250-410
Magnesium	lbs/A	215	290-550
Calcium	lbs/A	2850	2100-2900
Phosphorus	ppm	70	30-50
Potassium	ppm	125	120-200
Magnesium	ppm	108	140-270
Calcium	ppm	1425	1000-1500

Analysis		Result	Optimal
Sulfur	ppm	30	20-40
Boron	ppm	1.4	1.7-2.6
Copper	index	1.9	0.4-2.0
Iron	ppm	39	5-20
Manganese	index	33	19-50
Zinc	ppm	9	9-25

Mehlich3



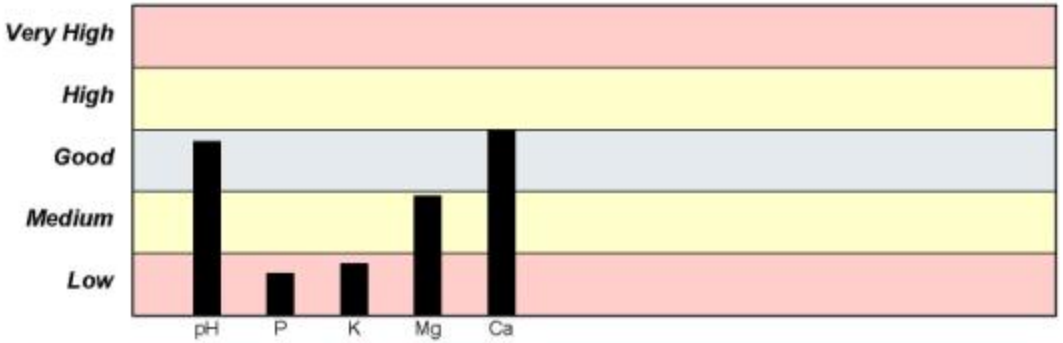
Spectrum Analytic Inc.
P.O. Box 639 - 1087 Jamison Road
Washington C.H., OH 43160
www.spectrumanalytic.com

SPECTRUM ANALYTIC INC
PO BOX 639
WASHINGTON CH, OH 43160

Prepared For
FARM NAME ANY STREET WASHINGTON COURT HOUSE, OH 43160

Sample Information			
Sample	A	Sampled	01-25-2006
Lab Number	Z00001	Tested	01-25-2006
Acres			

Analysis		Result	Optimal	Analysis	Result	Optimal
Soil pH		6.7	6.2-6.8			
Buffer pH		7.0				
Organic Matter	%	1.2				
CEC		10.3				
K Saturation	%	1.3	2.0-4.0			
Mg Saturation	%	11.0	10-20			
Ca Saturation	%	69.6	50-70			
K/Mg Ratio		0.4				
Ca/Mg Ratio		12.3				
Phosphorus	m3-ppm	17	50-80			
Potassium	m3-ppm	62	150-240			
Magnesium	m3-ppm	155	160-310			
Calcium	m3-ppm	1910	1400-1900			



Recommendations			Nutrients expressed in broadcast lbs/A, except Fe (foliar) and Mn (row)										
Yr	Crop		CaCO3	N	P2O5	K2O	Mg	S	B	Cu	Fe	Mn	Zn
06	Corn	150 bu	0	178	124	189	17						

Lime expressed in 100% pure CaCO3. Adjust accordingly. D=Dolomitic. C=Calcitic.

Corn: Starter fertilizer is normally suggested regardless of soil test levels. Monitor and adjust nutrient program based on annual leaf analysis.

Analyzed by Spectrum Analytic Inc.
www.spectrumanalytic.com

HID:0701-0842-9840-0009

Lab, Virginia Tech

lb/A

BROOKSIDE LABORATORIES, INC.

SOIL AUDIT AND INVENTORY REPORT

Name _____ City Somerset State VA

Independent Consultant XYZ Consulting Date 01/12/2006

Sample Location	MAIN FARM		22B		22B		
Sample Identification					3 ACRES		
Lab Number			0112-1		0113-1		
Total Exchange Capacity (ME/100 g)			8.66		9.60		
pH	Buffer (SMP)		6.4		7.0		
	H_2O (1:1)		5.3		6.2		
Organic Matter (humus) %			2.36		2.23		
Estimated Nitrogen Release		lb/A	67		65		
ANIONS / SOLUBLE SULFUR		ppm	25		18		
PHOSPHORUS / EASILY EXTRACTABLE		lb/A P as P_2O_5	197		160		
		ppm of P	43		35		
BRAY II		lb/A P as P_2O_5					
		ppm of P					
OLSEN		lb/A P as P_2O_5					
		ppm of P					
EXCHANGEABLE CATIONS / CALCIUM:		lb/A	1388		2418		
		ppm	694		1209		
MAGNESIUM:		lb/A	242		374		
		ppm	121		187		
POTASSIUM:		lb/A	322		218		
		ppm	161		109		
SODIUM:		lb/A	28		32		
		ppm	14		16		
BASE SATURATION PERCENT							
Calcium		%	40.07		62.97		
Magnesium		%	11.64		16.23		
Potassium		%	4.77		2.91		
Sodium		%	0.70		0.72		
Other Bases		%	6.80		5.20		
Hydrogen		%	36.00		12.00		
EXTRACTABLE MINORS							
Boron (ppm)			0.48		0.52		
Iron (ppm)			92		95		
Manganese (ppm)			123		81		
Copper (ppm)			0.93		1.26		
Zinc (ppm)			2.35		1.95		
Aluminum (ppm)			895		608		
OTHER TESTS / Soluble Salts (mmhos/cm)							
Chlorides (ppm)							

SMP Buffer = Modified SMP = Sikora Buffer

Mehlich-III = Easily Extractable P

Soil Testing Lab, Virginia Tech

Report Number:
R06236-0023
Account Number:
52425

A&L Eastern Laboratories, Inc.

7621 Whitepine Road Richmond, Virginia 23237 (804) 743-9401
Fax No. (804) 271-6446 Email: office@al-labs-eastern.com

Send To: NO NAME INC
POB 888
FARMVIEW LN
RICHMOND, VA 232377

Grower: JOHN DOLE FARMS

Submitted By: JOHN DOLE

Farm I D:

Field I D:

SOIL ANALYSIS REPORT

Page: 1 **Date Received:** 8/23/2006 **Date of Analysis:** 8/24/2006 **Date of Report:** 8/25/2006

Analytical Method(s):
Mehlich III

Sample Number	Lab Number	Organic Matter			Phosphorus				Potassium		Magnesium		Calcium		Sodium		pH		Acidity	C.E.C.
		%	ENR lbs/A	Rate	Available ppm	Rate	Reserve ppm	Rate	K ppm	Rate	MG ppm	Rate	CA ppm	Rate	NA ppm	Rate	Soil pH	Buffer Index	H meq/100g	meq/100g
#1	13167	2.9	97	M	624	VH			290	VH	75	L	1120	H			6.4	6.9	0.7	7.7

Sample Number	Percent Base Saturation					Nitrate	Sulfur		Zinc		Manganese		Iron		Copper		Boron		Soluble Salts	Chloride		Aluminum	
	K %	Mg %	Ca %	Na %	H %	NO3-N ppm	Rate	SO4-S ppm	Rate	ZN ppm	Rate	MN ppm	Rate	FE ppm	Rate	CU ppm	Rate	B ppm	Rate	ms/cm	Rate	CL ppm	Rate	AL ppm	Rate
#1	9.7	8.2	73.2		8.9			25	M	9.5	VH	12	M	180	VH	2.5	H	0.5	L						

Values on this report represent the plant available nutrients in the soil.
Rating after each value: VL (Very Low), L (Low), M (Medium), H (High), VH (Very High).
ENR - Estimated Nitrogen Release. C.E.C. - Cation Exchange Capacity.

Explanation of symbols: % (percent), ppm (parts per million), lbs/A (pounds per acre), ms/cm (milli-mhos per centimeter), meq/100g (milli-equivalent per 100 grams).
Conversions: ppm x 2 = lbs/A, Soluble Salts ms/cm x 640 = ppm.

This report applies to the sample(s) tested. Samples are retained a maximum of thirty days after testing. Soil Analysis prepared by: A & L EASTERN LABORATORIES, INC.

by: Paul Chu, Ph.D.

Report Number:
R06236-0023
Account Number:
52425

A&L Eastern Laboratories, Inc.

7621 Whitepine Road Richmond, Virginia (804) 743-9401
Fax No. (804) 271-6446 Email: office@al-labs-eastern.com

To: NO NAME INC
POB 888
FARMVIEW LN
RICHMOND, VA 232377

For: JOHN DOLE FARMS

Copy To: JOHN DOLE

Date Received: 08/23/2006
Date Reported: 08/25/2006

SOIL FERTILITY RECOMMENDATIONS

Sample ID	Intended Crop	Yield Goal	Lime Tons/A	Nitrogen N lb/A	Phosphate P2O5 lb/A	Potash K2O lb/A	Magnesium Mg lb/A	Sulfur S lb/A	Zinc Zn lb/A	Manganese Mn lb/A	Iron Fe lb/A	Copper Cu lb/A	Boron B lb/A
#1	Greens, Vegetable	20 m	0.0	125	0	0	0	20	0.0	**	0	0	1.0

ALE-Rec

Sample #1: The phosphorus recommendation was set at zero for environmental concern. For vegetables, if planted early in the spring, apply 30-60# P2O5 as a side placement application near the plants will improve availability and stimulate growth.
Sample #1: Boron recommendations are on a broadcast basis.
Sample #1: ** Manganese is not effective when broadcasted. For row crops, apply 4 to 6 pounds per acre in band near the crops. For non-row crops, apply 2 pound per acre foliar when needed.

Paul Chu, Ph.D.

Agri Analysis, Inc.

PO Box 483 Leola, PA 17540 (Phone) 717-656-9326

INVOICE # 96574
RECEIVED Apr 18, 2005
REPORTED Apr 20, 2005
SAMPLED BY

CUSTOMER:
Company Name
Company Address

GROWER:
Grower Name/Address

Soil Analysis Report

FIELD DATA / NUTRIENT REMOVAL / LIME AND FERTILIZER RECOMMENDATIONS

Your Field I.D.	Acres	Lab Number	Last Crop Grown	Next Crop	Yield Goal	Nutrient Removal of Next Crop Nitrogen	P2O5	K2O	LIMESTONE lbs/acre	NITROGEN lbs/acre	P2O5 lbs/Acre	K2O lbs/Acre	MgO lbs/Acre
#1	5	4867	CORN GRAIN	CORN GRAIN	150 BU	160	60	50	2000	160	0	0	0
#2	6	4868	SOYBEANS GRAIN	CORN GRAIN	150 BU	160	60	50	None	160	0	0	0
3	4	4869	CORN GRAIN	SOYBEANS GRAIN	50 BU	190	60	70	None	20	0	0	0
4	8	4870	CORN GRAIN	ALFA SEEDING	4 TON	200	60	200	2000	20	0	30	0
5	5	4871	ALFA MAINT	CORN SILAGE	25 TON	180	100	180	None	180	0	90	0

LABORATORY DATA

Your Field I.D.	CEC	Acidity	SOIL pH	SMP Buffer	% O.M.	Lbs/A - - % Saturation (K, Mg, Ca) POTASSIUM (K)	MAGNESIUM (Mg)	CALCIUM (Ca)	Phos. lbs/A	K ppm	Mg ppm	Ca ppm	P ppm	P2O5 lbs/A	K2O lbs/A	MgO lbs/A
#1	8.9		6.3			436 (6.3%)	454 (21.3%)	2572 (72.2%)	236	218	227	1286	118	543	524	727
#2	8.3		6.7	6.98		354 (5.5%)	363 (18.2%)	2514 (75.7%)	182	177	182	1257	91	420	425	581
3	10.7		6.6			647 (7.8%)	568 (22.1%)	3018 (70.5%)	328	324	284	1509	164	754	777	908
4	9.3		6.7	6.98		384 (5.3%)	451 (20.2%)	2764 (74.3%)	229	192	226	1382	114	526	461	722
5	8.8		6.6			295 (4.3%)	508 (24.1%)	2528 (71.8%)	140	148	254	1264	70	322	354	813

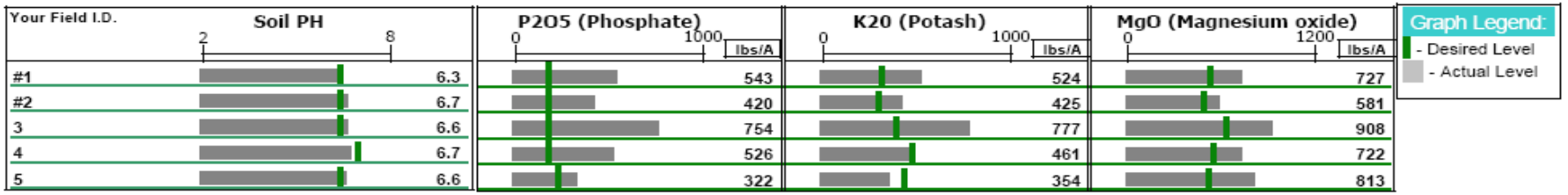
TRACE MINERALS

Your Field I.D.	(Cu) ppm	(Fe) ppm	(Mn) ppm	(Zn) ppm	(B) ppm	(SO4) ppm	(Na) ppm
#1	1.9	200.6	136.4	3.9	1.27	17.2	33.1
#2	1.8	182.9	134.9	2.9	1.01	14.9	29.5
3	3.2	207.7	173.6	5.9	1.28	19.7	40.6
4	2.4	196.6	178.8	3.6	0.97	15.8	30.6
5	1.8	207.4	156.8	2.0	0.86	12.2	28.8

Ranges
Cu: 0.5-2.0 Fe: 12-50
Mn: 15-45
Zn: 1.0-4.0
B: 0.6-2.0

* Mineral extraction method is Mehlich 3 (ICP)

* Limestone rec. is based on 100% calcium carbonate equivalent.



Recommendation supplied are for PA silt-loam soils. Use as guideline only.

Soil Report

Job Name: Sample Job Date: 1/1/2007

Submitted By: Logan Labs Sales Person:

Sample Location			Field	Field	Field	Field	Field
Sample ID			# 1	# 2	# 3	# 4	# 5
Lab Number			46	47	48	49	50
Sample Depth in inches			6	6	6	6	6
Total Exchange Capacity (M. E.)			11.85	13.93	12.39	12.77	13.87
pH of Soil Sample			6.60	7.00	6.90	6.80	6.80
Organic Matter, Percent			2.16	1.94	2.23	2.27	2.25
ANIONS	SULFUR:	p.p.m.	12	13	8	8	12
	Mehlich III Phosphorous:	as (P_2O_5) lbs / acre	74	95	55	67	69
EXCHANGEABLE CATIONS	CALCIUM: lbs / acre	Desired Value	3223	3787	3369	3472	3773
		Value Found	3170	3858	3392	3398	3842
		Deficit	-53			-74	
	MAGNESIUM: lbs / acre	Desired Value	341	401	356	367	399
		Value Found	547	796	688	716	685
		Deficit					
	POTASSIUM: lbs / acre	Desired Value	369	434	386	398	432
		Value Found	180	185	145	153	178
		Deficit	-189	-249	-241	-245	-254
	SODIUM:	lbs / acre	63	52	51	56	61
BASE SATURATION %	Calcium (60 to 70%)		66.88	69.26	68.45	66.54	69.24
	Magnesium (10 to 20%)		19.23	23.82	23.14	23.37	20.58
	Potassium (2 to 5%)		1.95	1.70	1.50	1.54	1.65
	Sodium (.5 to 3%)		1.16	0.81	0.90	0.96	0.95
	Other Bases (Variable)		4.80	4.40	4.50	4.60	4.60
	Exchangable Hydrogen (10 to 15%)		6.00	0.00	1.50	3.00	3.00
TRACE ELEMENTS	Boron (p.p.m.)		0.69	0.69	0.65	0.72	0.73
	Iron (p.p.m.)		131	152	135	147	166
	Manganese (p.p.m.)		122	141	156	142	127
	Copper (p.p.m.)		1.46	1.89	1.67	2.41	2.03
	Zinc (p.p.m.)		1.06	1.41	1.06	2.69	1.97
	Aluminum (p.p.m.)		713	665	667	650	685
OTHER							

AgroLab

Account No. : 91000

Soil Analysis Report

Invoice No. : 1069932
Date Received : 10/21/2010
Date Reported : 10/22/2010

AGROLAB, INC.

Results For : AGRICULTURAL LAB PROFIENCY PROGRAM
Location :

Sample ID / Lab No.	Soil pH 1:1	SMP Buffer pH	Soluble Salts 1:1 mmho/cm	Al ppm	Organic Matter %	NO3-N ppm	U of D P Sat Ratio	Mehlich 3 Phosphorus ppm P / F/V	K ppm	Ca ppm	Mg ppm	Na ppm	SO4 - S ppm	Zn ppm	Fe ppm	Mn ppm	Cu ppm	B ppm	Cl ppm	C.E.C. meq / 100g	% Base Saturation H	K	Ca	Mg	Na
CHECK TRAY 16																									
3145	5.9	6.9		630.0	1.5		26	71	122	378	89	16	8	0.63	120.0	120.0	0.61	0.21		4.1	27	8	45	18	2
CHECK TRAY 17																									
3177	5.9	6.9		700.0	1.4		25	75	140	428	100	23	9	0.68	120.0	130.0	0.70	0.23		4.4	23	8	48	19	2
CHECK TRAY 18																									
3209	5.9	6.9		670.0	1.3		26	77	138	440	98	23	9	0.88	120.0	120.0	0.63	0.33		4.6	24	8	48	18	2
CHECK TRAY 19																									
3241	5.8	6.9		730.0	1.2		24	74	145	435	103	25	10	0.76	130.0	130.0	0.74	0.31		4.3	19	9	49	20	3
CHECK TRAY 20																									
3273	6.0	7.0		640.0	1.3		27	76	129	431	92	28	8	0.58	110.0	110.0	0.59	0.31		3.4	0	10	63	23	4

Reviewed By: W.R. Rohrer - AgroLab, Inc.

Copy : 1 10/22/2010 Page 1 of 1

Bus: 302-265-2734
Fax: 888-412-0873
web site
www.agrolab.us
1009 Mattlind Way
Milford, DE 19963

Converting to Va Tech Values from

- **Waters Ag. Lab, Camilla, GA – *www.watersag.com***

  - **Phosphorus:**

    Waters Phosphorus (P) lb/A X 0.50 = *VT* P ppm

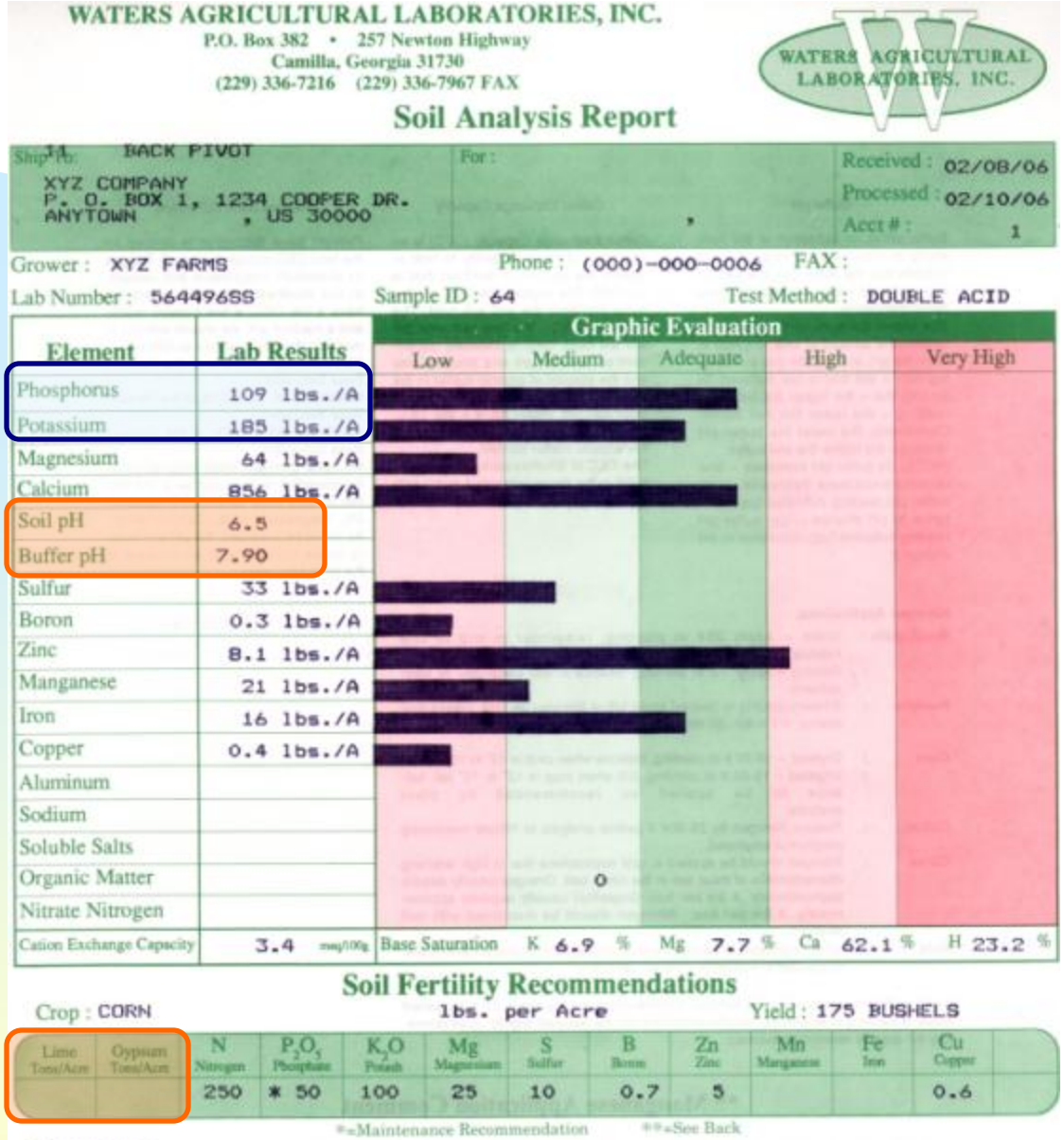
    (Waters Phosphorus (P) lb/A X 1.00 = *VT* P lb/A)

  - **Potassium:**

    Waters Potassium (K) lb/A X 0.53 = *VT* K ppm

    (Waters Potassium (K) lb/A X 1.06 = *VT* K lb/A)

VNMSC: p. 42



WATERS AGRICULTURAL LABORATORIES, INC.
P.O. Box 382 • 257 Newton Highway
Camilla, Georgia 31730
(229) 336-7216 (229) 336-7967 FAX

Soil Analysis Report

Ship To: 14 BACK PIVOT
XYZ COMPANY
P. O. BOX 1, 1234 COOPER DR.
ANYTOWN , US 30000

For:

Received: 02/08/06
Processed: 02/10/06
Acct #: 1

Grower: XYZ FARMS Phone: (000)-000-0006 FAX:
Lab Number: 564496SS Sample ID: 64 Test Method: DOUBLE ACID

Element	Lab Results
Phosphorus	109 lbs./A
Potassium	185 lbs./A
Magnesium	64 lbs./A
Calcium	856 lbs./A
Soil pH	6.5
Buffer pH	7.90
Sulfur	33 lbs./A
Boron	0.3 lbs./A
Zinc	8.1 lbs./A
Manganese	21 lbs./A
Iron	16 lbs./A
Copper	0.4 lbs./A
Aluminum	
Sodium	
Soluble Salts	
Organic Matter	
Nitrate Nitrogen	
Cation Exchange Capacity	3.4 meq/100g

Graphic Evaluation: Low | Medium | Adequate | High | Very High

Base Saturation K 6.9 % Mg 7.7 % Ca 62.1 % H 23.2 %

Soil Fertility Recommendations

Crop: CORN lbs. per Acre Yield: 175 BUSHELS

Lime Tons/Acre	Gypsum Tons/Acre	N Nitrogen	P_2O_5 Phosphate	K_2O Potash	Mg Magnesium	S Sulfur	B Boron	Zn Zinc	Mn Manganese	Fe Iron	Cu Copper
		250	* 50	100	25	10	0.7	5			0.6

*=Maintenance Recommendation **=See Back

Comments:

15 LBS OF NITROGEN AND 50 LBS OF PHOSPHATE RECOMMENDED AS A STARTER ON ALL CORN. FERTILIZER APPLIED AS A STARTER, SHOULD BE DEDUCTED FROM ABOVE. BE SURE THAT SULFUR IS APPLIED IN ORDER THAT NITROGEN-SULFUR RATIO IS MAINTAINED. A PORTION OF THE NITROGEN AND POTASSIUM SHOULD BE APPLIED THROUGH THE IRRIGATION SYSTEM IF AVAILABLE, BEGINNING PRIOR TO TASSEL. 25% OF POTASSIUM SHOULD BE APPLIED IN SPLIT APPLICATIONS OF NO MORE THAN 20 LBS OF EACH. CHECK WITH LAB OR FIELDMAN BEFORE APPLYING NITROGEN AND POTASSIUM IN COMBINATION.
IF DOLOMITE LIME HAS BEEN APPLIED RECENTLY, MAGNESIUM RECOMMENDATION CAN BE CUT IN HALF.

- Uses Mehlich 1;
- Reports Elemental P & K;
- Reports P & K in Units of lbs/A;

Therefore Can Use Numbers Like VT's Reported Numbers.

Soil Testing → Plant Analysis

MANMH: p. 180-185

Soil Testing Lab, Virginia Tech

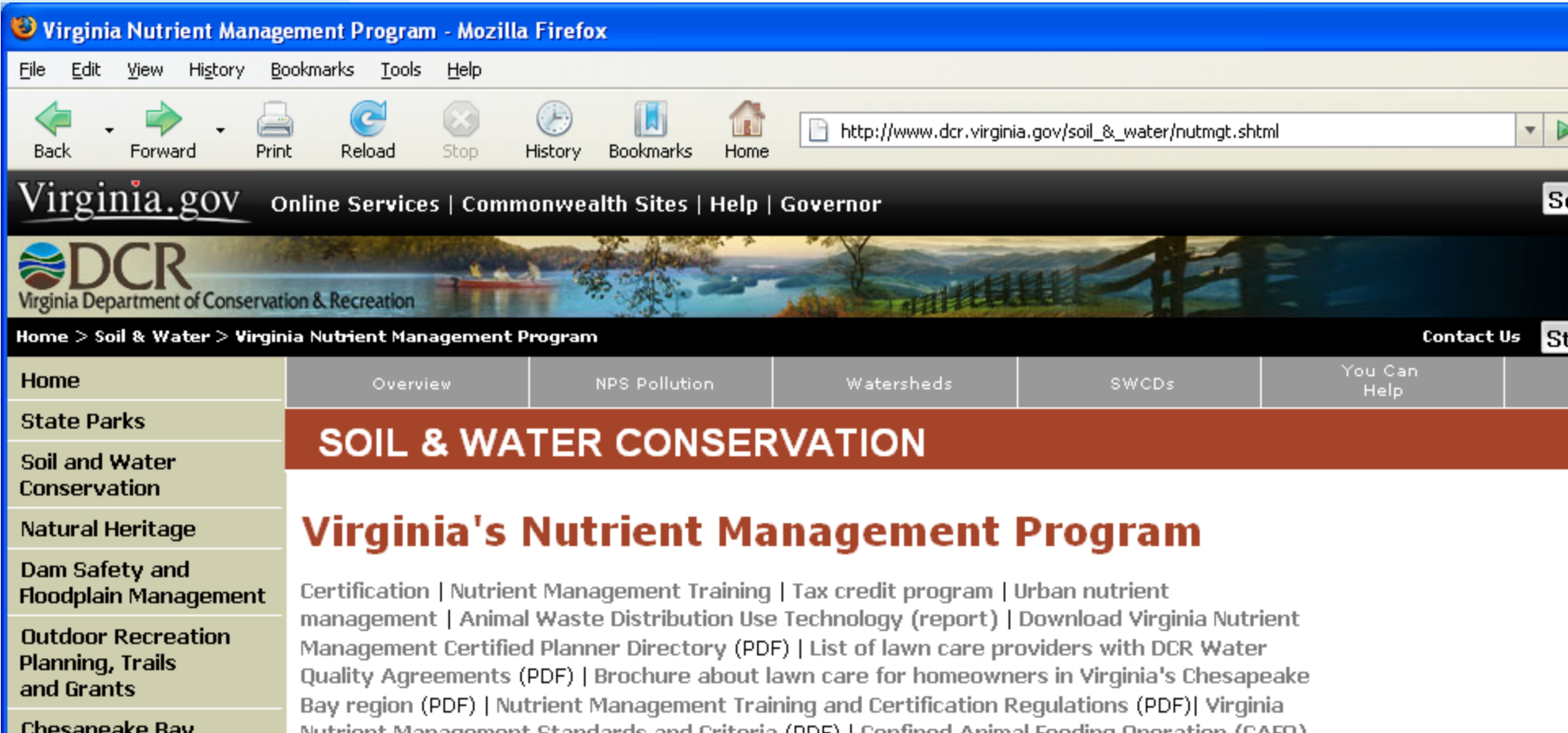
Tissue Testing

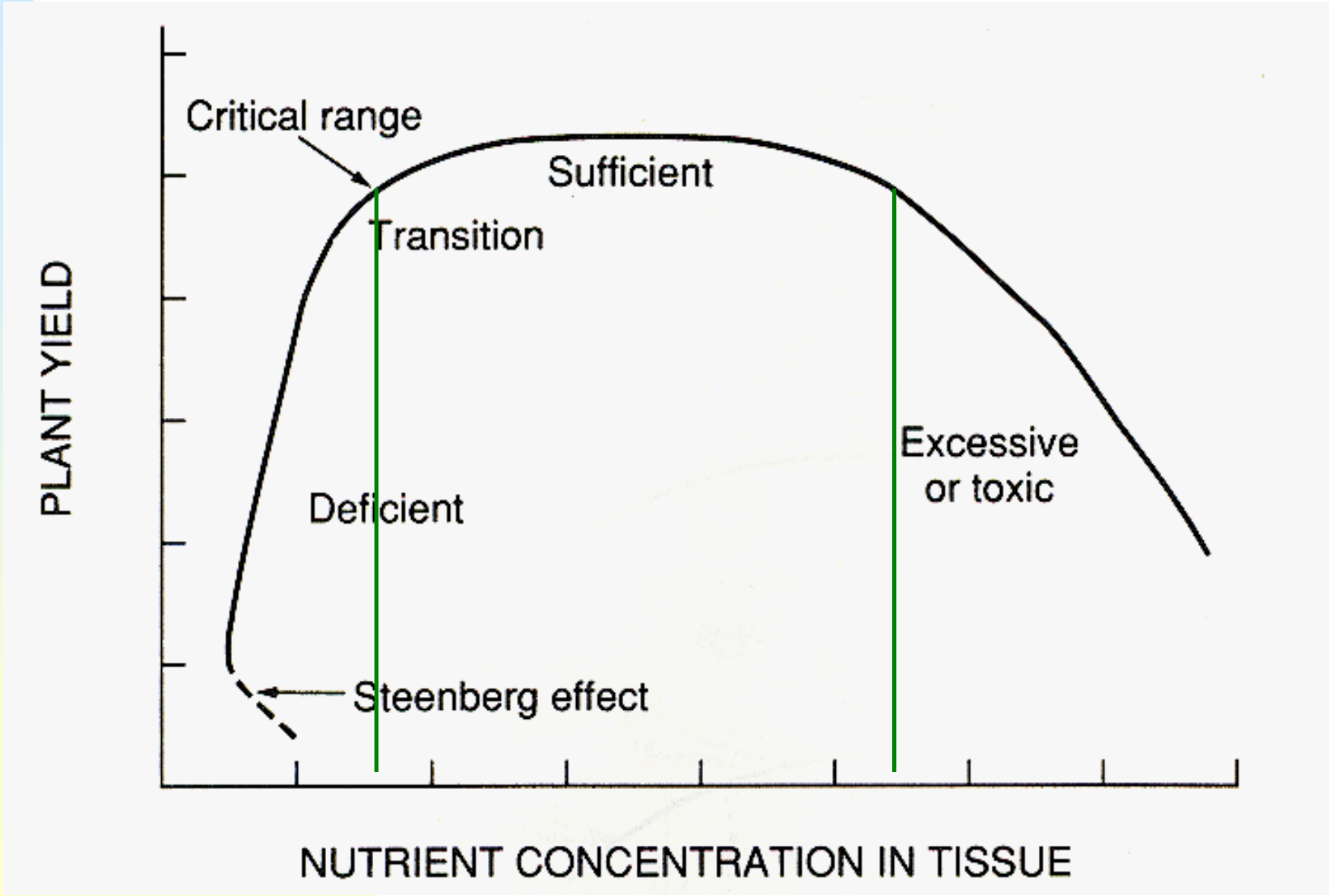
- **Most commonly used to diagnose nutritional problems related to soil fertility or to monitor the effectiveness of fertilizer practices on growing crops.**
- **Not a substitute for soil testing**
- **Most effective when used in conjunction with a regular soil testing program.**

Soil Testing Lab, Virginia Tech

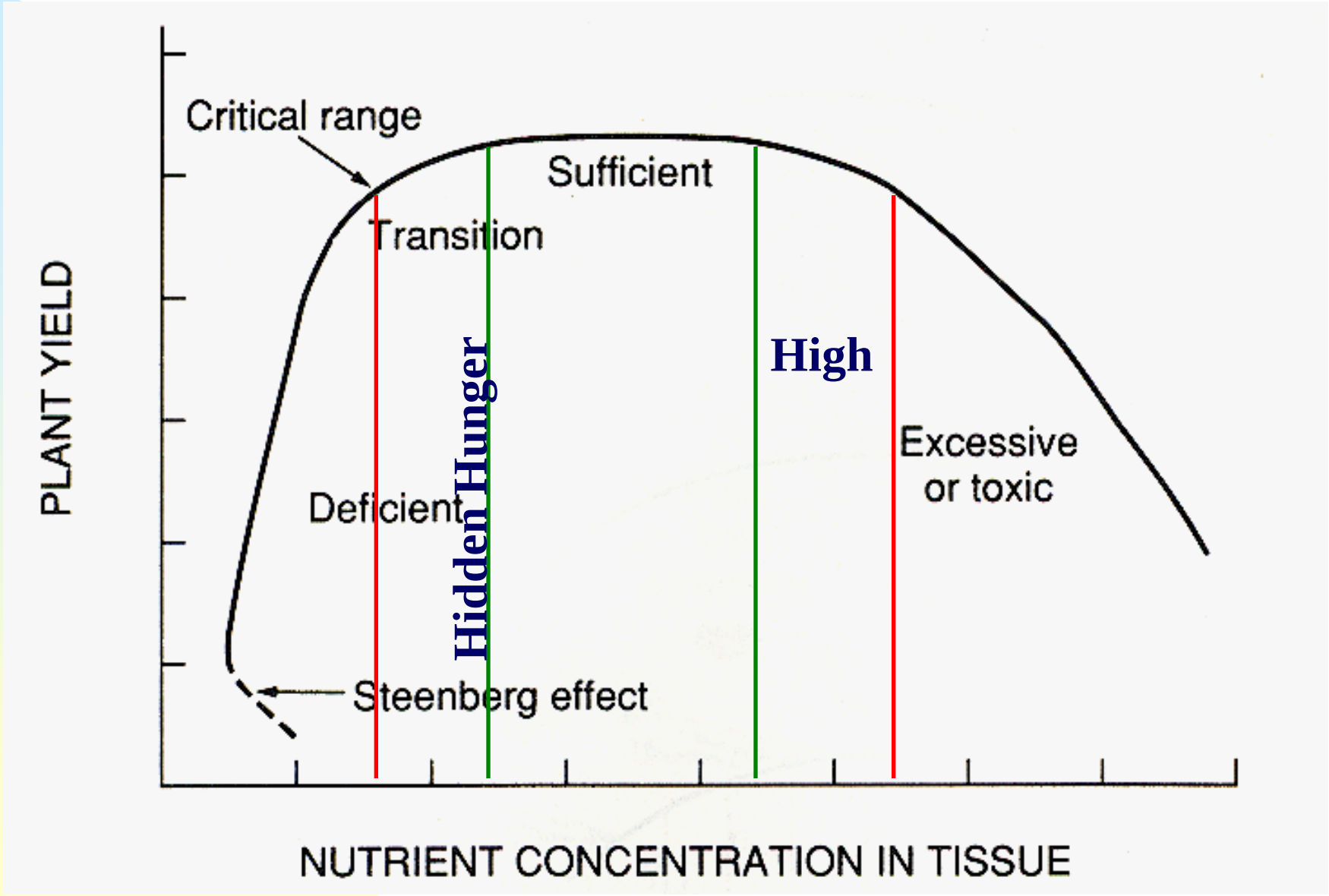
Tissue Testing

- **Nitrogen management for wheat/barley – See VA Nut Mgt Stds & Criteria Rev.Oct.2005 pages 66, 69 73 and 76, on-line at www.dcr.virginia.gov/documents/StandardsandCriteria.pdf**





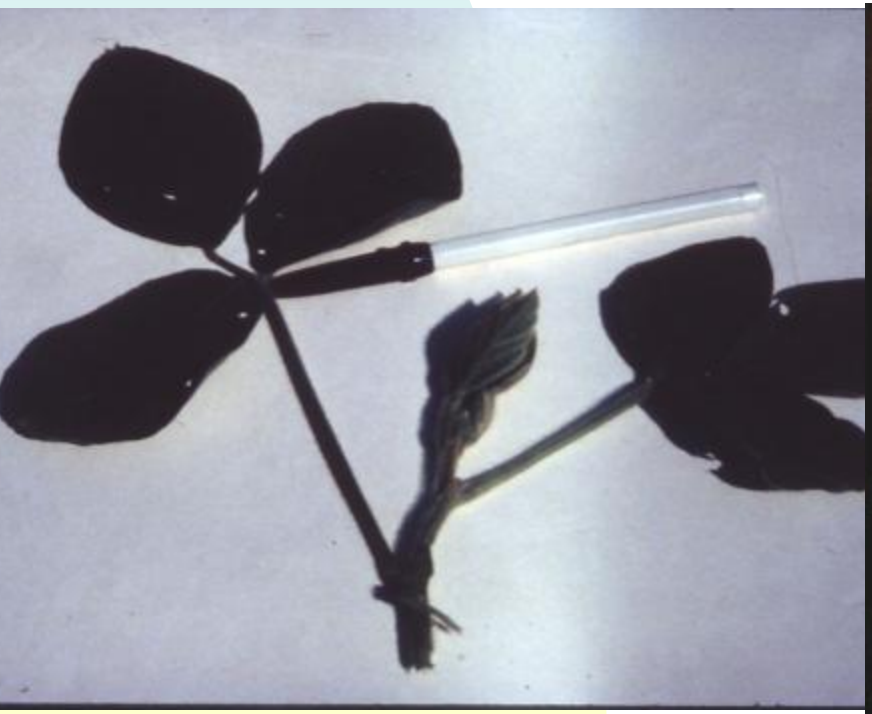
Soil Testing Lab, Virginia Tech



Soil Testing Lab, Virginia Tech

Tissue Testing – Sample Collection

- **Proper sampling requires that a specific plant part be taken (particular leaf, group of leaves or portion of the plant)**



Tissue Testing – Sample Collection

- **If no instructions are available – general rule of thumb is to sample the upper, most recently mature, fully developed leaf**

Agronomy Handbook – VCE Pub. # 424-100: p. 77-78

Tissue Testing – Sample Collection

- **Recommended time of sampling – usually just prior to beginning of reproductive stage**

Tissue Testing – Sample Collection

- **DO NOT COLLECT:**
  - **Diseased or dead plant material**
  - **Materials damaged by insects or mechanical injury**
  - **Plant that have been under nutrient stress for an extended period of time.**

- **If a nutrient deficiency is expected:**
  - **Collect samples from affected area and from normal plants in the immediate or adjacent areas**

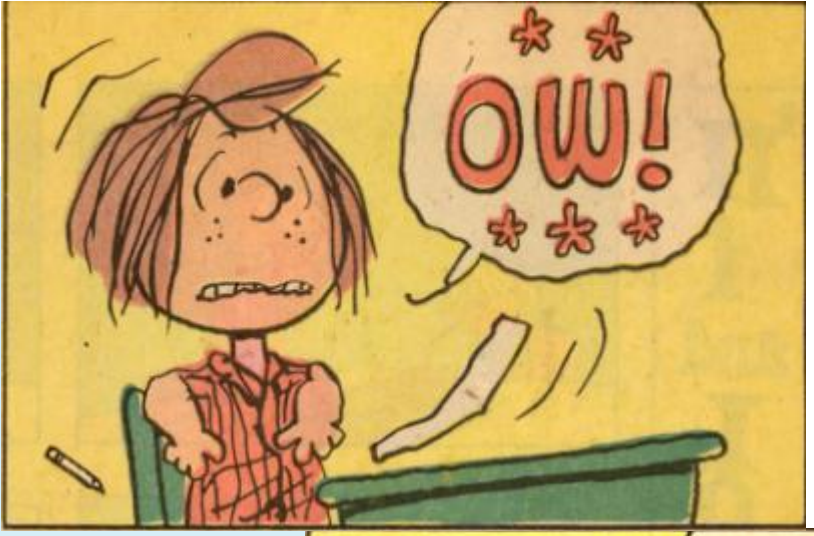
Tissue Testing

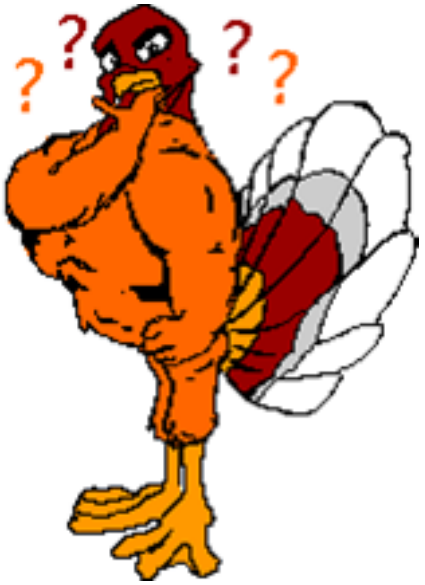
- **If leaves are dusty:**
  - **brush or wipe with a damp cloth to remove contaminates**

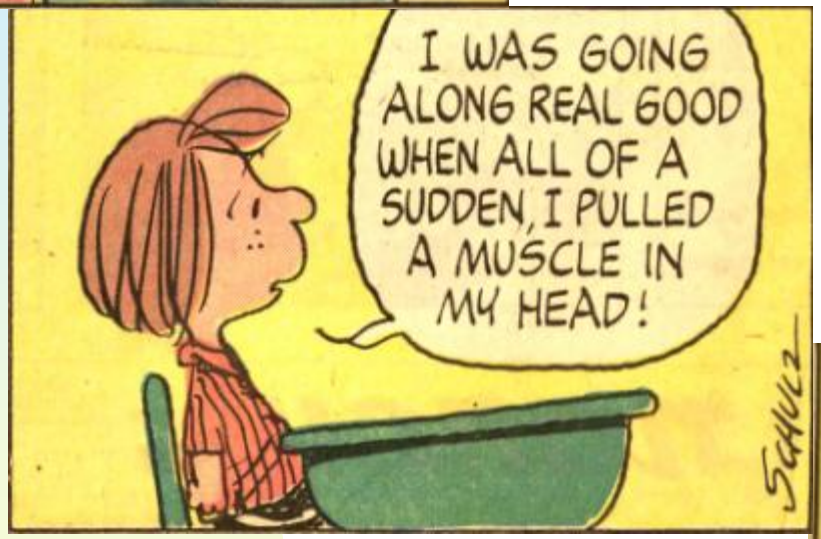
  or

  - **Wash in a mild detergent and rinse in running water.**

- **Air-Dry tissue samples before shipment to the laboratory**


OW!




I WAS GOING ALONG REAL GOOD WHEN ALL OF A SUDDEN, I PULLED A MUSCLE IN MY HEAD!
SCHULZ


THAT'S ALL I CAN DO...
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