Pest, Disease, and Weed Management
in Vegetable Gardens

Matt Jones
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NC Cooperative Extension - Chatham County Center

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NC COOPERATIVE EXTENSION

Part II

Abiotic Disorders

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Causal Factors of Plant Problems

- Cultural
- Environmental

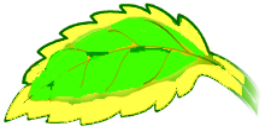
} **Abiotic Causal Factors**

- Pests
- Pathogens

} **Biotic Causal Factors**

Cultural Causal Factors

Univ. of Arizona



Fertility Management

Pesticide Misapplication

Water Management

Environmental Causal Factors

Temperature Fluctuations
Temperature Extremes
Sunlight

Random Acts of Nature

Soil COMPACTION

Heavy rains and floods

Nutrient Deficiencies

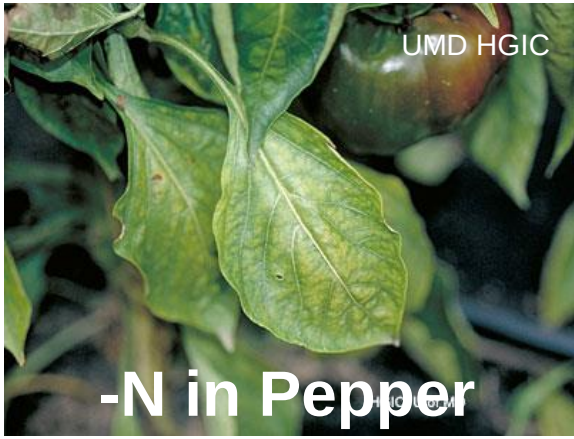
Some nutrient deficiencies (and toxicities) are symptomatic in leaves

Symptoms

- Chlorosis or necrosis
- Entire leaf, margin, or interveinal
- Older vs. younger leaves

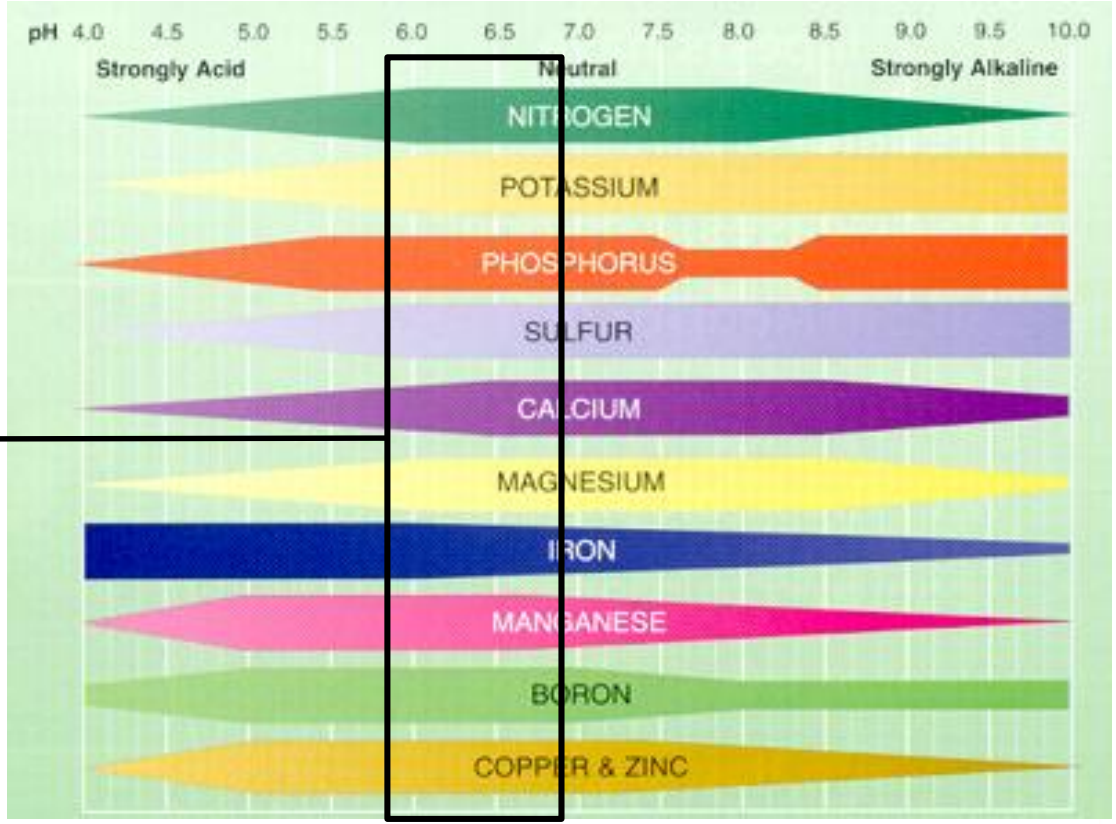
Requires tissue analysis for confirmation

- NCDA ($3)
- http://www.ncagr.gov/agronomi/uyrplant.htm



How pH Affects Nutrient Availability

Many vegetable crops favor pH 6.0-6.8



Adding Lime to Raise Soil pH

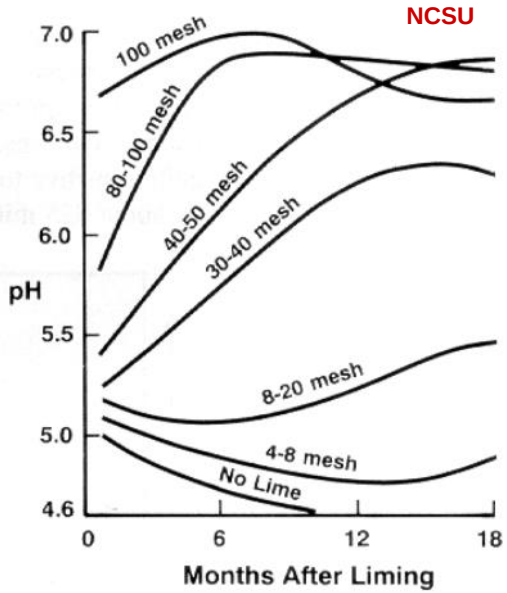
Only add lime based on soil test results!

Lime Materials

- Calcitic lime ($CaCO_3$, $Ca(OH)_2$, CaO)
- Dolomitic Lime ($MgCO_3$)

Finer grains, faster reaction

- Most agricultural lime is 8-20 mesh
- 4-6 months to react & raise pH



Soil Acidity & Liming: Basic Information for Farmers and Gardeners
https://content.ces.ncsu.edu/soil-acidity-and-liming-basic-information-for-farmers-and-gardeners

Adding Sulfur to Lower Soil pH

For acid loving plants

- *Rhododendron* spp., blueberries

Elemental Sulfur

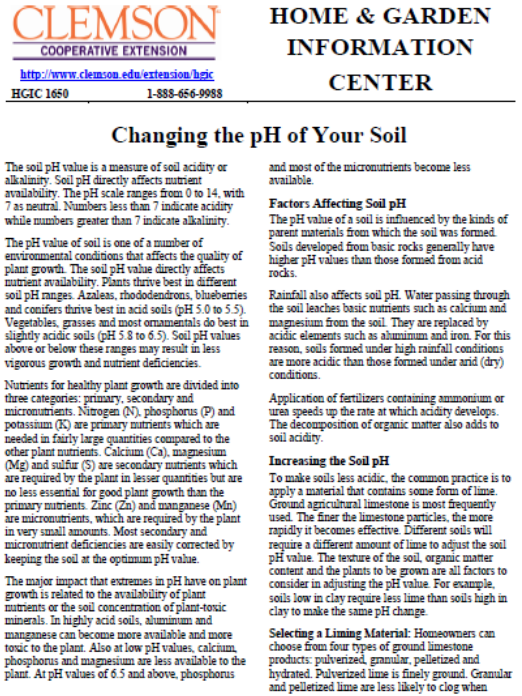
- Biological reaction (slow)
- Potent

Aluminum Sulfate

- Chemical reaction (fast)
- Less potent

Acidifying Fertilizers

- Ammonium sulfate, $(NH_4)^2 SO_4$ (21-0-0)
- Sulfur-Coated Urea



CLEMSON COOPERATIVE EXTENSION

http://www.clemson.edu/extension/hgic

HGIC 1650 1-888-656-9988

HOME & GARDEN INFORMATION CENTER

Changing the pH of Your Soil

The soil pH value is a measure of soil acidity or alkalinity. Soil pH directly affects nutrient availability. The pH scale ranges from 0 to 14, with 7 as neutral. Numbers less than 7 indicate acidity while numbers greater than 7 indicate alkalinity.

The pH value of soil is one of a number of environmental conditions that affects the quality of plant growth. The soil pH value directly affects nutrient availability. Plants thrive best in different soil pH ranges. Azaleas, rhododendrons, blueberries and conifers thrive best in acid soils (pH 5.0 to 5.5). Vegetables, grasses and most ornamentals do best in slightly acidic soils (pH 5.8 to 6.5). Soil pH values above or below these ranges may result in less vigorous growth and nutrient deficiencies.

Nutrients for healthy plant growth are divided into three categories: primary, secondary and micronutrients. Nitrogen (N), phosphorus (P) and potassium (K) are primary nutrients which are needed in fairly large quantities compared to the other plant nutrients. Calcium (Ca), magnesium (Mg) and sulfur (S) are secondary nutrients which are required by the plant in lesser quantities but are no less essential for good plant growth than the primary nutrients. Zinc (Zn) and manganese (Mn) are micronutrients, which are required by the plant in very small amounts. Most secondary and micronutrient deficiencies are easily corrected by keeping the soil at the optimum pH value.

The major impact that extremes in pH have on plant growth is related to the availability of plant nutrients or the soil concentration of plant-toxic minerals. In highly acid soils, aluminum and manganese can become more available and more toxic to the plant. Also at low pH values, calcium, phosphorus and magnesium are less available to the plant. At pH values of 6.5 and above, phosphorus and most of the micronutrients become less available.

Factors Affecting Soil pH

The pH value of a soil is influenced by the kinds of parent materials from which the soil was formed. Soils developed from basic rocks generally have higher pH values than those formed from acid rocks.

Rainfall also affects soil pH. Water passing through the soil leaches basic nutrients such as calcium and magnesium from the soil. They are replaced by acidic elements such as aluminum and iron. For this reason, soils formed under high rainfall conditions are more acidic than those formed under arid (dry) conditions.

Application of fertilizers containing ammonium or urea speeds up the rate at which acidity develops. The decomposition of organic matter also adds to soil acidity.

Increasing the Soil pH

To make soils less acidic, the common practice is to apply a material that contains some form of lime. Ground agricultural limestone is most frequently used. The finer the limestone particles, the more rapidly it becomes effective. Different soils will require a different amount of lime to adjust the soil pH value. The texture of the soil, organic matter content and the plants to be grown are all factors to consider in adjusting the pH value. For example, soils low in clay require less lime than soils high in clay to make the same pH change.

Selecting a Liming Material: Homeowners can choose from four types of ground limestone products: pulverized, granular, pelletized and hydrated. Pulverized lime is finely ground. Granular and pelletized lime are less likely to clog when

https://hgic.clemson.edu/factsheet/changing-the-ph-of-your-soil/

How to determine nutrient & pH status?

Soil Testing from the NCDA!

- Only reliable method to asses soil nutrient content and pH
- Boxes & forms available from NC Cooperative Extension
- Analysis is *free* for NC residents (Apr.-Nov.)
  - $4/sample: Dec-Mar

Deliveries suspended during COVID-19

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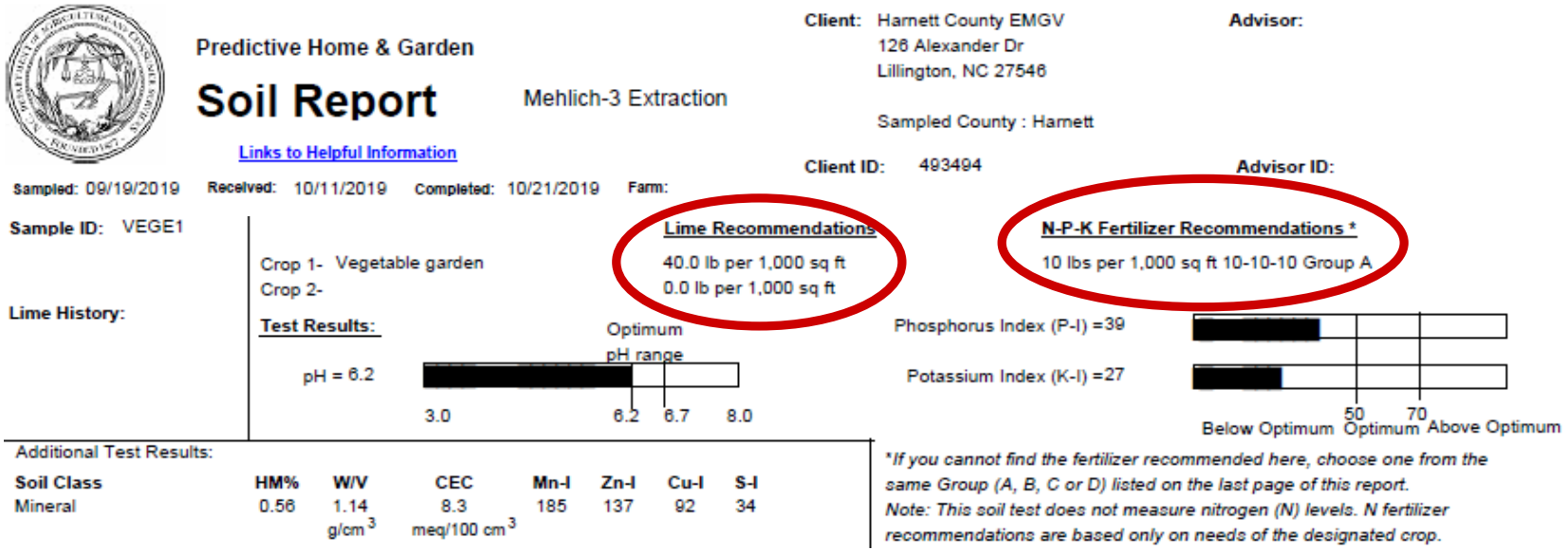
Master Gardener | Chatham County

Chatham MGVs deliver soil samples monthly during the free period!

How Much Fertilizer & Lime to Apply?

Follow test report recommendations!



Predictive Home & Garden

Soil Report Mehlich-3 Extraction

Links to Helpful Information

Client: Harnett County EMGV
126 Alexander Dr
Lillington, NC 27546

Advisor:

Sampled County : Harnett

Sampled: 09/19/2019 **Received:** 10/11/2019 **Completed:** 10/21/2019 **Farm:**

Client ID: 493494 **Advisor ID:**

Sample ID: VEGE1

Lime History:

Crop 1- Vegetable garden
Crop 2-

Lime Recommendations
40.0 lb per 1,000 sq ft
0.0 lb per 1,000 sq ft

N-P-K Fertilizer Recommendations *
10 lbs per 1,000 sq ft 10-10-10 Group A

Test Results:

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

Phosphorus Index (P-I) =39

Potassium Index (K-I) =27

50 70
Below Optimum Optimum Above Optimum

Additional Test Results:

Soil Class	HM%	W/V	CEC	Mn-I	Zn-I	Cu-I	S-I
Mineral	0.56	1.14 g/cm^3	8.3 meq/100 cm^3	185	137	92	34

**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.

Abiotic Disorders

Blossom End Rot

Susceptible Crops

- Tomato, pepper, eggplant, squash, watermelon

Symptoms & Causes

- Fruit tissue collapse
- Localized calcium deficiency in developing fruit
- Inconsistent watering
- Low pH
- Excessive nitrogen fertilizers

Good review article:https://extension.unh.edu/resource/growing-vegetables-managing-blossom-end-rot-fact-sheet-0

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Abiotic Disorders

Blossom End Rot

Management

- Water deeply and consistently
  - Mulches help
- Maintain soil pH 6.3-6.8
  - Soil test
- Avoid high N fertilizers
  - Ammonium nitrate
- Remove affected fruits

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Abiotic Disorders

Physiological Leaf Roll

Susceptible Crops

- Tomato

Symptoms & Causes

- Leaves curl inward
- Excess N, heat stress, pruning, climatic factors
- Cultivar dependent

Management

- Does not cause growth or yield reductions
- Provide consistent moisture, proper fertilization

Washington State University

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Abiotic Disorders

Blossom Drop

Susceptible Crops

- Tomato, pepper, eggplant, beans

Causes

- High Temperatures
  - Day > 85 ° F
  - Night > 70 ° F
- Humidity <40% or >70%
- Lack of pollinators

Management

- Plant earlier
- Provide partial shade
- Support pollinators

Bolting

Susceptible Crops

- Cool season leaf crops
- Lettuce
- Crucifers (broccoli, collards, Brussels sprouts)

Symptoms & Causes

- Warming spring temperatures induce flowering
- Leaves become bitter tasting

Management

- Plant and harvest earlier
- See NCSU Vegetable Planting Calendars

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Abiotic Disorders

Tip Burn and Sunscald

Susceptible Crops

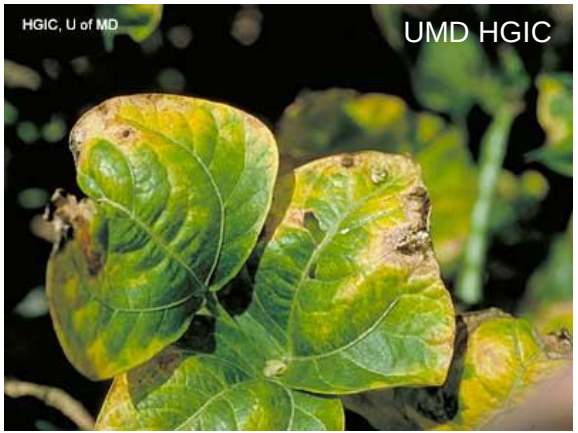
- Many vegetables

Causes

- High temps & water loss (tip burn)
  - Excessive soil fertility
- Prolonged sun exposure (sunscald)
  - Sudden leaf loss

Management

- Provide adequate water
- Address leaf loss issue
- Remove sun-scalded fruits



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