

Can I Use this Fertilizer on My Organic Farm?

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Overview

Organic farming relies primarily on the cycling of organic matter to maintain soil fertility. The maxim to 'feed the soil to feed the plant' summarizes the organic approach. Compost, cover crops, plant by-products, animal manure, and other biological materials form the bulk of what is applied to organic fields for fertility. Organic farmers are also permitted to supplement the addition of organic matter with the use of other natural products, such as mined minerals. The US Department of Agriculture's National Organic Program (NOP) rule [7 CFR 205] establishes the standard for agricultural products that can be labeled as 'organic.' Most synthetic fertilizers are prohibited by this standard [7 CFR 205.105(a)], with a few specific exceptions found on the National List [7 CFR 205.601(j)].

The standard requires organic producers to manage soil fertility and crop nutrients in a way that maintains or improves soil organic matter content [7 CFR 205.203(a)]. This objective is achieved through crop rotations, growing cover crops and the application of plant and animal materials. Nutrients harvested are expected to be replaced by the recycling of organic matter. However, the applications must be made in a way that does not result in the contamination of crops, soil or water by plants, nutrients, heavy metals, or materials that are otherwise prohibited for organic production. Any fertilizer or soil amendment to be used on certified organic land must be included in the Organic System Plan (OSP) [7 CFR 205.201(a)(2)]. Before any farming input can be applied, the USDA Accredited Certifying Agent (ACA) must approve the OSP [7 CFR 205.201(a)].

Animal manure that is composted or otherwise effectively treated to reduce pathogens may be applied without restriction to crops grown for human consumption. Raw animal manure is subject to an interval between application and harvest of crops for human consumption. Crops that are in contact with the soil, such as carrots, potatoes, spinach and lettuce are subject to an interval of 120 days. Crops not in contact with the soil, such as corn, beans, and fruit, are subject to an interval of 90 days [7 CFR 205.203(c)(1)].

Composting is defined in the regulation based on the carbon-to-nitrogen (C:N) ratio, temperatures reached, and duration. The initial C:N ratio must be between 25:1 and 40:1. Temperatures must reach between 131°F (55°C) and 170°F (77°C). In an in-vessel or static aerated pile system, these temperatures must be maintained for at least three days. Windrow systems must meet these requirements for 15 days and the piles must be turned a minimum of five times [7 CFR 205.203(c)(2)].

Manure may be composted by other means or heat-treated to reduce pathogens. If the ACA can be shown that a treatment has a comparable reduction in pathogens to composting, then crops

may be harvested without the pre-harvest interval. Such processed manures are recommended to be incorporated in the soil so as not to reinfest crops grown for human consumption with food borne pathogens. Sewage sludge is categorically prohibited [7 CFR 205.105(g)].

Buyer Beware

With the growth in organic farming, the number of packaged fertilizers marketed to organic farmers has also grown. Fertilizer labeling laws are enacted state-by-state in the United States. The regulators of fertilizer labeling laws are organized through the Association of American Plant Food Control Officials (AAPFCO). Most states follow the AAPFCO model bill, which defines ‘organic fertilizer’ as ‘[a] material containing carbon and one or more elements other than hydrogen and oxygen essential for plant growth’ (AAPFCO, 2008). This definition permits fertilizers to be labeled as ‘organic’ even if they do not necessarily comply with the NOP standards to produce organic food. As a result, sewage sludge, urea and blended fertilizers that contain organic matter and a variety of synthetic fertilizers that contain some carbon may bear the ‘organic’ label but could result in the loss of the NOP certification of an organic field for three years if applied. There is a tentative definition for ‘organic input’ that more closely follows the NOP standard. However, that tentative definition has not yet been adopted by most states, coordination of state officials with USDA and ACAs will be a challenge, and the other conflicting uses of the word ‘organic’ on fertilizers are expected to continue to cause confusion for certified organic farmers.

Know What is In the Product

When deciding whether to apply a fertilizer to a field, it makes sense to first know the composition of the product. The label should contain complete information on all of the ingredients, but not all fertilizer labels fully disclose all the ingredients. In general, ingredients of plant or animal origin, such as alfalfa meal or feather meal, should be identified in plain language. Some familiar ingredients may require additional information. For example, compost made using plant and animal materials and other natural ingredients would be acceptable. However compost that is made from sewage sludge or fortified with synthetic fertilizers would be prohibited.

Similarly, the presence of various chemical fertilizers, particularly macronutrient nitrogen, phosphate or potash sources on the label would indicate that the product is prohibited for use in organic production. These include all ammonia fertilizers and most nitrate fertilizers. Super- and triple-phosphate are also prohibited.

Highly soluble natural fertilizers are also restricted in their use because of concerns about the effects on soil and the environment. In particular, sodium (Chilean) nitrate, muriate of potash (potassium chloride) and calcium chloride are technically prohibited. However, sodium nitrate can be used for up to 20% of the nitrogen requirements of a crop. Muriate of potash may be applied provided that chloride accumulation in the soil is minimized. Calcium chloride may be used only as a foliar spray to treat a physiological disorder associated with calcium uptake.

Because organic standards are based in part on the cycling of natural nutrients, a number of similar or even chemically identical products can be allowed or prohibited based on their origin or manufacturing. For example, not all sources of lime are permitted. Mined limestone (calcium

carbonate) and dolomite (magnesium carbonate) are allowed. However, quicklime (calcium oxide), burnt dolomite (magnesium oxide), slaked lime (calcium hydroxide), and milk of magnesia (magnesium hydroxide) are not. Mined gypsum is permitted; calcium sulfate that is a by-product of superphosphate manufacture or from reclaimed drywall is not. Natural potassium sulfate from lake brine or recovered from mined sources are allowed, but potassium sulfate from entirely synthetic sources are prohibited.

A few synthetic fertilizers are permitted based on their traditional use in organic farming systems such as stabilized liquid fish products, aquatic plant extracts and humic acid derivatives. These are considered 'semi-synthetic' or nearly natural with a small amount of synthetic processing based on practical considerations. The secondary nutrients elemental sulfur and magnesium sulfate are also permitted from synthetic sources. Synthetic magnesium sulfate may be used only with a documented deficiency.

Synthetic micronutrients are also permitted with a documented soil deficiency of the nutrient in question. ACAs may accept soil or plant tissue tests. Producers should also document the nutrient requirements for the crop being grown. Micronutrients recognized in the rule include boron, cobalt, copper, iron, manganese, molybdenum, selenium and zinc. Cation micronutrients may be applied in sulfate, carbonate, oxide or silicate form. Lignin sulfonate is permitted as a chelating agent.

When products that contain several ingredients that are allowed with restrictions, the ACA will usually require the producer to meet all of the restrictions associated with the restricted ingredients. For example, a blended fertilizer that contains uncomposted manure and synthetic zinc must meet the days-to-harvest interval and also document that the soil has a zinc deficiency.

Do the Ingredients Make Sense?

Because organic fertilizers are comprised mainly of plant and animal materials, they will have relatively small amounts of the macronutrients, nitrogen (N), phosphorous (P) and potassium (K). Guaranteed analyses of fertilizers are often calculated on the phosphate (P_2O_5) and potash (K_2O) that is immediately soluble or plant available, rather than the total amount that is in the product. The guarantees on the label, actual values determined by analysis and the contribution of nutrients by each of the ingredients all need to be consistent.

Fertilizer fraud is a potential problem. Nitrogen is often seen as the first limiting nutrient in organic production and therefore of greatest concern for willful product misrepresentation. Most organic sources of nitrogen are in the form of protein and are not water soluble. Proteins would tend to be in solid form and filtration to remove particles above a size that can pass through emitters would also remove a significant amount of the nitrogen. Protein nitrogen is slowly released in a plant-available form from organic matter. Therefore, the adulteration of fertilizers claimed to be NOP compliant with synthetic soluble nitrogen is a risk, especially with liquid products.

By knowing the approximate contribution of each ingredient for each nutrient, one can estimate whether the reported formulation is consistent with the label guarantee and final analysis. If the nutrients are concentrated in the fertilizer then the waste product from manufacturing the

fertilizer must be more dilute. If F_i the percentage of the ingredient reported in the formulation divided by 100 and the concentration in the ingredient of the nutrient in question is C_i , then the predicted value of the nutrient in the fertilizer should approximate the guarantee, G_j according to this formula:

$$\sum_{i=1}^n F_i C_i \approx G_j$$

In most cases, $G_j = \{N, P_2O_5, K_2O\}$. Nitrogen can be partitioned into nitrate (NO_3-N), ammonia (NH_4-N), organic soluble and organic insoluble. Phosphate can be partitioned into available (weak) and total (strong). The secondary nutrients calcium, magnesium and sulfur may also be indicators. In some cases, deficiencies of secondary minerals and carbon can be indicators of adulteration of synthetic high-nitrogen materials.

In the absence of a laboratory analysis of an ingredient for the reported nutrients, reference values from various published sources can be used.

Brand Name Material Lists

The NOP established a policy that each Accredited Certifying Agent (ACA, certifier) is responsible for conducting its own reviews of inputs for agricultural production, such as formulated pesticides and soil amendments. The NOP also allows certifying agents to recognize reviews conducted by other certifying agents and competent third-party reviewers as described in the Verification of Materials policy linked below. All ACAs are required to verify, along with their clients, that all materials used or planned for use by certified organic operations comply with the NOP. To paraphrase, ACAs have three options available to determine whether branded or formulated products comply:

1. ACAs can contact the manufacturer to obtain disclosure of the contents of the product and verify that they all comply;
2. ACAs may consult with another ACA that has reviewed the information and accept their determination that the material is NOP compliant; or
3. ACAs may consult with a reputable third party source such as the Organic Materials Review Institute (OMRI) to review materials for compliance with the NOP regulation.

ACAs must document their determinations and verify that the inputs are used according to the regulation. ACAs must either have the capacity and expertise to review products or contract with organizations accredited do so. Many ACAs contract with OMRI, a non-profit initially established by certifiers specifically for that purpose. The Washington State Department of Agriculture (WSDA) also reviews products according to the NOP and publishes a list of brand name products that other ACAs use. The OMRI and WSDA lists are both online. These lists are not comprehensive, so there may be other brand name products that can be used. However, in order to be sure that a product complies, the manufacturer must fully disclose all ingredients and manufacturing processes to an ACA or a third party contracted by the ACA. All ingredients must comply with the standards described above.

Record Keeping Requirements

All inputs used for fertility management need to be in the Organic System Plan (OSP). The OSP is part of the initial application for organic certification and includes any subsequent updates provided to the ACA. The OSP is the basis of the record keeping system that is reviewed during the certification process. The certifier must approve the plan for the farm to be certified. Using a fertilizer not on the OSP may result in denial of organic certification. If a producer wants to use fertilizers, soil conditioners, and foliar feeds that are allowed with restrictions, it is especially important to describe how the restrictions are met in the OSP.

The NOP requires that all inputs used and planned for use must be included in the OSP and be reviewed and approved by the ACA before use. When the inspector visits, product labels are sometimes sufficient to demonstrate NOP compliance of a brand name product. If the product is OMRI or WSDA listed, the label should be sufficient proof for the inspector to verify that the brand name product meets the NOP standard. If a product is not OMRI Listed or WSDA Registered, the label will help to verify whether the active ingredients are allowed. However, the farmer or ACA must have a disclosure from the manufacturer that all ingredients—including the carriers, chelating agents, dust suppressants, and stabilizers—to know if it meets NOP requirements.

In addition to labels, producers should keep copies of purchase receipts and shipping invoices for all purchased inputs. Producers and ACAs must maintain these records for five years.

Fertilizer application records must be maintained and are also subject to review during inspections. They can be kept in whatever form is adapted to the farm, but they must be sufficient to demonstrate compliance with the NOP. Normally a record of the material used and the date, rate, and location of application is sufficient. For example, if uncomposted manure is applied to a field, then the date of the application and the date of harvest of the subsequent crop must be recorded.

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This resource guide builds upon two other articles written by Nick Andrews (Oregon State University) and Brian Baker (Organic Materials Review Institute) and published by the eXtension Foundation. For more information, view the following articles at the websites indicated:

Can I Use This Input On My Organic Farm?

<http://www.extension.org/article/18321>

Can I Use this Product for Disease Management on my Organic Farm?

<http://www.extension.org/article/18360>