



Fertilizing the Organic Garden

Organic gardeners build soil fertility through regular use of composts, cover crops, and organic mulches, which provide their crops with a slow, steady supply of nutrients as the organic materials break down in the soil.

Building natural soil fertility is a long-term process. Gardeners who choose not to supplement with synthetic fertilizers may find it takes two or three years of conscientious soil-building before their gardens begin producing lush, healthy plants and abundant harvests.

What makes a fertilizer organic?

Organic growers define organic fertilizing materials as those derived exclusively from decomposed or decomposing plant or animal remains, as well as naturally-occurring mined products subjected to no processing beyond simple physical processes such as washing, crushing or grinding.

Some common organic fertilizing materials include raw or composted animal manures, compost without synthetic additives, seaweed and seaweed extracts, plant meals (such as soybean and alfalfa meal); cover crops tilled under as “green manures” and organic mulches such as legume hay or leaves. Mineral fertilizers include ground limestone, ashes from household wood stoves, rock phosphate and sulfate of potash-magnesia.

All commercial fertilizers, synthetic or organic must by law carry a “guaranteed analysis” on the label, stating the guaranteed minimum percentages of the three major plant nutrients – total nitrogen (N), available phosphate (P_2O_5) and soluble potash (K_2O) – contained in the product. Percentages of other essential plant nutrients, such as calcium, magnesium, sulfur and trace elements may also be listed but are not required.

However, New Hampshire’s laws define organic fertilizer as any material containing carbon and one other element (other than oxygen or hydrogen) essential to plant growth. This means that fertilizers marketed as “organic” may include products manufactured exclusively from synthetic materials. Furthermore, no federal or state law requires all materials included in a fertilizer product to be listed on its label. So, even a product listing cow manure and composted vegetable matter among its ingredients could contain synthetic materials not listed on the label.

Gardeners who prefer to avoid using synthetic fertilizers should look for the words “natural organic” on the container. If gardeners are trying to conform to certified organic production standards, they should look for a statement such as “Approved for use in organic gardens” or “OMRI approved”.

Using animal manures

Animal manures make excellent garden soil amendments. They build organic matter and can contribute significant amounts of plant nutrients, although the nutrient content of animal manures varies widely with type and age of the animals, feeds and manure management methods.

We don't recommend planting directly into a garden soil recently treated with fresh manure. Fresh manure may contain harmful bacteria that, when splashed onto the leaves of crops eaten raw, could cause human illness. Fresh manure may also contain abundant annual and perennial weed seeds that will be difficult to control once they germinate in your garden.

If you plan to use animal manure, we recommend composting the manure first and aging the compost for at least six months before incorporating it into soil, or tilling in fresh manure and planting a cover crop, such as oats or winter rye. The cover crop will hold nutrients and prevent soil erosion. Refer to the Fall Vegetable Garden Activities fact sheet for more information on timing and what crops to use.

Because composts and manures differ so widely in their relative percentages of various plant nutrients, it is difficult to estimate the amounts of nutrients a grower is adding to the soil in any given year from these materials. Most organic gardeners test their soil every two or three years to measure the impact of their long term soil-building practices.

Safety first: protect shallow wells and surface waters

Fertilizers and pesticides may move downward through soil (leach) or move over the soil surface (run-off), posing possible threats to water quality. New Hampshire's Shoreland Protection Act prohibits application of any fertilizers except limestone, slow-release nitrogen, and low-phosphorous products within 250 feet of surface waters. State law also prohibits use of all pesticides and all fertilizers except limestone within 25 feet of shorelines.

Although state law doesn't regulate use of pesticides and fertilizers on home lawns, gardens, and landscapes, UNH Cooperative Extension urges home gardeners to protect their drinking water supply. Even environmentally-friendly products may pose health risks to humans and domestic animals if the product drains into drinking water.

As a rule of thumb we suggest applying no pesticides, and limiting fertilizers (including organic) to agricultural lime and slow-release nitrogen, within 75 feet of a shallow or dug well.

Test that soil!

Cover crops, organic mulches and applications of compost will slowly build soil fertility, but gardeners should have their soil tested on a regular basis – about every three years for thriving, well-established gardens, every year for the first three or four years on new ground. Soil testing is especially helpful when you are using nutrient sources that have uncertain nutrient contents. Over time, the soil test results will give you the information you need to adjust your fertilizing program.

Using your soil test recommendations:

If you want organic recommendations with your soil test results, choose the Organic Soil Test Kit/Form when getting your test kit/form from extension. Your results will then provide soil nutrient levels, which nutrients are needed, potential organic materials to use, and recommended amounts to apply. For example, if the test recommends adding 1 lb of Nitrogen for every 1000 sq. ft of garden, it states that this is equivalent to adding 17 lbs of soybean meal, or 8 lbs of dried blood per 1000 sq ft.

If you would like to use a different nutrient source, use the calculations on page 4 to determine the amount of materials you need. Many organic fertilizers provide more than one nutrient. For example, alfalfa pellets contain significant amounts of both nitrogen and potassium (see Table 1.) Consider this when choosing which nutrient source to use.

Approximate Nutrient content (by weight) of Organic Materials (Nutrient content varies with origin and handling)

Table 1. Nitrogen Sources

Material	N(%)	P ₂ O ₅ (%)	K ₂ O(%)	Relative Availability
Alfalfa Pellets	3	0.5	3	slow
Compost	1-3	0.5-1	1-2	slow
Dried Blood	13	2	.5	med/rapid
Fish Emulsion	4-5	1-2	1-2	rapid
Soybean Meal	6-7	1-2	2	slow/med
Sodium Nitrate	16	0	0	rapid
Cottonseed Meal	6	2	2	slow/med

Table 2. Phosphorus Sources

Material	N (%)	P ₂ O ₅ (%)	K ₂ O(%)	Relative Availability
Colloidal phosphate	0	18-25*	0	slow
Rock phosphate	0	20-32**	0	slow

*3 percent available

**2 percent available

Table 3. Potassium Sources

Material	N (%)	P ₂ O ₅ (%)	K ₂ O(%)	Relative Availability
Sulfate of potash-magnesia	0	0	21	rapid
Wood Ashes***	0	1-3	3-7	rapid
Seaweed Extract	1	2	5	rapid

Table 4. Magnesium Sources

Material	Mg(%)	Relative Availability
Sulfate of potash-magnesia	11	rapid
Wood Ashes***	3-7	rapid
Epsom Salts	10	rapid

***Wood ash has variable P-K-Mg content, and can rapidly raise pH; use carefully!

Source: 2008-9 New England Vegetable Management Guide, <http://www.nevegetable.org>

To calculate material amount needed:

If your recommendations suggest adding 1 lb of nitrogen (N) per 1000 sq ft of soil, and you plan to use cotton seed meal as your N source, you need to figure how much cottonseed meal will provide 1 lb N.

1. First determine what percentage of cottonseed meal is nitrogen. Look back at Table 1. Cottonseed meal is 6% N. (You can also check your product label for %N.)
2. The recommendation on the soil test was that the soil needs 1 lb of N for 1000 sq ft.
3. Divide the percentage of N into 1: $1 \div 0.06 =$
4. The answer is 17. You will need to apply 17 lbs of cottonseed meal to every 1000 sq ft of your garden, to get the needed 1 lb of N to the soil.
5. If your recommendation was that your soil needed 2 lbs of N for every 1000 sq ft, and you were using cottonseed meal, you would divide: $2 \div 0.06 = 33$. You would apply 33 lbs of cottonseed meal to every 1000 sq ft of your garden.

Common calculations are done in the figure below. When in doubt, use the package's N-P-K for calculating amount needed:

Figure 1: Material amount needed.

Soil Test Recommended Rate of →	1 lb per 1000 sq ft	2 lb per 1000 sq ft	3 lb per 1000 sq ft
N sources	Apply this much: (lbs per 1000 sq ft)		
Alfalfa Pellets	33	67	100
Dried Blood	8	15	23
Fish Emulsion	25	50	75
Soybean Meal	14	29	43
Sodium Nitrate	6	13	19
Cottonseed Meal	17	33	50
Compost	*	*	*

*Compost has variable N-P-K content, check the package for correct calculations.

P Sources	Apply this much: (lbs per 1000 sq ft)		
Colloidal phosphate	5	10	15
Rock phosphate	3	7	10
Bone Meal	4	7	11

K Sources	Apply this much: (lbs per 1000 sq ft)		
Sulfate of potash-magnesia	5	10	14
Seaweed Extract	20	40	60
Greensand	14	29	43
Wood Ashes	14-33	29-67	43-100

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