UNIVERSITY OF GEORGIA
EXTENSION

Soil Amendments in Georgia: Facts and Policies

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Advanced manufacturing and food processing are major economic drivers in Georgia, providing jobs and products that are used all over the world. The inevitable outcome of industrial processing is the generation of industrial waste, which must be properly disposed of to avoid adverse environmental impacts. If properly treated, some industrial wastes can be a good source of soil amendments that can be applied to improve soil health—by building soil organic matter, enriching the soil microbiome, improving soil structure, and increasing the water-holding capacity of soil, for example.

Such use of industrial wastes will contribute to the circular economy and reduce wastes that would have otherwise been disposed of in landfills or by incineration. Not all industrial wastes are suitable for land application, so we need policies to govern the use of soil amendments. Because of increasing questions and concerns raised by farmers, conservationists, and members of the public, there is a great need for more information about the use and management of soil amendments from industrial sources. This publication clarifies what the term "soil amendments" refers to and highlights current policies governing the use of these materials in Georgia.

After reading this article, you should be able to:

- explain what soil amendments are, according to the Georgia Soil Amendment Act;
- briefly outline the general provisions of the Georgia Soil Amendment Act; and
- identify industrial by-product-derived (IBD) soil amendments that require compliance with extra provisions in the Georgia Soil Amendment Act.

Soil Amendments

The Georgia Soil Amendment Act of 1976 (O.C.G.A. § 2-12-70) is the official policy governing the use of soil amendments in Georgia. According to the Act, "soil amendment" means any substance intended for changing the characteristics of soil or other growth medium for the purposes of:

a. increasing penetrability of water or air;
b. increasing water-holding capacity;
c. alleviating or decreasing soil compaction; or
d. altering soil or other medium in such a manner that the physical properties are materially enhanced.

In this policy, the term "soil amendment" does not include any substance for which nutritional claims are made, such as commercial fertilizers, liming materials, or unmanipulated vegetable or animal manures. The Georgia Fertilizer Act of 1997 provides the rules and regulations that govern the use of fertilizers in Georgia, and the Georgia Liming Materials Act of 1996 governs

the use of liming materials in Georgia.

Poultry Litter

While poultry litter is commonly referred to as a soil amendment, it is not regulated under the Georgia Soil Amendment Act. Poultry litter is a mixture of poultry manure, feathers, and bedding material that is usually applied by growers as a source of plant nutrients. Typically, it has 3% nitrogen, 3% phosphorus pentoxide (P_2O_5), and 2% potassium oxide (K_2O), plus many secondary and micronutrients. However, the nutrient composition can vary depending on the type of poultry, feed type and ration, number and duration of growouts, and mode of storage and handling of the litter.

Figure 3. Piles of Compost at CompostNow, a Georgia Composting Facility With a Class 2 Certification by the Georgia EPD.

Biochar

Under the act, biochar can be considered a soil amendment. ***Biochar*** is produced by ***pyrolyzing***—burning or heating organic feedstock until it decomposes—under limited-oxygen conditions. The process retains the carbon content of the feedstock by minimizing the formation of carbon dioxide. This means that biochar can have about two times more carbon than the biomass that was pyrolyzed. Biochar also has a low decomposition rate and can last more than 100 years in soil.

Biochar has desirable physical and chemical properties, and land application of biochar could improve various soil functions, including physical support, biodiversity and habitat quality, nutrient cycling, and water flow and storage. In particular, biochar has a high ***cation***

exchange capacity (a measure of a soil's ability to supply nutrients to plants), which helps it retain nutrients on its surface and improve the water-holding capacity of the soil.

Mulch

Mulch may also be considered a soil amendment under the Georgia Soil Amendment Act when the product label claims it to be a soil amendment or provides directions for incorporation into the soil. ***Mulch*** is any organic or inorganic soil-surface cover used to retain moisture in the soil. It impedes evaporation, creates a physical barrier to discourage weed growth, maintains a constant temperature by insulating the soil, discourages runoff and soil erosion by shielding the soil surface from water abrasion, and promotes water absorption and retention.

While the Soil Amendment Act does not include any substance for which nutritional claims are made, the application of biosolids, compost, biochar, and certain mulch materials will nonetheless enrich the soil with nutrients.

General Provisions of the Georgia Soil Amendment Act

Five general provisions are covered under the Georgia Soil Amendment Act:

1. prohibitions,
2. sampling and analyses,
3. registration and renewal,
4. labeling, and
5. tonnage reports.

A simplified summary of the rules is provided below. Readers are encouraged to read the official Georgia Soil Amendment Act of 1976 at the website provided in the For Further Reading section.

Rule 40-31-1-.02 Prohibitions Applicable to All Soil Amendments

The rule prohibits the registration, distribution, or application of materials that contain any amount of nonagricultural biosolids or materials collected by a grease trap at a food-production facility. It also prohibits misbranding or adulterating soil amendments. In other words, a registered soil amendment cannot be mixed with an unregistered product and applied to the land. This prohibition rule ensures that soil amendments are safe for land application.

Rule 40-31-1-.03 Sampling and Analysis

The sampling and analysis rule grants the commissioner of the Georgia Department of Agriculture or their designated agent the authority to freely collect samples of a soil amendment from any public or private premises within Georgia where a soil amendment is manufactured, processed, packed, stored, distributed, held for distribution, applied, or held for application. It

also includes access to vehicles or containers used to transport, hold, or apply a soil amendment. The commissioner may determine methods of sampling and analysis suitable to assess compliance with the act and chapter.

Rule 40-31-1-.04 Registration and Renewal Requirements Applicable to All Soil Amendments

Every prospective soil-amendment registrant is required to submit a draft copy of the soil amendment's label to the commissioner, along with the registration request forms. In addition, the commissioner may require a prospective registrant to submit proof of specific claims made for a proposed soil amendment, or proof of the soil amendment's usefulness and value. The proof must be based on research data, and the commissioner may require the experimental data to be developed from tests conducted under conditions identical to or closely related to those in Georgia. The commissioner may rely on the advice of the University of Georgia College of Agricultural and Environmental Sciences' experiment station personnel or other university personnel in evaluating the experimental data on a proposed soil amendment.

The requirement to have the research data based on conditions identical to or closely related to those in Georgia is very important. For instance, most soils in the southeastern U.S. are natively acidic, compared to most soils in the western U.S. that are natively alkaline. Differences in soil pH could affect the usefulness of certain soil amendments depending on the location.

Rule 40-31-1-.05 Labeling

The labeling rule requires that all soil amendments have a label that includes the product name; a statement of specific claims, or—if no specific claims are made—the soil amendment's value; the concentration of soil amending and other ingredients; the directions for use; the net weight; and the name and address of the registrant.

For bulk shipments, the rule requires that a physical or electronic copy of the label be provided to the person to whom the soil amendment is distributed by the time of delivery. The labeling requirement, especially the directions for use, ensures that soil amendments are applied safely.

Rule 40-31-1-.06 Tonnage Reports

The tonnage reports rule requires that all registrants who distribute a soil amendment in Georgia file a semiannual report with the commissioner. The report must provide the soil amendments distributed within Georgia that are either in containers over 10 lb in weight or in bulk. A tonnage fee also must be paid for the tonnage distributed to unregistered recipients; currently the fee is $0.30 per ton. The tonnage report must be based on the soil amendment's weight at the time of delivery, rather than on a dry-weight basis.

Industrial By-Product-Derived Soil Amendments

Industrial by-product-derived soil amendments, also referred to as IBD soil amendments, are derived from one or more industrial by-products, sewage sludge, or chemical by-products of pulp digestion. Registrants of IBD soil amendments must comply with supplemental regulations in addition to the general provisions of the Georgia Soil Amendment Act.

The supplemental regulations include:

1. supplemental registration and renewal requirements;
2. control,
3. supplemental restrictions and prohibitions;
4. records, and
5. elemental concentration limits.

The extra provisions for IBD soil amendments do not apply to (a) biosolids treated to Class A or exceptional-quality sludge standards following a sludge management plan approved under a permit issued by Georgia EPD; (b) compost produced by a Class 1, Class 2, or Class 3 composting or anaerobic digester facility following rules enforced or a permit issued by Georgia EPD; or (c) forest products or soil amendments derived from industrial by-products generated solely from forest products. This excludes chemical by-products of pulp digestion, slates, clays, shells, gypsum, and lime.

A list of all companies in Georgia producing soil amendments or industrial by-product-derived soil amendments can be accessed on the Georgia Department of Agriculture website (https://www.agr.georgia.gov/search-licenses). For further information on the extra provisions for IBD soil amendments, see Georgia Code 40-31-2.

A nutrient management plan (NMP) is required for every site where an IBD soil amendment will be applied, and application of the IBD soil amendment cannot be made until 48 hr after the NMP is obtained for the site. See Georgia Code 40-31-3 for the rules and regulations on NMP for IBD soil amendments.

A typical nutrient management plan for IBD soil amendments must contain the following information:

- A description of the property, including the property's address.
- Color aerial and topographic maps of the site.
- Information on the soil at the application site.
- The agricultural operations at the site, including crops, animal husbandry, and related yield goals.
- Nitrogen and phosphorous application rates for the crops to be grown in each application area, based on published literature for crops in Georgia.

- Required practices to maintain a soil pH within the optimum range for crop production (between 6.0 to 7.5), including supplementally applying lime, gypsum, or other materials during the period when the registrant's product is being applied at the site.
- Maximum hydraulic loading rates in inches per hour or gallons per hour and the maximum total hydraulic loading amount per application for IBD soil amendments applied by subsurface injection.
- Information outlining the required timing and method of IBD soil amendment application. For instance, IBD soil amendments with greater than or equal to 85% moisture content must be applied via subsurface injection, whereas IBD soil amendments with less than 85% moisture content can be applied topically, but it must be followed by incorporation into the soil within 6 hr of application.
- Best management practices to protect human health and the environment.
- A representative analysis of the IBD soil amendments intended for land application. The analysis must include ammonia-N, total Kjeldahl nitrogen, total nitrogen, nitrate-N, volatile solids, total solids, pH, total phosphorus, total potassium, arsenic, cadmium, copper, lead, mercury, molybdenum, nickel, selenium, zinc, and aluminum.

Industrial waste that cannot be registered for land application must be properly treated or disposed of. Industrial wastewater treatment entails two basic stages (primary and secondary treatments). In the primary stage, solids are allowed to settle and are removed from the wastewater. The secondary stage uses biological processes to further purify the wastewater. Sometimes, the stages are combined into one operation to enhance efficiency.

Landfilling and incineration are the common ways to dispose of solid industrial wastes. Compared to incineration, landfilling of waste is relatively less costly, but there are environmental concerns related to the release of greenhouse gases, such as methane and carbon dioxide. In addition, landfilled sites should be properly maintained and lined to prevent the release of harmful pollutants into bodies of surface water and groundwater. Moreover, landfilled sites are becoming less and less available because of limited space.

While incineration is more costly, it reduces the volume of waste (leaving incinerated ash) that must go into landfills. Incineration sites require a scrubbing process to prevent the release of harmful air pollutants into the atmosphere. Compliance with all rules and regulations governing the use of industrial wastes will ensure environmental quality in Georgia and the long-term sustenance of advanced manufacturing and food processing industries, which have a major economic impact on the state.

Official Code of Georgia

Georgia Soil Amendment Act, O.C.G.A. § 40-31 (1976 & rev. 2022).
https://rules.sos.state.ga.us/GAC/40-31

Composting and Anaerobic Digestion Facilities. O.C.G.A. § 391-3-4-.16 (1989 & rev. 2021).

https://rules.sos.ga.gov/GAC/391-3-4-.16

Sewage Sludge (Biosolids) Requirements. O.C.G.A. § 391-3-6-.17 (1994 & rev. 2023) https://rules.sos.ga.gov/gac/391-3-6-.17

For Further Reading

Environmental Protection Division. (2006, June). *Guidelines for land application of sewage sludge (biosolids) at agronomic rates*. Georgia Department of Natural Resources. https://epd.georgia.gov/document/document/guidelines-land-application-sewage-sludgepdf/download

Environmental Protection Division. (2024, January). *Georgia rules for solid waste management feedstock categories and compost facility classes*. Georgia Department of Natural Resources. https://epd.georgia.gov/media/128801/download

Glossary

Terms used in this publication include:

Biochar
: Soil amendment product that is produced by burning organic feedstock under limited-oxygen conditions.

Biosolids
: Solid organic matter that is produced as a result of sewage treatment processes.

Cation Exchange Capacity
: A measure of how many positively charged ions are present in soil; this indicates how well the soil can provide nutrients to plants.

Colony-Forming Units (CFU)
: CFU is a unit of measurement indicating the number of microbial (bacteria, virus, fungi) cells in a sample that are capable of growing or developing.

Compost
: A mixture of decomposed organic materials; when piled and mixed properly, decay is accelerated and pathogens and weed seeds are destroyed in the process.

Dissolved Air Flotation (DAF)
: A wastewater treatment process that removes suspended materials through a process involving pressurized air that forces the materials to the surface, where they can be skimmed off more easily.

Enteric Virus Analysis
: An analysis of treated sewage sludge to determine the amount of enteric viruses in the material. Most enteric viruses cause gastrointestinal illness but they also can cause more serious issues. They typically are transmitted by materials contaminated with feces.

Fecal Coliform
: Bacteria that live in the intestinal tracts of warm-blooded animals.

Feedstock
: Organic materials used in compost, such as yard trimmings, food scraps, animal waste, crop residues, food processing by-products, and untreated wood chips or sawdust.

Geometric Mean
: In basic terms, this is a way of determining the average of a set of numbers—such as multiple measurements of fecal coliform taken from a water sample. Mathematically, this is calculated by multiplying all the values together and finding the root of the resulting number. This is different from what most people think of when the term "mean" (arithmetic mean or average) is used, which is when values are added together and divided by the number of values.

IBD Soil Amendment
: A soil amendment derived from industrial by-products.

LAS Permit (Land Application System Permit)
: In Georgia, this is a permit needed to apply treated wastewater to land.

Most Probable Number (MPN)
: A statistical method to estimate a sample's concentration of microbes (bacteria, viruses, fungi) that are capable of growing or developing.

NPDES Permit (National Pollutant Discharge Elimination System Permit)
: In Georgia, this permit is required for any "point source" that allows discharge into state waters. The point source may be a pipe, ditch, well, etc. State waters include lakes, streams, creeks, springs, and other surface or subsurface water, manmade or natural.

Salmonella
: Bacteria that cause gastrointestinal illness with symptoms like nausea, stomach pains, diarrhea, and fever.

Soil Amendment
: Sometimes called a soil conditioner, this is any substance that is intended to change (usually improve) the chemical and physical properties of soil. However, fertilizers, lime, pesticides, and manures are excluded from this definition.

Viable Helminth Ova Analysis
: Helminth ova are eggs of parasitic worms that frequently are found in wastewater or sewage sludge. Analyzing a sample for these eggs helps prevent materials that might cause illness from being spread on pastures, crops, or other land.

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