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Michael Johnson

Utah State University Extension

Rich Koenig

Utah State University Extension

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SELECTING AND USING ORGANIC FERTILIZERS

Rich Koenig, Extension Soil Specialist
Michael Johnson, Grand County Extension Agent

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INTRODUCTION

Homeowners recognize the need for timely nutrient applications to promote vigorous plant growth in landscapes and gardens. These nutrients may be supplied by either organic or inorganic fertilizers, or a combination of materials. Many nursery and garden supply stores now stock a wide variety of organic fertilizers. In addition, many organic materials are produced around the home, or can be obtained at little or no cost from livestock operations, municipal green waste collection centers, and local landfills. Virtually any organic material can be used as a fertilizer; however, materials vary considerably in the concentration of plant nutrients they contain and the rate at which these nutrients are released for plant use. Therefore, some organic fertilizers are better for certain situations than others, and different materials need to be applied at different rates to supply the correct amount of plant nutrients.

A common misconception is that organic fertilizers are safer for plants and the environment than inorganic (chemical) products. Improper *organic* fertilizer application can also contribute to surface and ground water pollution, may induce a plant nutrient deficiency or toxicity, or cause salt burn. Properly used, both organic and inorganic fertilizers are safe for plants and the environment. The purpose of this guide is to provide general selection and use information for organic fertilizers. See the related guide, *Selecting and Using Inorganic Fertilizers* for similar information on inorganic products.

DETERMINING NUTRIENT NEEDS

Nutrient needs vary widely depending on soil conditions, previous fertilizer and organic matter additions, and the type of plants grown. The best way to determine which nutrients are needed and in what amounts is to test the soil. A soil test (cost: \$10.00 to \$40.00 per sample) is recommended every two to three years for landscapes and gardens. Sample soils more frequently if you have problems. See your County Extension Agent for instructions on how to collect soil samples and where to send them for analyses.

A soil test report will be accompanied by interpretations and nutrient recommendations for your specific conditions (Figure 1). Nitrogen is the most common nutrient needed in home landscapes and gardens. Table 1 summarizes nitrogen recommendations for a variety of plants. Refer to your soil test report to determine if nitrogen is needed. Ornamentals such as trees and shrubs, as well as turf, will grow at slower rates if less nitrogen is used than the recommendations

listed in Table 1. Slower growth rates may be desirable depending on the goal of the landscaper and the intensity of management. Vegetable nitrogen requirements are designed to produce

Soil Test Report		USU Analytical Labs	
and		Utah State University	
Fertilizer Recommendations		Logan, Utah 84322-4830	
		(435) 797-2217	
		(435) 797-2117 (FAX)	
Date Received: 5/12/98			
Date Completed: 5/12/98			
Name: Homeowner			
Address:			
		County:	
Lab Number: 98011000		Grower's Comments: Acres in Field:	
Identification:			
Crop to be Grown: Garden			
Soil Test Results		Interpretations	Recommendations
Texture	Sandy Loam		
Lime	++	Normal	
pH	7.7	Normal	
Salinity - E _{Ce} mmhos/cm	0.4	Normal	
Phosphorus - P ppm	11	Low	1-2 lbs P ₂ O ₅ /1000 sq ft
Potassium - K ppm	82	Low	2 lbs K ₂ O/1000 sq ft
Nitrate-Nitrogen - N ppm	1.5		2-4 lbs N/1000 sq ft
Zinc - Zn ppm	1.2	Adequate	0 oz Zinc/1000 sq ft
Iron - Fe ppm	7.9	Adequate	
Copper - Cu ppm	0.4	Adequate	
Manganese - Mn ppm	1.8	Adequate	
Sulfate-Sulfur - S ppm	13.0	Adequate	0 lbs Sulfur/1000 sq ft
SAR			
Organic Matter %	3.2		
Notes			

Figure 1. Report from a comprehensive (\$40.00) soil test with recommendations for a mixed vegetable garden.

optimum yields in a garden setting.

Table 1. Annual nitrogen recommendations for landscapes and gardens.

Plants	General requirements	Recommendation
Ornamentals	Low: xeriscapes, natural areas	0 to 1 pound of nitrogen/1000 sq ft
	Intermediate: standard landscapes	1 to 2 pounds of nitrogen/1000 sq ft
	High: flower beds, new landscapes	2 to 4 pounds of nitrogen/1000 sq ft
Turf*	Low maintenance	0 to 1 pound of nitrogen/1000 sq ft
	Intermediate maintenance	2 to 3 pounds of nitrogen/1000 sq ft
	High maintenance	4 to 6 pounds of nitrogen/1000 sq ft
Vegetables**	Low: peas, beans	1 to 2 pounds of nitrogen/1000 sq ft
	Intermediate: asparagus, beet, carrot, melon, cauliflower, broccoli, brussels sprout, celery, pepper, tomato, lettuce, radish, spinach, turnip, squash, pumpkins	2 to 3 pounds of nitrogen/1000 sq ft
	High: onion, sweet corn, potato	4 to 6 pounds of nitrogen/1000 sq ft

*Split the total amount of nitrogen into 2 or more separate applications made over the growing season. To prevent burning do not apply more than 1 ½ pounds of nitrogen/1000 sq ft in a single application.

**For high nitrogen requirement vegetables, apply the intermediate recommendation before planting, then broadcast or band additional nitrogen after plants are well established (see text under fertilizer application methods).

SELECTING AN ORGANIC FERTILIZER

The numbers on an organic fertilizer label refer to the concentration (percent) of three major nutrients in the material: nitrogen (or N), phosphate (or P₂O₅), and potassium (potash, or K₂O) (Figure 2). For example, a 6-12-0 fertilizer (bone meal; Figure 2) contains 6% nitrogen, 12% phosphate (P₂O₅), and 0% potash (K₂O). One-hundred pounds of this material would contain 6 pounds of nitrogen (100 x 0.06), 12 pounds of phosphate (100 x 0.12) and no potash. Fertilizer labels on organic products have been standardized so that the concentration of nitrogen, phosphate, and potash always appear in the same order on the front of the package. Other common organic fertilizers are listed in Table 2. Many organic fertilizers also contain other nutrients like sulfur, iron, and zinc; however, concentrations of these are usually not given on the label because levels are either too low or too variable to be specified. In addition to supplying nutrients, regular use of organic fertilizers also increases soil organic matter levels, which improves soil physical properties like water holding capacity, drainage, and tilth (the physical condition of soil related to structure and the ease of tillage).



Figure 2. Examples of common organic fertilizer products.

If a soil test report indicates levels of some nutrients are high or excessive, select products containing lower concentrations of these nutrients. Further applications of organic materials containing these nutrients may create an imbalance and reduce plant growth. If a soil test report indicates a need for nitrogen, select a high nitrogen material like blood meal or fish meal (Table 2). If nitrogen and phosphorus are recommended, select a high nitrogen- and phosphorus-containing material, or a combination of two separate materials to meet the requirement. For fast growing plants with high nutrient requirements like corn and potatoes (Table 1), use materials that release nutrients rapidly (Table 2). Slow growing plants and xeriscapes can be fertilized with a moderate availability material. Materials with slow to very slow nutrient availability, while good sources of organic matter, generally make poor sources of nutrients for most plants.

The variety of organic fertilizers on the market means the homeowner can find a product to meet any need. Organic fertilizers vary considerably in price. Bulk quantities of organic materials are less expensive than small packages and should be purchased when fertilizing large garden and landscape areas.

FERTILIZER RATE CALCULATION

Nutrient recommendations for landscapes and gardens are expressed in pounds per 1000 square feet (Figure 1; Table 1). Calculate the amount of organic fertilizer needed by using the soil test nutrient recommendation, the concentration of nutrients in the fertilizer selected, and the size of the area fertilized. A simple formula used to calculate the amount of fertilizer required to meet a nutrient recommendation is:

$$\text{Fertilizer needed} = \frac{X \text{ lbs of nutrient}}{1000 \text{ sq. feet}} \times \frac{1 \text{ lb fertilizer}}{Y \text{ lb nutrient}} \times Z \text{ sq. feet area}$$

Where **X** is the nutrient recommendation from a soil test report in pounds/1000 sq ft, **Y** is the percent of the nutrient in the fertilizer *divided by 100*, and **Z** is the square footage of the area fertilized. Garden and landscape areas are usually different than 1000 square feet. Estimate the size of the area to be fertilized by pacing or using a measuring tape to determine length and width. Multiply length by width to calculate area.

Example: A gardener is using blood meal (12-2-1; Table 2) to supply 2 pounds of nitrogen per 1000 square feet. The garden area is 1400 square feet. How much 12-2-1 fertilizer is required for this situation? *Answer:* In the above equation, **X** is 2 pounds, **Y** is 0.12 (12% divided by 100), and **Z** is 1400 square feet. Entering these numbers into the equation gives an answer of 23 pounds of 12-2-1 fertilizer for the garden.

FERTILIZER APPLICATION METHODS

Organic materials can be broadcast on the surface and tilled or watered into soil, or applied in a narrow band on or beneath the surface. A common fertilizer spreader will often work well for applying small quantities of organic fertilizer. Two main types of broadcast applicators are available: the drop spreader and the rotary spreader (Figure 3). Most drop spreaders are capable of applying a wide range of rates; however, the path spread is limited to the width of the unit (normally 18 inches to three feet). Rotary spreaders may

!!!CAUTION!!!

Many organic materials contain high levels of salts. These salts will burn plants if organic materials are over-applied.

broadcast organic materials in a 5 to 10 foot wide path but with less uniformity and rate control than drop spreaders. If necessary, screen the material before spreading to remove large particles.

Spreaders are adjustable for different fertilizer materials and rates of application. The spreader manufacturer will list calibration settings for various *inorganic* fertilizers. The gardener must calibrate these spreaders for *organic* fertilizer materials. Adjust the spreader to a relatively high setting. Place two or three pounds of organic material in the hopper and proceed to spread this amount in a continuous straight path. Note the width of the spread path and the distance traveled to broadcast all of the material. Calculate the rate of application and compare this to the rate needed. For example, if your spreader broadcasts a five foot wide path and you traveled 20 feet to empty three pounds of compost, the rate of application would be three pounds per 100 square feet (5 ft by 20 ft), or approximately 30 pounds of compost per 1000 square feet. Compare this to the rate of compost needed and if necessary adjust the spreader and calibrate again. Because of their relatively low nutrient content, organic fertilizers are applied at much higher rates than inorganic fertilizers. Therefore, even at the highest spreader settings you may have to make two or more passes over an area to apply the required amount of material. Once a spreader is calibrated for a specific nutrient rate and organic fertilizer keep a record of the setting for future use with this material.

Avoid streaking caused by skips and overlap by applying one-half of the fertilizer while traveling in one direction and the remaining one-half while traveling in a perpendicular direction. This method of application is especially important for turf fertilization where streaking is common. An alternative method of broadcasting large quantities of organic material is to space piles of the material throughout the area and spread the piles out uniformly using a garden or leaf rake.

Banding is a convenient way to make in-season fertilizer applications to high nitrogen requiring vegetables like corn (Table 1). Use an organic fertilizer with rapid nutrient availability when banding. To band an organic fertilizer, first calculate the amount of material needed for the area as if you were going to broadcast the material. Divide this amount by the number of plant rows in the area to determine the amount of organic fertilizer to apply for each row. Make narrow furrows six to eight inches away from the base of the plants, two to three inches deep. Distribute the organic material evenly in the furrow and cover with soil.

Liquid and foliar fertilizer applications can be made with water soluble products like fish emulsion or seaweed extract. There is a potential for leaf burning with liquid applications, so follow product label instructions carefully. Manure or compost tea can also be used as a source of liquid fertilizer. Partially fill a burlap or cloth bag with manure or compost and submerge for several days in a bucket of warm water. The resulting “tea” can be applied directly to the soil or foliage of plants.



Figure 3. Rotary (left) and drop (right) fertilizer spreaders.

Table 2. Average nutrient concentrations and rates of availability for various organic materials.

Material	%Nitrogen	%Phosphate	%Potash	Availability*	Notes**
Alfalfa hay	2-3	0.5-1	1-2	slow/mod.	
Bone meal	1-6	11-30	0	moderate	alkaline
Blood meal	12	1-2	0-1	rapid	acidic
Cottonseed meal	6	3	1	slow	acidic
Composts	1-3	1-2	1-2	moderate	alkaline
Feather meal	12	0	0	moderate	
Fish meal	6-12	3-7	2-5	rapid	acidic
Grass clippings	1-2	0-0.5	1-2	moderate	
Hoof/horn meal	12-14	1.5-2	0	moderate	alkaline
Kelp	1-1.5	0.5-1	5-10	moderate	zinc, iron
Leaves	1	0-0.5	0-0.5	slow	
Legumes	2-4	0-0.5	2-3	moderate	
Manures: <i>Cattle</i>	2-3	0.5-1	1-2	moderate	weed seed
<i>Horse</i>	1-2	0.5-1	1-2	slow	weed seed
<i>Swine</i>	2-3	0.5-1	1-2	rapid	
<i>Poultry</i>	3-4	1-2	1-2	rapid	
<i>Sheep</i>	3-4	0.5-1	2-3	moderate	weed seed
Pine needles	0.5	0	1	slow	acidic
Sawdust	0-1	0-0.5	0-1	very slow	
Sewage sludge	2-6	1-4	0-1	moderate	zinc, iron
Seaweed extract	1	2	5	rapid	zinc, iron
Straw/corn stalks	0-0.5	0-0.5	1	very slow	
Wood ashes	0	1-2	3-7	rapid	

*Approximate rate of nutrient release from the material.

**Special properties or characteristics of the material.

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