

Soil Testing and Mineral Amendments

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Soil testing plays an important role in evaluating soil health and crop management, capturing snapshots of how the biological, chemical, and physical properties of a soil are interacting to support your crops. The NOFA/Mass Soil Tech Team can help collect and interpret both what's in your soil, as well as how best to amend, through services including Soil Carbon Proxy Testing and Soil Fertility Technical Assistance.

Soil Carbon Proxy Testing provides a comprehensive field-based assessment of carbon indicators, which are collectively suggestive of overall soil health. Biological indicators such as quantification of earthworms in a 1 cubic foot hole, chemical indicators such as active carbon testing, and physical indicators including the slake test, provide a comprehensive assessment of the various factors assembling to impact soil health. Please see our past newsletter articles: "[Soil Carbon Proxy Testing Can Help You Help Your Soil](#)" and "[A Primer on Sustainable Soil Management](#)" for additional information regarding Soil Carbon Proxy Tests and their role in evaluating soil health.

Through a grant funded by the Sustainable Agriculture Research and Education (SARE) program, the NOFA/Mass Soil Tech Team has been training other NOFA chapters in New York and Connecticut to expand regional Soil Carbon Proxy Testing. As a part of this SARE-funded longitudinal study, NOFA/Mass is studying changes in soil carbon at three Massachusetts farms over the course of three years. The project also includes funding for Soil Carbon Proxy testing at an additional seven Massachusetts farms over the course of the project. Please contact the NOFA/Mass Soil Tech Team at soilhealth@nofamass.org for additional information if you are interested in having a Soil Carbon Proxy Test performed at your farm or garden, either in contributing to the SARE project or to benefit your property.

Most farmers and gardeners understand the importance of performing regular soil tests, but what should be done with the results once you have them? The NOFA/Mass Soil Tech Team's Soil Fertility Technical Assistance program serves farmers and gardeners who have completed soil tests and need assistance interpreting the test results. We typically recommend that soil tests be submitted to Logan Labs or UMass Amherst for scientific evaluation; then, upon receipt of test results, the NOFA/Mass Soil Tech Team can help you interpret what the results mean, recommend what to apply to address any deficits, and let you know when it is best to apply the amendments. This targeted approach allows you to remain confident in what you're applying to your fields, knowing that it's appropriate for your soil and crops while maintaining organic certification, and protecting the environment and your budget from overapplication of nutrients.

To help growers effectively and affordably meet the fertilization needs of their farms and gardens, the NOFA Tri-State Bulk Order Program offers an extensive array of fertilizers, composts, and amendments for purchase. The NOFA Tri-State Bulk Order Program typically

opens for ordering each January, with product pickup in mid-March. However, for the first time, NOFA/Mass is offering a Mineral Amendment Flash Sale this October (please follow this [link](#) for more information or to make a purchase). The Flash Sale is exclusive to soil amendments, which can be ordered and picked up before October 23, 2021. This short-term offer allows you to order what you need in sync with your interpreted soil tests and, where appropriate, apply them immediately this fall.

The amendments offered in the Flash Sale are offered in partnership with the Bionutrient Food Association (BFA) with the goal of using naturally-occurring minerals to address underlying issues in agricultural systems that limit crop growth. The BFA has identified locally-sourced granitic and basaltic rock minerals that can be used for systemic soil remineralization, as well as minerals that can address soil deficiencies in both macro and micro/trace nutrients (note that not all products provided are locally-sourced, though all are recommended by the BFA). All available amendments are recommended to be applied with a broadcast spreader unless otherwise noted.

A Summary of Available Amendments and their Practical Uses

Targeted Mineral Amendments

These amendments are designed to address a specific soil deficiency identified through soil testing. NOFA/Mass does not recommend applying a targeted amendment without a prior soil test.

Macronutrient Amendments: These amendments supply specific macronutrients.

- *Gypsum – Pelletized (21% Ca 16% S):* Considered an excellent form of plant-available calcium and sulfate. Calcium is only available once the calcium base saturation exceeds 60%, which can be identified through soil testing. The sulfur is plant-available and does not function as a soil amendment. Yearly application limit is 2000 lbs/acre/yr.
- *Sulfate of Potash – Granular Organic (0-0-50 17% S):* USA-produced, this organic potash (potassium sulfate) supplies 50% potassium. Recommended for soils with low potassium levels but sufficient levels of other macronutrients.
- *Trio Sul-Po-Mag – Granular (0-0-22 22% S 11% Mg):* Also known as Kmag or langbeinite, this organic sulfate of potash-magnesia supplies 22% potassium, 22% sulfur (as sulfate), and 11% magnesium. Highly recommended for soils low in potassium and magnesium; the potassium is more readily available than potassium sulfate with a slower-acting form of magnesium than magnesium sulfate (epsom salt). Recommended to feed the crop over a season versus building soil-based potassium and magnesium.
- *Florida soft rock phosphate (Calphos):* This medium-coarse powder is mined from Florida and contains 3% available phosphate, but 20% total phosphate that may become plant-available over time through microbial action. Also contains 20% calcium as calcium

oxide. Recommended where phosphate is needed at the rate of 250-1000 lbs/acre or more. Recommended application using drop spreader or some broadcast spreaders.

- *Coal screenings (carbon)*: The BFA considers this new, mined form of concentrated carbon experimental, potentially offering the same benefits as other sources of carbon, such as compost and humates, but much less expensive. Due to possible heavy metal contamination, use sparingly, yet levels should be low and not pose a risk. It is a dusty coarse powder, and, as with all dust, avoid breathing it. Recommended application at up to 200 lbs/acre using a drop spreader or some broadcast spreaders.
- *Potassium Sul-Po-Mag Sulfur*: This blend of sulfate of potash (potassium sulfate), sul-po-mag, and elemental sulfur is intended to be used to address a deficiency in potassium, especially when magnesium is low. This can also be used to feed crops in high-magnesium soils. Granular form.
- *Sulfur – Granular Organic (90%) – pH adjustment*: This organic, granular elemental 90% sulfur product specifically targets soil sulfur deficiencies. Yearly application limit of 100 lbs/acre (90 lbs actual sulfur).

Micronutrient Amendments: These amendments supply specific micronutrients.

- *Boron 10% - Granular*: A granular calcium borate product with 10% boron, this is released slower in the soil than sodium borate, making it less prone to leaching and causing excesses. Yearly application limit is 20 lbs/acre.
- *Copper Sulfate – Granular (15% Cu 6%S)*: Providing 15% copper, this granular copper sulfate product is released slower in the soil than water-soluble copper sulfates, making it less prone to leaching and far less harsh on soil microbiology. The yearly application limit is 53 lbs/acre (which supplies 8 lbs actual copper).

General Mineral Amendments

General amendments supply a balanced range of macro and/or micro nutrients and are typically used as an “all purpose” fertilizer.

- *Carbonatite*: This natural, mined volcanic calcium mineral contains many different minerals and trace elements in a non-leachable, but biologically available form. The composition is roughly: 33% calcium carbonate, 7.5% clay compounds (biotite, vermiculite, greensand, etc.), 6% rock phosphate, and 4% trace elements. Highly recommended all-purpose amendment and/or calcium amendment. Contents: 19.5 Calcium, 1.3% Magnesium, 0.8% Potassium, 3.8% Iron, and 3.2% Phosphate. Not recommended for soils already high in calcium. Apply 500-2000 lbs/acre. Dusty sand form, recommended application with a drop spreader or some broadcast spreaders.
- *Dynamine*: As a natural, mined clay mineral, dynamine contains a wide variety of available elements and has excellent levels of trace elements. Stimulates soil microbiology,

helping to trap ammonia and nitrate. Contents: 3.8% Calcium, 2.4% Magnesium, 1% Potassium, and 2.7% Iron. Recommended application rate 100-1000 lbs/acre, use as a livestock supplement-free choice, or can be added to supplement compost or manure. Powdery clay form, recommended application with a drop spreader.

- *KS Plus (aka Super Sulfur Potash)*: Potassium Sulfate Plus (KS Plus) is a natural, mined mineral that contains high levels of Potassium, Sulfur, Calcium, and trace elements. Thus while it is not a targeted amendment, it is important to have an idea of these nutrients before applying to avoid excesses. It is excellent at bringing energy into the soil system and massively increases biological activity in soil. As a naturally mined product, mineral levels may vary between batches, with elemental sulfate ranging from 3-35%, sulfate forms ranging from 10-70%, readily available calcium sulfate ranging 5-35%, and potassium (as potassium sulfate and potassium silicate) ranging 2.5-8.5%. KS Plus can be mixed with compost and manure to convert volatile ammonia into ammonium sulfate to be used as a nitrogen source, minimizing nitrogen losses and reducing odors. Apply 100-500 lbs/acre based upon sulfur and potassium needs, with smaller maintenance applications thereafter. This is a coarse powder; recommended application using a drop spreader or broadcast spreader.
- *Spring Blend*: Modeled after the Bionutrient Food Association's Spring Blend from past years, is the BFA's standard general fertilizer blend. It supplies 15% humates, 10% alfalfa meal, 10% carbonatite, 10% KS Plus, 10% TN Rock Phosphate, 10% Sul-Po-Mag, 10% Dynamine, 10% humus compost, 5% sea salt, 5% kelp meal, and 5% zeolite. Recommended application rate 1,000 lbs/acre.
- *Garden Blend*: This is a standard blend consisting of Spring Blend mixed with an additional 1,000 lbs of compost to provide additional organic matter. Recommended application rate of 2,000 lbs/acre.
- *Basalt Fines*: Natural, mined paramagnetic rock powder stimulates soil microbiology and supplies minerals and trace elements. This dusty, coarse powder is recommended to be applied with a drop spreader or some broadcast spreaders at a rate of 500-20,000 lbs/acre.

Compost Amendments

These amendments provide a balanced range of macro and/or micronutrients, as well as organic matter through compost.

- *Humates (screened)*: Humates are stable organic compounds that provide a physical home to soil microbiology, as well as providing mineral exchange capacity for both cation and anion elements. Their potential electro-chemical effects may also stimulate additional biological activity. This natural, mined humate should be applied in conjunction with nitrogen, as well as when applying trace element fertilizers, as the

humates can help to buffer the harsh effects of fertilizers on soil biology. Material is dusty, 1/8" screened.

- *Humus compost*: Humus compost is a type of compost that is produced under controlled conditions over a period of time, allowing for the growth of a wide array of microbiology, especially fungi, that works to "humify" a portion of the organic matter. This high-quality sifted compost is recommended for use as a potting soil additive or soil top dress. Recommended application rate 500-4000 lbs/acre, or more, applied using some broadcast or manure spreaders.
- *Humus compost with cobalt, molybdenum, and selenium*: This is the humus compost product mixed with cobalt carbonate, sodium molybdate, and sodium selenate. As a general compost with micronutrients, it supplies trace nutrients not typically tested for by Logan Labs. It is recommended to be used in combination with a lab test that identifies deficiencies, typically in response to an observed plant pathology. BFA recommends applying it at a rate less than 250 lbs/acre; 250 lbs of product contains approximately 6.3 oz Molybdenum, 15 oz Cobalt, and 1.6 oz Selenium. It is recommended to apply this sifted compost with some broadcast and manure spreaders.

Amendments offered during the Mineral Depot Sale are available for purchase on a first come, first served basis [online](#) through Friday October 22, 2021. Products can be picked up from the Mineral Depot in Leominster, MA on October 9, 16, and 23, from 9am-noon (sorry, no deliveries). Order by 5pm on the Friday prior to pick up. As with all amendments, we recommend checking with your organic certifier before using any product on your organically-certified farm.

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