University of California
Agriculture and Natural Resources

UCCE Master Gardener Program
San Luis Obispo County

SOIL TESTING AND PLANT NUTRIENTS
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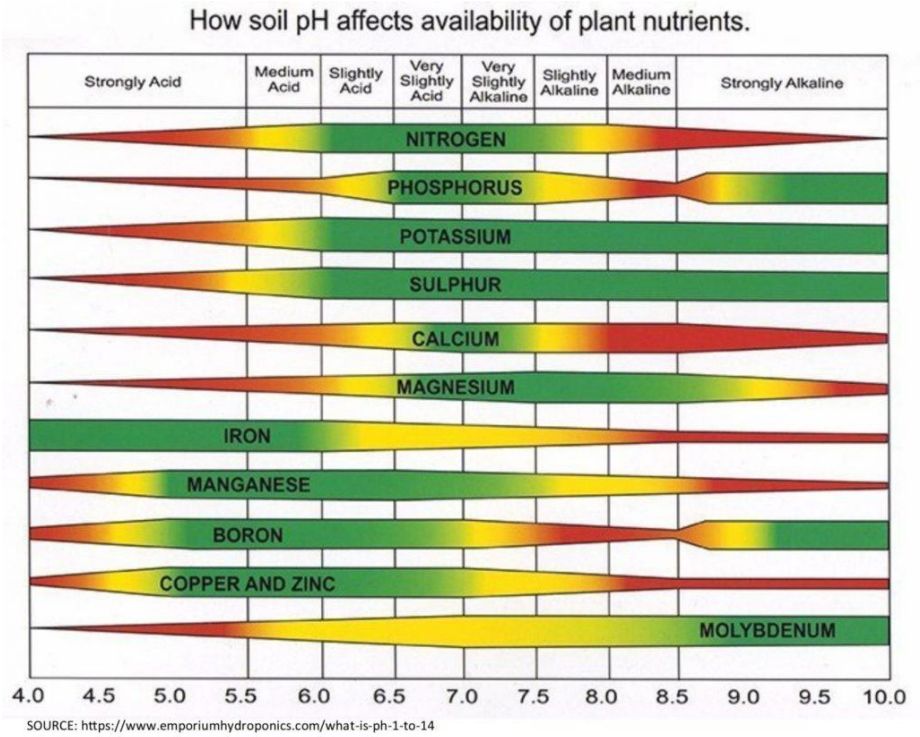
17 nutrients are needed for healthy plant growth

Carbon, hydrogen and oxygen are taken from the air and/or water. Primary nutrients (nitrogen (N), potassium (K), and phosphorous (P); secondary nutrients (calcium, magnesium and sulfur); micronutrients (boron, chlorine, copper, iron, manganese, molybdenum, nickel and zinc) are all drawn from the soil. An imbalance, excess or deficiency of any of these can result in poor plant growth.

pH- Alkalinity or Acidity of Soil

- pH determines the availability of the soil nutrients.
- Most crops do best in pH range of 5.5-7.5.
- Soil can contain all the needed plant nutrients, but they may not be absorbed by the plant in certain pH ranges. See nutrient chart.



SOURCE: https://www.emporiumhydroponics.com/what-is-ph-1-to-14

When to Consider Soil Testing

- Establishing a new garden or landscape
- Current garden shows poor growth. Visual symptoms of deficiency are difficult to diagnose due to overlapping deficiencies and variable symptoms depending on the plant type.
- When: Best time to do soil testing is fall. This allows adequate time for correction of nutrient deficiencies before spring planting.
- How often: Every three to five years is adequate for most gardens
- Benefits: Good for your wallet and the environment as it can prevent overuse of fertilizers.

Soil Testing Options

- Home kits available at garden centers: Test for pH, nitrogen (N), phosphorous (P) and potassium (K)
- Pros - quick and inexpensive especially for small gardens; Cons - accuracy varies, kits may be more suitable for eastern gardens with acidic soil and not the alkaline saline soils of California.
- Commercial labs are more accurate than home kits (vary in cost and materials).

- Labs often have a standard testing panel that may include macronutrients, nitrogen (N), phosphorous (P), potassium (K), calcium, magnesium, sulfur and micronutrients boron and zinc; pH, sodium, concentration of soluble salts and organic matter. Some include trace minerals such as aluminum, arsenic, cadmium and lead.
- Pros - good for large gardens or landscaping projects, testing more extensive and often includes interpretation with recommendations; Cons - cost varies but can be expensive (approx. $50).
- Standard soil analysis does not include testing for chemical residues, water quality, diseases or pests, soil physical characteristics. Although these may be available in a separate analysis. Call or visit the labs website for information.

How to take your sample

Always consult the testing lab's website for specifics on sampling and submitting sample before you begin. Correct sampling is key to an accurate test. Test results are only as good as the sample submitted. Here are some common guidelines:

- The soil tested should come from an area with the same soil texture, use, irrigation and fertilizing program. For example, soil from a vegetable garden should be tested separately from soil samples taken from landscaped area.
- If plants in one section of a garden show poor growth or other problems, they should be sampled and tested separately.
- Use a soil probe or shovel to dig hole to desired depth. Depth depends on type of area sampled. Sample 2-6 inches for lawn or groundcover, 6-8 inches for vegetable beds, 12-18 inches for trees and shrubs.
- Once hole is dug, take sample from side of the hole.
- Use clean, non-rusty tools for sampling. Do not sample when soil is wet or if recently fertilized.
- Take samples from 5 to 15 spots. Place these samples in a clean plastic bucket and mix thoroughly. Remove about 2-3 cups from the mixed soil and secure in a plastic storage bag.

Other Considerations

- Important to remember that soil which has all the needed nutrients will not support healthy plant growth if irrigation water is of poor quality (high in salts, chloride, sodium or boron) or water management is poor (over or under watering).

Regional Soil Testing

- Wallace Labs; http://us.wlabs.com/
- Fruit Growers lab: http://www.fglinc.com/documents/SamplingProcedures-AG/Vegetable_Garden_Soil.pdf
- Farm Supply Company

The list is neither comprehensive nor all-inclusive. No endorsement of any business is intended

References:

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