Understanding the Soil Test Report

Charlotte Glen,
Horticulture Agent
NC State Extension
Chatham County Center

NC State Extension

Review These Slides Online

go.ncsu.edu/soil-testing

Home » Soil Testing for Lawns and Gardens

Soil Testing for Lawns and Gardens

- Learn about our Spring Soil Test Drive, March 20 – April 12, 2017
- Review Presentation: Soil Testing for Lawns and Gardens
- Review Presentation: Understanding the Soil Test Report

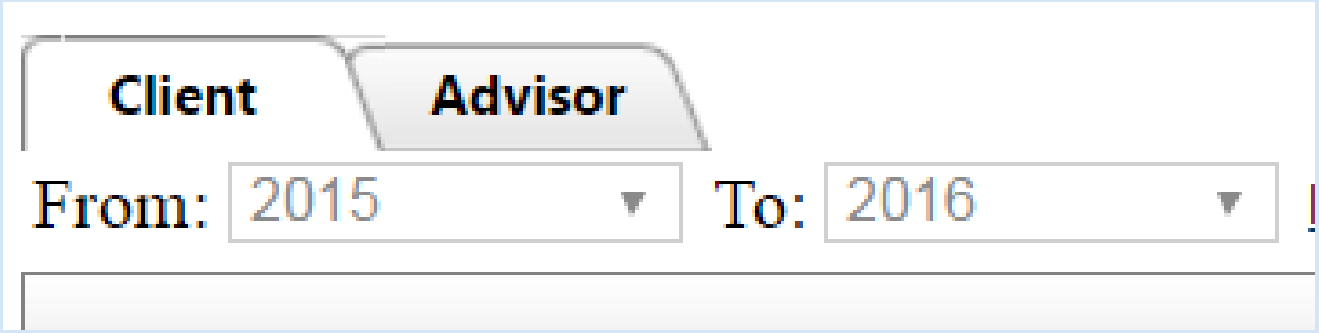
Healthy soil is the foundation of successful gardening. The first step to cultivating healthy soil is having your soil tested.

Collecting soil samples only takes a few minutes and has many benefits. It can help you save money in your lawn, garden and landscape, can result in healthier plants by telling you which nutrients are already in

How Do I Find My Soil Test Report?

- **Available online:**

  http://www.ncagr.gov/agronomi/pals
- Search by **last name** only!
- Can access reports ~ last 3 years
- Change date range:



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What Soil Testing Can Tell You

- **Nutrients** your soil needs to support healthy growth
- If nutrient levels are **too high**
- **Soil pH**
  - Is your soil acidic (sour), or
  - Is it alkaline (sweet)
- **If lime is needed** & how much

Iron deficiency, likely caused by high pH

NCDA&CS Agronomic Division | Phone: (919) 733-2655 | Website: www.ncagr.gov/agronomi/ | Report No. FY15-SL031657

Predictive Home & Garden

Soil Report

Mehlich-3 Extraction

Client: Charlotte Glen
P.O. Box 279
Pittsboro, NC 27312

Advisor:

Sampled County : Chatham

Sampled: | Received: 04/21/2015 | Completed: 04/30/2015 | Farm:

Links to Helpful Information

Agronomist's Comments:

This report provides Test Results and Recommendations for each sample submitted for testing. Look for Lime Recommendations and N-P-K Fertilizer Recommendations. If lime is needed, application at the indicated rate will raise soil pH to the optimal level for the plant you specified. Common target pH values are as follows: 5.0 for azalea, camellia, rhododendron and mt. laurel; 5.5 for centipedegrass; 6.0 for other lawn grasses, shrubbery, and; flowering plants; and 6.5 for vegetable gardens. N-P-K Recommendations are based on the nitrogen (N) needs of the plants being grown and the soil test results for phosphorus (P-I) and potassium (K-I); a 50 to 70 index for either is optimum. If the exact fertilizer cannot be found, find the closest match and adjust the rate accordingly. Refer to "Understanding the Soil Report" (last page of this report) for additional explanation and links to helpful information.

Sample ID: RED

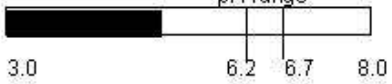
Lime History:

Charlotte Glen

	Lime Recommendations	N-P-K Fertilizer Recommendations *
Crop 1- Vegetable garden	75.0 lb per 1,000 sq ft	20 lbs per 1,000 sq ft 5-10-5
Crop 2-		

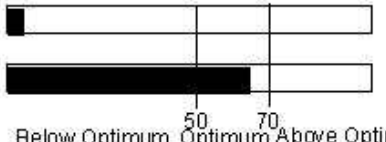
Test Results:

pH = 5.0 (Optimum pH range)



Phosphorus Index (P-I) = 1

Potassium Index (K-I) = 65



Additional Test Results:	HM%	W/V g/cm³	CEC meq/100 cm³	Mn-I	Zn-I	Cu-I	S-I
	0.04	0.79	5.7	62	18	26	222

** If you cannot find the fertilizer recommended here, choose one from the same Group (A, B, C or D) listed on the last page of this report.*

Note: This soil test does not measure nitrogen (N) levels. N fertilizer recommendations are based only on needs of the designated crop.

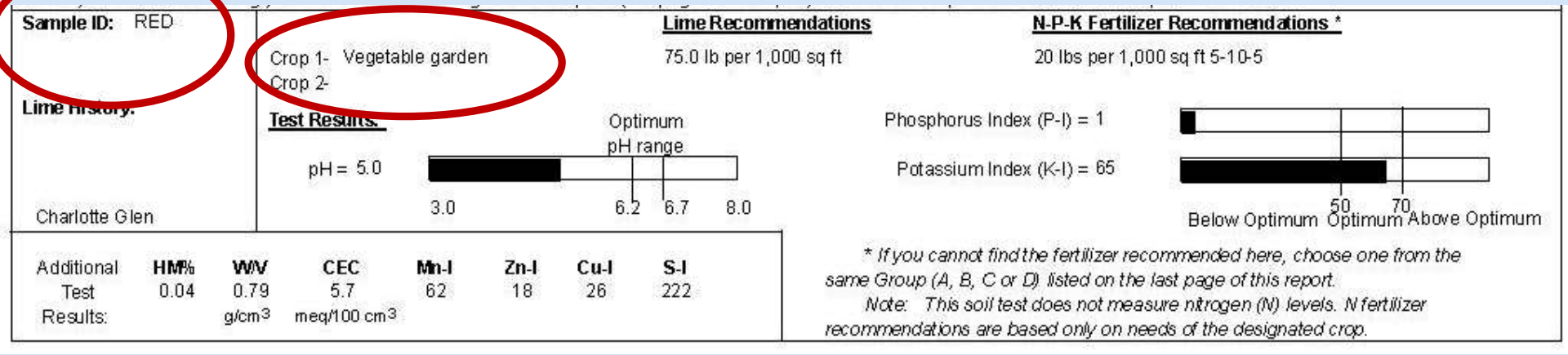
North Carolina Tobacco Trust Fund Commission

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 Trox*

Soil Test Report



Sample ID: RED

Crop 1- Vegetable garden
Crop 2-

Lime History:

Charlotte Glen

Lime Recommendations

75.0 lb per 1,000 sq ft

N-P-K Fertilizer Recommendations *

20 lbs per 1,000 sq ft 5-10-5

Test Results:

Optimum pH range

pH = 5.0

3.0 6.2 6.7 8.0

Phosphorus Index (P-I) = 1

Potassium Index (K-I) = 65

50 70

Below Optimum Optimum Above Optimum

Additional Test Results:	HM% 0.04	W/V 0.79 g/cm3	CEC 5.7 meq/100 cm3	Mn-I 62	Zn-I 18	Cu-I 26	S-I 222

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- **Sample ID** – what you entered
- **Crop 1** – what you plan to grow

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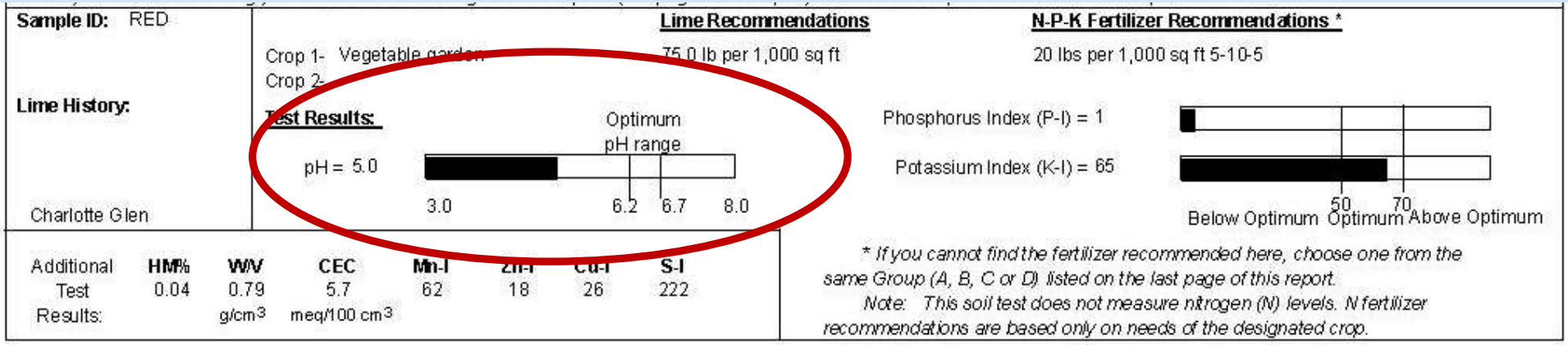
pH



Sample ID: RED

Lime History:

Charlotte Glen

Crop 1- Vegetable garden

Crop 2-

Lime Recommendations

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- Actual pH (number)
- Also shows where your pH is in comparison to target range - based on soil type and what you intend to grow

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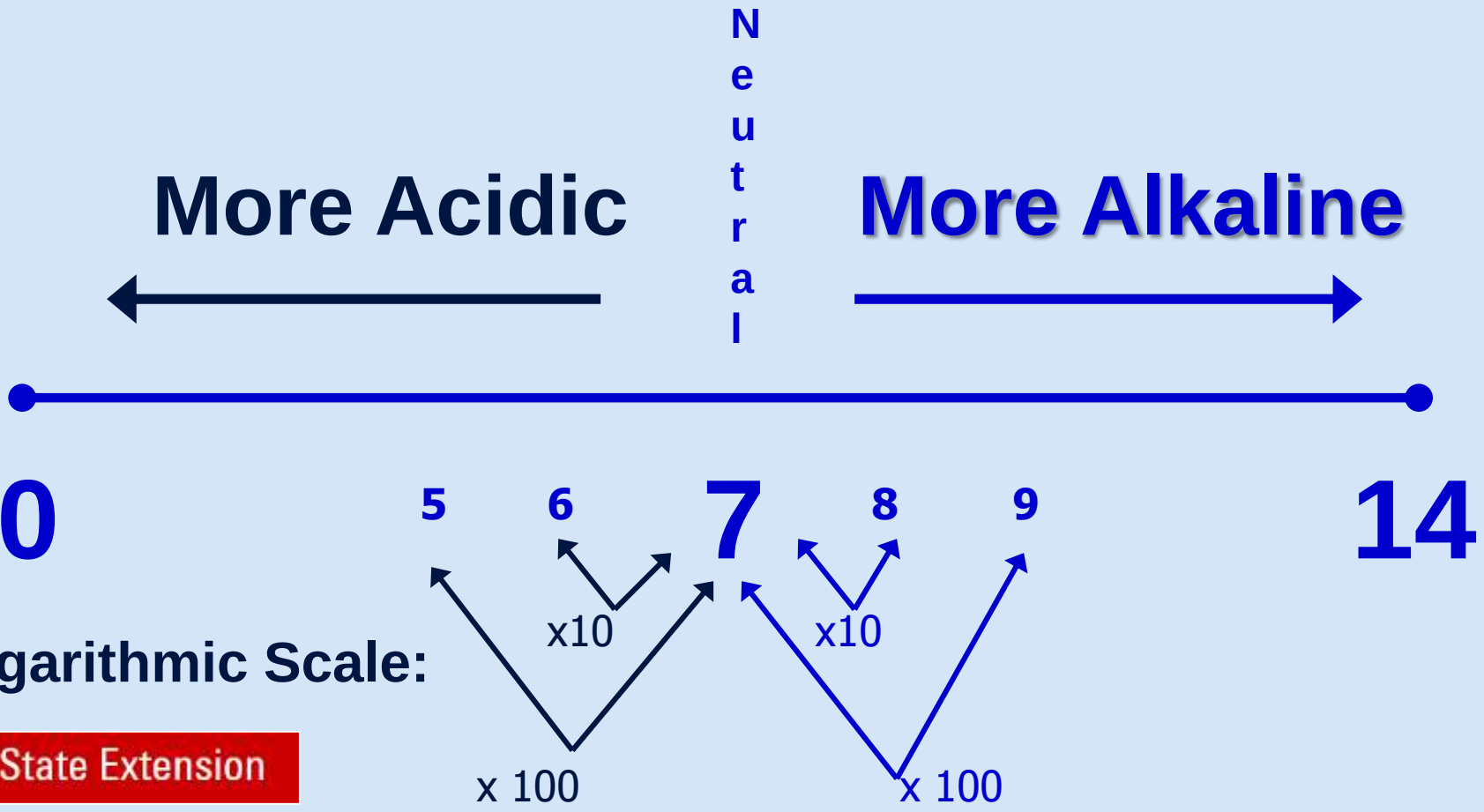
pH



Logarithmic Scale:

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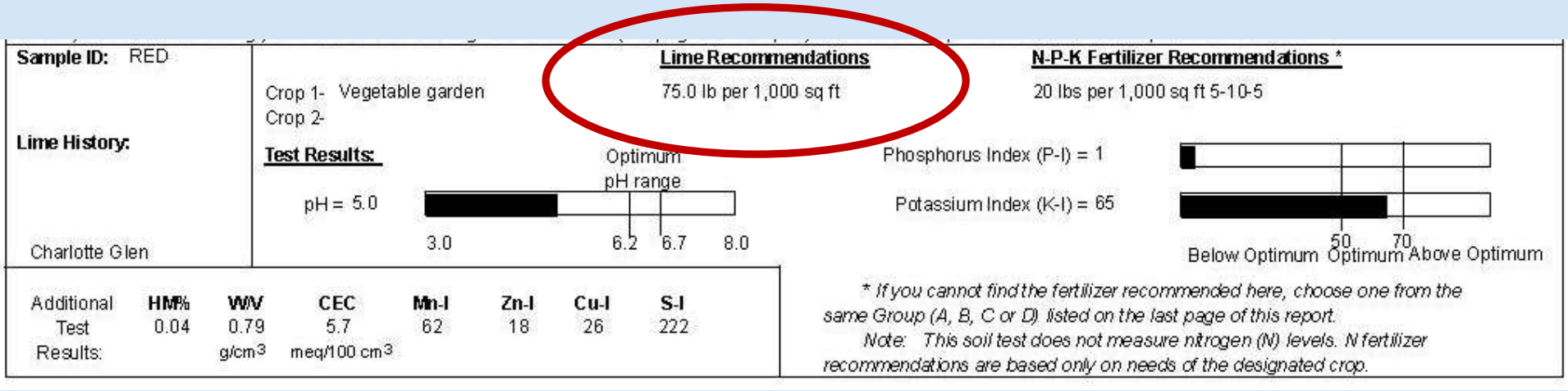
Lime Recommendation



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Lime History:

Charlotte Glen

Crop 1- Vegetable garden
Crop 2-

Lime Recommendations

75.0 lb per 1,000 sq ft

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Additional Test Results:	HM% 0.04	W/V 0.79 g/cm^3	CEC 5.7 meq/100 cm^3	Mn-I 62	Zn-I 18	Cu-I 26	S-I 222

** If you cannot find the fertilizer recommended here, choose one from the same Group (A, B, C or D) listed on the last page of this report.*

Note: This soil test does not measure nitrogen (N) levels. N fertilizer recommendations are based only on needs of the designated crop.

- **If pH is low for crop you intent to grow, lime will be recommended**
- Rate is in pounds per 1000 square feet
- For dolomitic or agricultural/garden lime

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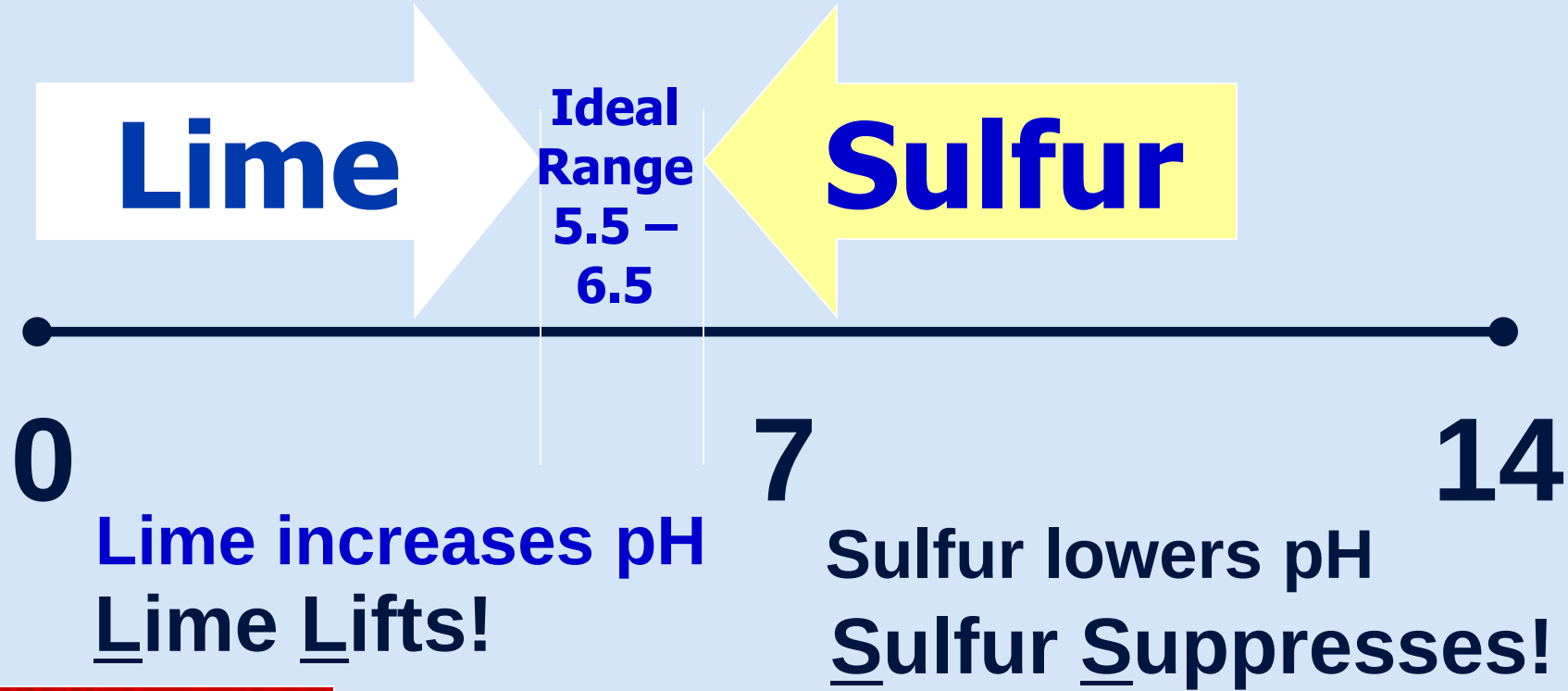
Changing Soil pH

Based on soil test results



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Should You Alter pH?

If low, YES!

- **Lime raises pH**
- Only add lime if recommended
- Add agricultural or dolomitic lime
- **Till lime into the soil before planting** – takes 6 months to fully react

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Should You Alter pH?

If high, maybe

- **Sulfur lowers pH**
- Apply only amount recommended by report
- Till into soil – takes 2-3 months to react
- Consider adding if pH over 7.5 and plants show symptoms of micronutrient deficiency

Micronutrient Deficiency

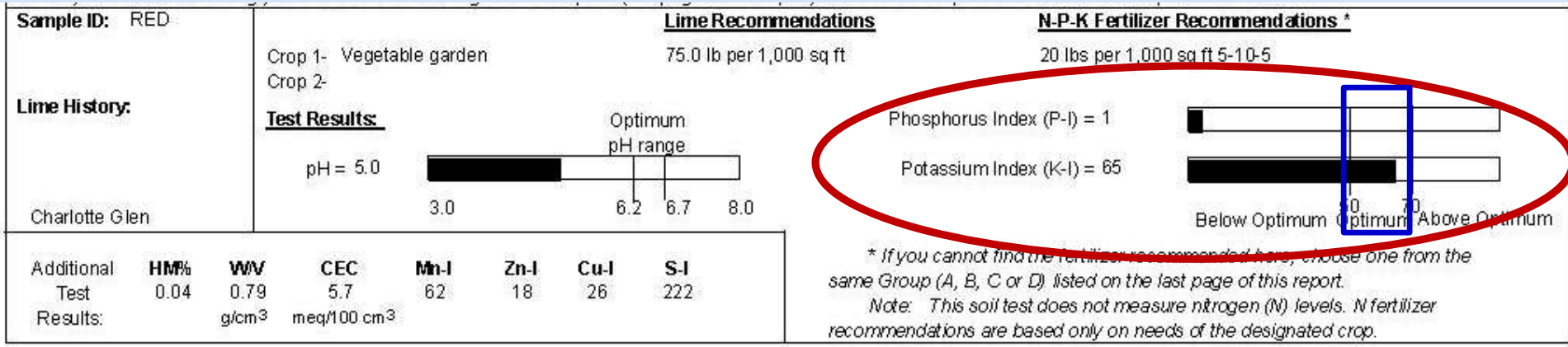
Zinc

Magnesium

Iron

Epsom Salts = Magnesium sulfate, lowers pH and provides Mg and S, two nutrients that are often deficient at higher pH – apply no more than 2-3 times a season

Phosphorus & Potassium Index



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Crop 1- Vegetable garden — 75.0 lb per 1,000 sq ft

Crop 2-

Test Results:

pH = 5.0

Optimum pH range

3.0 6.2 6.7 8.0

N-P-K Fertilizer Recommendations *

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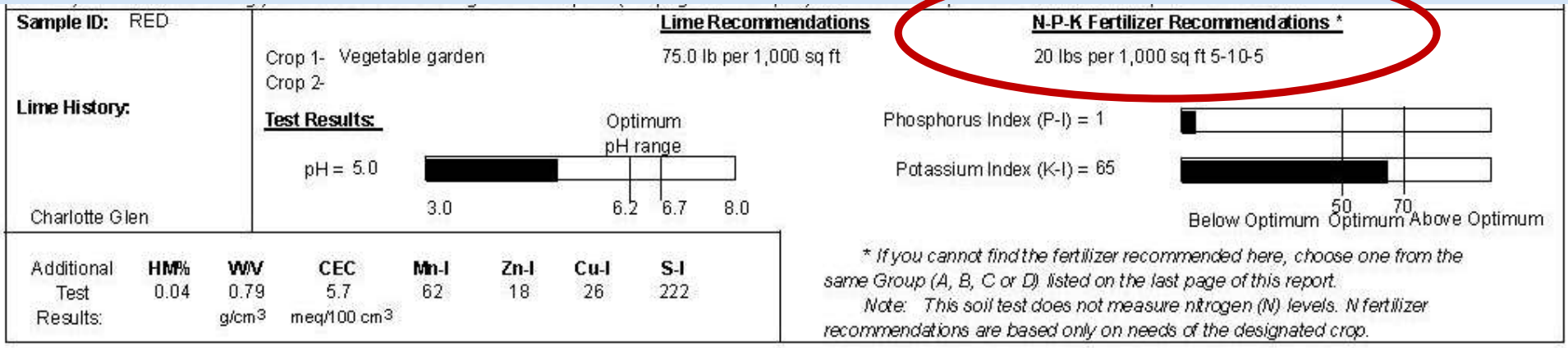
- Both are essential plant nutrients
- Between 50 and 70 is ideal
  - Shown as actual number and bar graph
- If less than 50 will recommend fertilizer
- **Notice:** There is no Nitrogen index
  - Too volatile to measure

Fertilizer Recommendation



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Lime Recommendations

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Crop 2-

N-P-K Fertilizer Recommendations *

20 lbs per 1,000 sq ft 5-10-5

Test Results:

pH = 5.0 (Optimum pH range: 6.2 – 6.7; 3.0 – 8.0)

Phosphorus Index (P-I) = 1

Potassium Index (K-I) = 65

50 70

Below Optimum | Optimum | Above Optimum

Additional Test Results:	HM% 0.04	W/V 0.79 g/cm³	CEC 5.7 meq/100 cm³	Mn-I 62	Zn-I 18	Cu-I 26	S-I 222

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Note: This soil test does not measure nitrogen (N) levels. N fertilizer recommendations are based only on needs of the designated crop.

- Given in pounds per 1000 square feet
- Based on index numbers and crop intend to grow
- Nitrogen recommendation based on anticipated crop needs
- Can use natural (organic) or synthetic fertilizers to supply

What the numbers mean:

Number in the analysis represent % of:

N	P	K
		
Nitrogen New growth	Phosphorus Roots, Flowers and Fruits	Potassium/Potash Flavor and Hardiness

This knowledge allows you to "decode" fertilizers!

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Nitrogen 10-5-15

N

- Promotes green, leafy growth
- **Most limiting nutrient**
  - Most common deficiency
- **Easily leaches from soil** – Can pollute surface and groundwater
  - **Not enough?** Stunted growth, yellow leaves – older leaves first

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Nitrogen

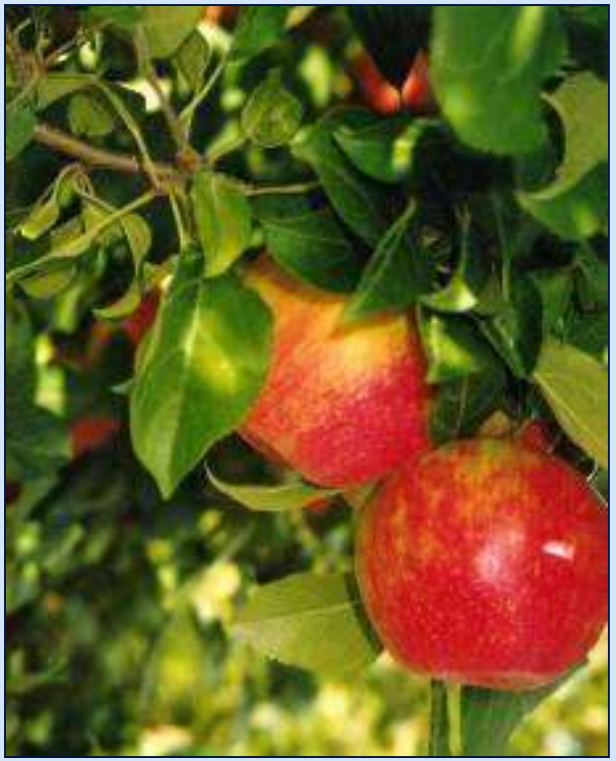
Too much:

- **Burns plants**
- **Can increases pest problems**
- **Reduces vegetable yields**
  - Especially in beans, tomatoes, cucumbers, squash, peppers

Phosphorous 10-**5**-15

P

- Promotes root growth, flower, fruit and seed production
- **Held tightly by soil – leaching rare**
- **Causes pollution when soil erodes,** P attached to soil particles
- **Needs to be incorporated before planting**
- **Frequently fertilized** soils often have too much



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Phosphorous

P

Not Enough?

- Reduced growth
- Plants dark green
- Purple or reddish color to older leaves

Not taken up well in cold or wet soils

- Deficiency symptoms in winter usually due to cold weather rather than lack of nutrient in soil

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Potassium 10-5-15

K

- Increases drought tolerance, disease resistance and improves winter hardiness
- **Improves flavor in melons and tomatoes**
- Sometimes called potash
- **Visible deficiency symptoms rarely seen** though levels often low

18-18-21

Nutrient Sources

Synthetic

- Manmade
- More predictable, higher analysis
- More likely to leach, burn

Natural

- Often low analysis, slow to release
- Condition the soil – feed microbes
- Typically more expensive
- Do not release well in cold weather

Compost vs. Fertilizer

- **Compost** = Improves soil, supports microbes, adds some nutrients but often not enough; N not immediately available
  - » Typical analysis: 2-1-1
- **Fertilizers** = more concentrated source of nutrients. Added in much smaller amounts. Typical analysis:
  - » Organic: 5-3-3
  - » Synthetic: 14-14-14

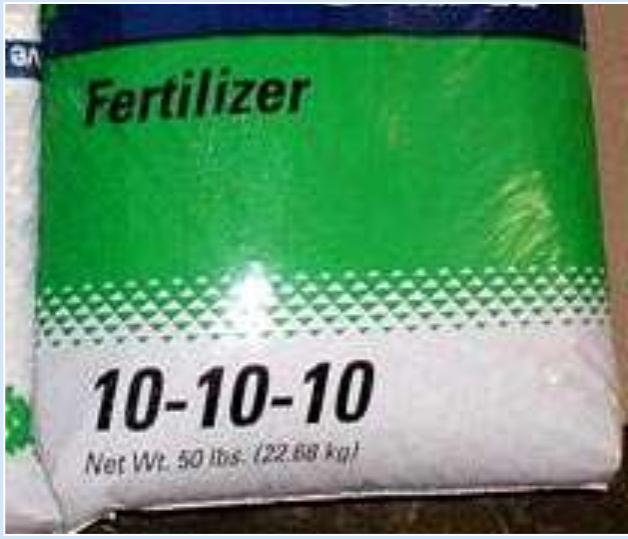
Slow Release Fertilizers

- **Time release fertilizers** (e.g. Osmocote) = slowly release nutrients over 2-6 months
- **Organic fertilizers** naturally slow release – nutrients not readily available in cold weather; feed microbes

Fertilizers

- **Liquid fertilizers** (Miracle Grow, Compost tea) = **fast food**, quick boost but no sustained feeding
- Good for plants growing in potting soil in containers
- Not recommended for garden/landscape except to help seedlings establish OR if need quick fix (nitrogen deficiency)

Fertilizers



10-10-10 and other granular fertilizers

- Dissolve in water – excess leaches
- Apply only small amounts at a time, reapply as needed – easy to over do it!

Specialty fertilizers

- **Fertilizer spikes** – not good! Need to spread fertilizer across root zone, not concentrate
- **Rose, Tomato, etc.. Fertilizer** – just a marketing ploy

18-18-21

Can't Find The Recommended Analysis?

1. Find something with similar ratio, for example, 5-10-5 is a 1:2:1 fertilizer and adjust rate accordingly
2. Use a complete fertilizer but **always base application rate on Nitrogen** – eg., if you have 5-3-3 (Plant-tone), apply at same rate recommended for 5-10-5

If need N only

- Blood meal is the most common natural N source
- Dried Blood is 12% nitrogen, 12-0-0

To determine how much is needed per 1000 sq. ft. to supply 1 lb of nitrogen, divide %N into 100:
100/12 = 8.3 lbs per 1000 sq. ft.

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If need additional Phosphorous

- **Bone Meal**
  - Natural
  - 0-10-0
  - 10% P
- **Triple Super Phosphate**
  - Synthetic
  - 0-45-0
  - 45% P

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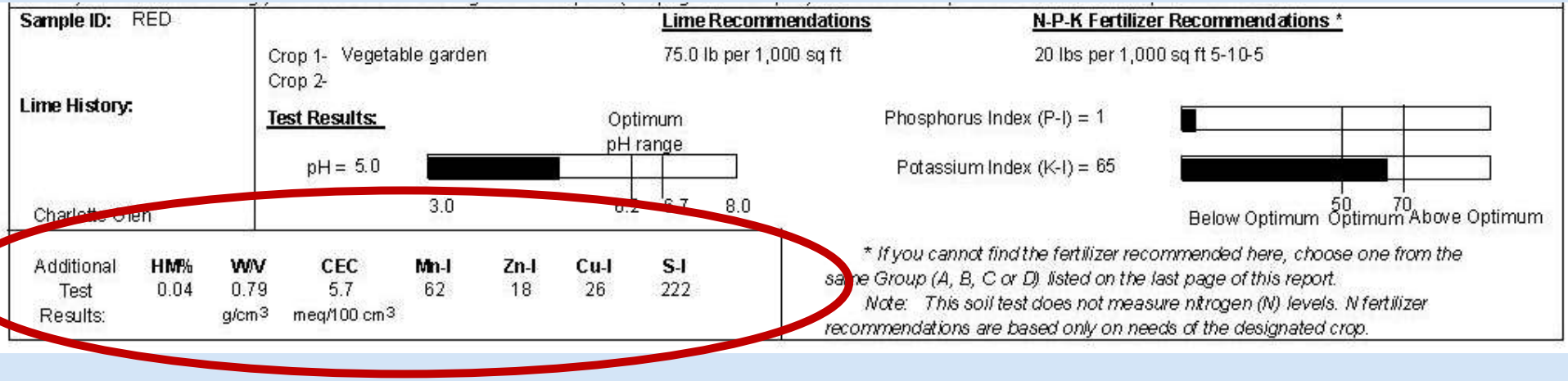
If need additional Potassium

- **Muriate of Potash,** 0-0-60, not organic
- **Wood ashes** – K levels vary from 3 to 7%
  - Also raises soil pH!
- **Greensand**, 0-1-5

When to Fertilize

- **Vegetables** – at planting time and again 3-6 weeks later if needed
- **Annuals** – at planting time; may need additional N by mid-summer
- **Fruit trees, grapes, berries** – typically early spring
- **Trees, shrubs, perennials** – spring IF NEEDED
- **Fescue Lawns** – Fall and early Spring
- **Bermuda/Zoysia**: Summer

Additional Information



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HM% - humic matter, not total organic matter

W/V – Weight/Volume, over 1.5 sandy; under 0.5 organic

Mn, Zn, Cu, S indices – ideal range 50-70

Zn and Cu often high, want under 2000

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Cation Exchange Capacity (CEC)

- Measure of soil's capacity to hold nutrients
- Increases as organic matter, pH, and clay content increase
- Sandy soils lower, eg. 2.0
- Organic/Clay soils higher, eg. 25

Additional Test Results:	HM% 0.04	W/V 0.79 g/cm^3	CEC 5.7 meq/100 cm^3	Mn-I 62	Zn-I 18	Cu-I 26	S-I 222

Organic matter increases CEC

What the Report Doesn't Tell You

- Drainage issues
- Soil compaction

Both affect root health and plant growth – Must correct these problems before lime or fertilizer can help

- Add organic matter

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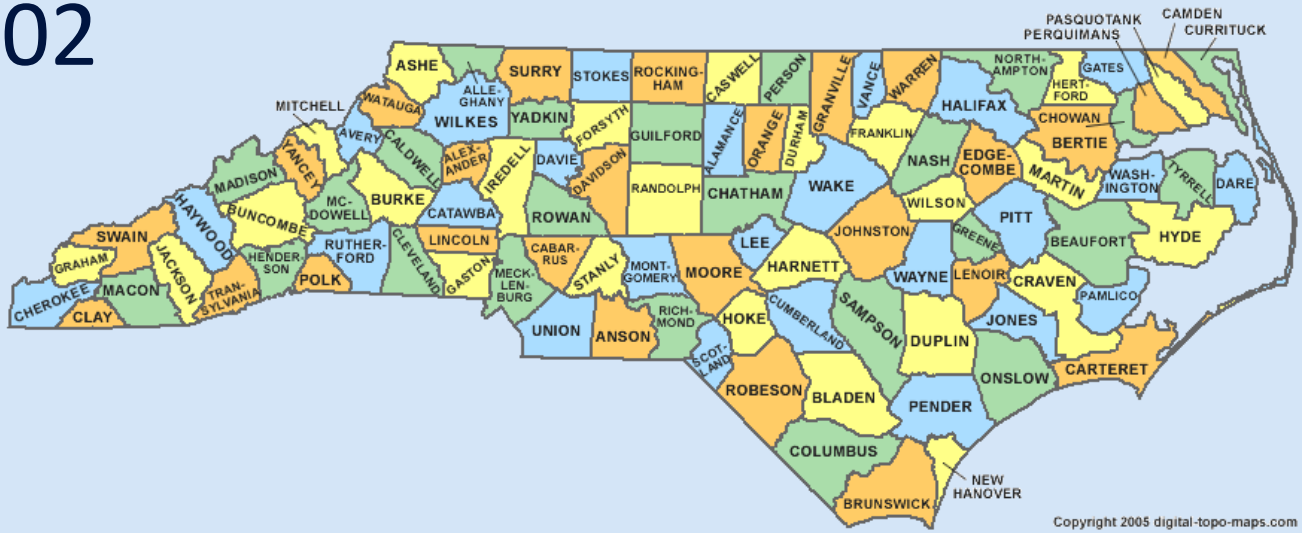
Questions?

There is an Extension center in every NC County!

Chatham County Center

http://chatham.ces.ncsu.edu

919-542-8202



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