UMass Extension

Soil and Plant Nutrient Testing Lab
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Corrective Measures and Management of Over-Fertilized Soils

Soils in New England are naturally low in essential nutrients needed for crop production due to high yearly rainfall that leaches out many nutrients. Phosphorus is the only nutrient element that is usually adequate in New England soils because it is not susceptible to leaching. Most soil phosphorus is tightly bound to the soil particles. The exception is in soils with very high phosphorus in close proximity to water. In these cases, phosphorus may be leached into waterways, causing algae blooms and killing fish.

There are several reasons why your soil might have high nutrient values. It may be caused by over-fertilization, or the overuse of compost, manure or other organic materials. It has become increasingly common for soils from gardens and small farms processed by the UMass Soil and Plant Nutrient Testing Lab to contain excessive nutrients, high organic matter and high soluble salts.

Soluble salts are dissolved inorganic solutes such as calcium, magnesium, sodium, chloride, sulfate, bicarbonate, potassium, ammonium, nitrate, and carbonate which are also found in most soils. Sources of soluble salts include commercial fertilizers, animal manures, soil organic matter, composts, runoff from areas where salt or ice-melt products have been used, and irrigation water that is high in dissolved salts (contaminated with road salt).

Excessive soluble salts levels in soils can cause plants to be drought stressed because the water in the soil is pulled away from plant roots. Soluble salts above the normal range for a prolonged period may cause root injury, leaf burn and wilting or death.

It is important that you have your soil tested before applying fertilizer or other nutrient-supplying material such as compost in order to know the current levels of essential nutrients.

Management of soils with excessive nutrient levels

1. **Re-check your sampling method.** Soil test results will only be as accurate as the sample taken. Did you follow proper sampling recommendations below? Review these guidelines and re-sample if needed.
   - Using a clean bucket and a spade, auger, or sampling tube, collect 12 or more subsamples **to a depth of six to eight inches** (four to six inches for turf) from random spots within the defined area.
   - Avoid sampling garden edges and other non-representative areas. Avoid sampling when the soil is very wet. Avoid sampling within six to eight weeks of a lime or fertilizer application (liquid or granular).
   - Some planting media contain prills that provide controlled-release, time-released or slow release fertilizer. These prills are small, round capsules that contain water-soluble fertilizer encased in a semi-permeable resin coating. The prills, sometimes known as Osmocote, release small amounts of nutrients when wet. They provide nutrients over time, usually for several weeks. The rate of nutrient release for most of these fertilizers is regulated by water and temperature, that is, the warmer the temperature, the faster nutrients are released. Remove prills from the soil sample prior to submittal. Prills left in a sample will result in an inaccurately high result.
   - Break up any lumps or clods of soil, remove stones, roots, and debris, and thoroughly mix subsamples in the bucket. Submit one cup of soil from this mixture for testing.
2. **Assess plant health.** Plants vary in their tolerance to high nutrition. The first step is to assess the health of your plants.
   - If plants and roots appear healthy with green leaves, **do not add fertilizer or organic amendments, including compost**. Conduct a routine soil test at the end of the growing season to monitor nutrient values.
   - If plants are not healthy, **do not add fertilizer or organic amendments, including compost**. If you did not request a Soluble Salt test with your initial order, one may request one by contacting the lab. The fee is $6 per sample when added to the Routine Soil Test. Soluble salt levels greater than 0.6 dS/m can cause plant injury and limit growth. Plant injury due to high soluble salts depends on such factors as the stage of plant growth and weather. To improve plant growth in such soils, remove excess salts from the root zone using practices such as leaching and the use of cover crops.

3. **Leach out salts.** Leaching is the removal of soluble nutrients by applying water. To do this, water the soil thoroughly using irrigation water with low salt levels. As a general guideline for leaching out soluble salts from the top foot of soil, apply 6 inches of water to leach about 50% of the salts; apply 12 inches to leach about 80% of the salts. Note that 1" of water over 100 sq. ft. equals 62 gallons of water. For water calculations see: https://water.usgs.gov/edu/activity-howmuchrain.html

4. **Cover crops.** Advanced gardeners can try planting a cover crop to absorb residual nutrients left in the soil at the end of the growing season. When the cover crop is fully grown and lush, cut and remove the tops from the garden. Compost the cut material in a different area. In New England, plant oats, Sudangrass, buckwheat, cereal rye and annual ryegrass to absorb soil nutrients.

   Plant cover crops in late summer to produce significant plant biomass before winter. This biomass captures the soil nutrients in an organic form and slowly releases nutrients when decomposing.

   Annual ryegrass and cereal rye will continue to grow and produce biomass until late November and then regrow in spring. Oats, Sudangrass, and buckwheat reach maximum biomass production when killing frost stops further plant growth.

5. **Monitor plant nutrition.** Have soil tested annually until nutrient levels drop. **Do not apply fertilizer or organic amendments, including compost, until recommended by a soil test**.

   Nutrient levels will come down over time through plant uptake and weathering, so waiting is sometimes the best option. If you are in New England, a high soil pH level will come down over time as well.

References:

Cover Crops and Green Manures, UMass Extension
https://ag.umass.edu/fruit/ne-small-fruit-management-guide/general-information/cover-crops-green-manures
Sundermeier A. 2010. Nutrient Management with Cover Crops. The Ohio State University Extension. Journal of the NACAA 3(1).
http://www.nacaa.com/journal/index.php?jid=45
Soluble Salts in Soils and Plant Health. 2013. Cornell University Cooperative Extension and Dept. of Horticulture
https://gardening.cals.cornell.edu/files/2015/12/Soluble-Salts-May-6-2013-o36voh-2evtxtu.pdf

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