



# Soil Amendments and Fertilizers

## Fertilizing Guidelines Included by Plant Group

Fertilizers and soil amendments are a wide array of materials added to soils to improve plant growth. They can be organic, such as bone meal, or inorganic, such as 10-10-10 fertilizer. Some must be purchased, while others are free for the taking from your landscape. Many are dual purpose—they serve as both fertilizers and soil amendments.

**Soil amendments** are anything mixed into topsoil to promote healthy plant growth. They function in a number of ways. For example, they may change the pH of soil or supply nutrients.

**Fertilizers** are primarily valued for their ability to supply nutrients. Plants use these nutrients to make components for plant growth such as proteins and carbohydrates.

One sub-set of soil amendments, **soil conditioners**, like composted horse manure, improve **soil structure** by binding soil particles into larger aggregates. This increases the amount of pore space and enhances air exchange, water movement, and root growth.

From the many “homegrown” and retail products available, the wise gardener selects those that most closely address a need while providing the best value for the money. Ask yourself if it makes sense to buy a fertilizer or amendment that has traveled thousands of miles when local alternatives are available.

### ***Feed The Soil First!***

*The surest way to improve plant growth is the regular incorporation of organic matter such as composted yard waste. Organic matter improves soil structure, slowly releases nutrients, and increases beneficial microbial activity.*

## FERTILIZERS

The main chemicals that must be supplied to plants are called **primary nutrients**. Those required in the greatest amounts

**Caution!!** Wear gloves and a dust mask when handling caustic or finely powdered materials. These include hydrated and burnt lime, perlite, vermiculite, and peat moss. Take similar precautions with bonemeal, fresh manure, and mulch.

are nitrogen (N), phosphorus (P), and potassium (K). Fertilizers are labeled with a three number analysis corresponding to N, P, and K. It tells what percentage of the net weight is actually composed of these three nutrients. A fertilizer containing all three nutrients is a **balanced fertilizer**. A 50-lb. bag of 10-6-4 fertilizer will contain 5 lb. of nitrogen (N), 3 lb. of phosphate ( $P_2O_5$ ), and 2 lb. of potash ( $K_2O$ ). (Phosphate and potash are the available forms of phosphorus and potassium respectively.) Some common N-P-K analyses of inorganic, granular fertilizers are 10-6-4, 5-10-5, and 10-10-10.

Plants also require the **secondary nutrients**: calcium, magnesium, and sulfur. Plus they need very small amounts of **micronutrients**: boron, copper, chlorine, iron, manganese, molybdenum, and zinc. These latter, plus a few others, are referred to as **trace elements**.

**Inorganic** or “**chemical**” fertilizers are typically less expensive (per pound of nutrient) and more readily available for plant growth than **organic fertilizers**. However, organic fertilizers often supply other nutrients in addition to N-P-K release nutrients slowly over the growing season, and may double as soil conditioners.

**Words that appear in *italics* are trade names. Listed products are only examples and not endorsements. Read All Product Label Instructions Before You Open the Bag!**

\*Materials with an (\*) are considered acceptable by organic gardeners.

### **Contributions of primary nutrients to plant health:**

- *Nitrogen (N)*- strong leaf growth, dark green color.
- *Phosphorous (P)*- roots, early plant growth, seed formation.
- *Potassium (K)*- plant vigor, disease and stress resistance, flavor and color enhancement.

Some fertilizers can be absorbed by plants immediately upon application. These are known as **quick release** or **highly soluble fertilizers**. They are useful when rapid results are required. They come in liquid or powder form and are applied to root zones or sprayed directly on foliage.

**Slow release fertilizers**, such as Osmocote and sulfur-coated urea, make nutrients available in small amounts over an extended period. Fertilizer stakes or tablets placed in root zone soil are also slow release formulations. However, salt accumulation resulting in root burn, can occur immediately adjacent to these latter products.

Fertilizers often target specific plant needs. For instance, **starter fertilizers** specially formulated for seedlings and transplants, are high in phosphorus to foster root establishment.

## **LIST OF FERTILIZERS**

**Alfalfa meal\***: typically 3-5% organic nitrogen (3-1-2). May contain ethoxyquin, a preservative, to keep it green.

**Ammonium sulfate**: a dry fertilizer which is 21% N, plus sulfur. Very acidic, especially suitable for blueberries and azaleas, which require the ammonium form of nitrogen. Mix into soil to prevent loss of nitrogen to atmosphere.

**Blood meal\***: readily available nitrogen, typically 10-12%. Lasts about 2 months. May help repel deer and rabbits when top-dressed around plants.

**Bone meal\***: steamed ground bone high in phosphate. Sample analysis (1-11-0) or (5-12-0). Especially good for bulbs and root crops. Contains 15-22% calcium, plus trace elements. Lasts 6 to 12 months.

**Boron\***: micronutrient. Can be toxic to plants if applied in excess. Often applied by fruit growers to prevent fruit pitting and rot disorders. Deficiencies are most likely to occur on sandy soils. Incorporate 6-7 tablespoons of Borax per 1,000 sq. ft. of vegetable garden area each spring where soils are sandy.

**Chelated iron\***: Chelated iron is applied to the foliage of

plants suffering from iron chlorosis (yellowing from iron deficiency.) Chelate means “claw” in Greek. Chelated elements are combined with compounds that hold them in solution, making them available for plant uptake through roots or leaves.

**Compost tea\***: ordinarily homemade from “steeping” compost in a bucket of water (5 parts water to 1 part compost by volume) for 1-3 days, then straining and applying the brew to plants. Make compost tea using composted yard waste (leaves, grass clippings, etc.) or vermicompost (worm compost). Do not use farm animal manure compost. Good method for applying soluble nutrients directly to foliage or roots during the early part of the growing season when nutrients from soil organic matter are not readily available.

**Corn gluten\***: a natural pre-emergent herbicide. Apply in spring as a top-dressing to help control crabgrass and some weed species. It adds some organic matter and nutrients to the soil (10-1-1).

**Cottonseed meal\***: a slow release fertilizer high in nitrogen, that also adds organic matter (6-2-1). Lasts 6 months to 1 year.

**Epsom salts\***: magnesium sulfate, a highly soluble form of magnesium and sulfur. Can be used as a foliar spray for speedier results. Makes melons sweeter. Does not prevent blossom-end rot.

**Foliar fertilizers** are applied directly to the upper and lower leaf surfaces. Plants take up nutrients more efficiently through leaves than through roots. Foliar feeding is recommended to aid in the root growth and establishment of seedlings and transplants.

**Fish products\***: formulations range from fish powder (9-1-1), to fishmeal emulsion (5-1-1). Contain many valuable micronutrients. May have strong fishy smell.

**Greensand\***: a naturally occurring iron-potassium silicate (also called glauconite) with the ability to absorb 10 times more moisture than ordinary sand. It contains marine potash, silica, iron, magnesium, and lime, plus up to 30 other trace minerals. Dual ability to bind sandy soils and loosen clay soils. Potassium (5-7 %) released very slowly over 4 to 5 years. Slightly acidic.

**Guano\***: decomposed manure, usually of bat or seabird origin, was the first commercial fertilizer sold in the U.S. Desert bat guano escapes leaching in caves, preserving its nutrients. Seabird guano recycles marine trace elements. Valued for fast release and high N analysis (10-3-1). Suggested use is as a potting soil additive.

**Holly-Tone, Bulb-Tone, etc.:** mixtures of organics (animal tankage, crabmeal, kelp, and greensand) and inorganics (sulfate of potash, ammonium sulfate) that target specific plant groups. All contain 11-12 micronutrients.

*Mix granular fertilizers into the top 4-6 inches of soil, then water the area well.*

**Humates\*:** a mined ancient organic soil. Unlike peat, humates are thoroughly decayed or mineralized, so nutrients are available to plants. Contains up to 35% humic acids that dissolve other nutrients for plant utilization. Manures and yard waste compost also contain humic acids.

**Kelp products\*:** made from seaweed; contain dissolved ocean minerals. Dried kelp will usually contain 1.6 to 3.3% nitrogen, 1 to 2 %  $P_2O_5$  and 15% to 20%  $K_2O$ . Also valued as a growth stimulant because of rich concentrations of trace minerals (over 60), amino acids, vitamins, and growth hormones, including cytokinins, auxins and gibberellins. Available in meal, powder, and liquid forms. Very good for seedlings and transplants.

**Manure:** (purchased) these products carry an NPK fertilizer analysis on their label and will also improve soil structure.

- **Cow or Steer (dehydrated)\***— manure exposed to 180°F, dried to 17% moisture, and ground into a fine, soil-like texture. Nutrients are more concentrated and the soluble salt level is probably higher in dehydrated manure than in locally available farm manure.
- **Cockadoodle Doo\***— (4-2-2) layer hen manure that has been dehydrated.
- **Cricket\***— manure of crickets raised for bait (4-3-2). Because high salts may burn roots, add sparingly to potted plants.

**Milorganite.** A composted sewer sludge that has been heat dried and therefore has a higher N-P-K (5-2-5). Labeled for use in vegetable gardens in Maryland. Anecdotal evidence suggests composted sewer sludge repels rabbits, deer, voles, and squirrels when used as a top-dressing.

**Miracid:** high-solubility fertilizer (30-10-10) with chelated iron to combat chlorosis in acid-loving plants. Over-use may drop the pH too low.

**Miracle-Gro:** highly soluble fertilizer. Dissolve in water. Used as a foliar spray or applied directly to soil. Ammonium phosphate and urea sources of N. Contains six important micronutrients.

**Osmocote:** resin coated, slow release fertilizer (up to 4 month release outdoors). Many different analyses are available. Popular in the nursery and greenhouse industries.

**Rock products:** a wide variety. Be aware that the touted “immediately available” nutrients may refer to only a small percentage of the whole, while the rest will be released slowly. Not considered organic if treated with a chemical to increase nutrient solubility. A selection of those available follows:

- **Azomite or rock dust\***— an aluminum silicate clay mixed with over 50 minerals, from marine deposits (2.5% potassium).
- **Black rock phosphate\***— about 30% phosphate rock with calcium oxide, silicas, and trace minerals. Only 3% of phosphate immediately available. Slow release builds longer reserve than colloidal phosphate. Best in slightly acid soils.
- **Soft rock or colloidal phosphate\***— phosphate clay with 18-22% phosphate, 27% calcium oxide, silicas, and 14 trace minerals. 2% phosphate immediately available, the rest slow-release over 3-5 years. Half the liming value of ground lime.
- **Superphosphate (0-20-0) and triple superphosphate (0-45-0)**—Phosphate rock treated with acid to make the phosphorus more soluble.

**Seaweed products:** See: “Kelp products”

**Soybean meal:** Similar to alfalfa and cottonseed meal with an analysis of 7-2-1. Can inhibit the germination of seeds planted right before or after an application.

**Sul-Po-Mag\*:** sulfate of potash magnesia from the mineral langbeinite, with about 22% sulfur, 22% potash, and 18% magnesium oxide. Readily soluble.

**Stop Rot\*:** a liquid formulation of calcium carbonate ( $CaCO_2$ ) used to prevent blossom-end rot in vegetable crops. Plants take up foliar sprays very efficiently.

*Blossom-end rot of tomatoes is caused by a lack of calcium in the developing fruit. Prevent it by adding a small handful of finely ground limestone to each planting hole prior to transplanting. Water plants regularly and deeply and keep them mulched. Be aware that excessive nitrogen levels may block calcium uptake.*

**Urea:** rapid nitrogen release (46-0-0) with a high “burn potential”. Handle and use with care. Must mix into soil to prevent conversion to ammonia and subsequent escape into the air. **Sulfur-coated urea** is a slow release formulation.

**Wood ashes\*:** analyses run from 1 to 2% phosphorus and from 4 to 10% potassium. Hardwood ashes are 45% carbonate equivalent and are half as effective as lime for raising soil pH. Softwood ashes are less effective than hardwood. Ashes are too fine to improve soil structure. The recommended yearly application rate is 25-50 lbs./1,000 sq. ft. At higher rates, test soil pH yearly.

**Worm castings\***: the rich digested “soil” produced by redworm farming. No guaranteed listed analysis due to the great variability in feedstock, storage, and handling. Concentrated source of Ca, Mg, N, P and K, in readily available form. Used for container plants, indoors and out. Use 1 to 2 cubic feet per 100 square feet of garden area. Castings can be purchased through catalogs or produced at home in redworm bins.

## SOIL CONDITIONERS

Most garden and landscape plants perform best in soils high in organic matter (greater than 2% organic matter, by weight, in the topsoil). These soils are loose, easy to work, and have a large number of earthworms. Organic matter is continuously used up through oxidation, downward movement through the soil profile, and plant growth. It should be replenished each year in cultivated flower and vegetable beds.

### Coverage

*3 cubic feet of organic matter will cover 36 sq. ft. to a depth of 1 inch.*

*Useful conversions:      7.5 gallons = 1 cu. ft.  
   1 cu. ft. = 1.25 bushels  
   27 cu. ft. = 1 cu. yd.*

**Compost (commercial or "home-grown")**: made from decayed organic materials such as straw, corn cobs, food wastes, cocoa bean hulls, poultry litter, grass clippings, leaves, manure. Composts improve soil structure and slowly release nutrients to plant roots. (See HG 35 *Backyard Composting*)

**Gypsum\***: calcium sulfate, a mined product also called “land plaster.” About 20-23% calcium and 15-18% sulfur, two secondary nutrients usually fairly well supplied in Maryland soils. The calcium is fast-acting. Also recommended to tie-up excess magnesium. Will leach sodium from soils with high salt concentrations caused by de-icing materials or ocean spray. Gypsum will not raise or lower soil pH.

**Humus\***: the stable, end product of the decomposition of soil organic matter. It holds water and nutrients, aids soil aggregation, is a source of humic acid and chelates, and contains huge microbial populations. May be purchased.

**Humic acid\***: an important component of organic matter. It's a very mild acid released in the decay process. Dissolves soil minerals, especially phosphorus, for plant use.

**LeafGro\***: composted leaves and yard debris from central Maryland. Approximate analysis 1-.5 -1, with a pH range of 6.8-7.2. Holds 225% of its weight in water and does not repel water when dry as peat moss does. Use as a soil amendment, mulch, potting mix component, or top-dressing when seeding turf. Good peat moss substitute.

### Use Manures Wisely

*Apply uncomposted manure in the Fall only. Mix into the top 4-6 inches of your soil; don't leave it on top of the ground. Never use pet manure in the vegetable garden. Fully composted manure can be mixed into garden soil in Spring.*

**Manure (local)\***: sheep, cattle, horse, and chicken manure widely available from nearby farms. Ask for manure that has been mixed with bedding material and allowed to compost and age for at least 4-6 months. Farm manures usually contain 1% or less each of N, P, and K. Rabbit, sheep and chicken manure are higher in these nutrients. Manure mixed with urine-soaked bedding will be higher in N. Approximately 20-40% of the nitrogen is available to plants the first year after application. Weed problems may occur when the entire compost pile does not reach sufficiently high temperatures. A heavy organic mulch will help smother weeds.

**Mushroom compost\***: used or “spent” compost from mushroom farming. It is some combination of manures, wheat straw, corn cobs, feathermeal, peanut meal, peat moss, lime, etc. Mushrooms grown in this media use only a small portion of the many nutrients. Nutrient analysis: 2.75-1.5-1.5. Can have high soluble salt levels and should be fully incorporated and watered prior to planting.

**Peat moss\***: partially composted moss mined from prehistoric non-renewable bogs. Light and porous, it absorbs 10-20 times its weight in water. Its high surface tension causes it to repel water when it's dry, so do not use as mulch or top-dressing. Contains little nutrient value, but has a high nutrient-holding capacity. Acidic (as low as 3.0 pH); good for working into azalea and blueberry beds.

**Pine bark fines\***: a finely shredded pine bark product that retains moisture. Sometimes a composted component of potting media. May be incorporated into annual and perennial beds. Very acidic, so watch soil pH levels if large quantities are used. A peat moss alternative.

**Sand\***: to improve water drainage and aeration of clay soils a minimum of 50% by volume is necessary. Use only coarse builder's sand, not play sand. Often impractical to use because of the large volume needed.

**Sawdust\***: only well-decayed sawdust should be incorporated into the soil. Fresh sawdust can burn plant roots and “tie up” nitrogen as it decomposes. (Soil microbes that break down the high-carbon sawdust need nitrogen.) Good for mulching blueberry beds.

**Topsoil\***: no state or federal standards. Quality will vary. Inspect topsoil and ask for references. Inquire where it came from and whether any testing for pH, soluble salts, heavy

metals, etc. has been done. Avoid sticky, grayish, mottled, or foul-smelling soils.

Blended **topsoil (70%) and leaf compost (30%) mixes** are excellent for an instant raised bed garden. Can be purchased by the cubic yard.

**Water-absorbing polymers:** super-absorbent polymer granules that can absorb 300-400 times their weight in water. As soil dries, stored water is released slowly back into soil. Also absorbs and releases fertilizer. The cost-effectiveness of these materials has not been demonstrated for outdoor garden use.

## GROWTH STIMULANTS

*See also:* Humus, Kelp products

**Bioactivators\*:** various commercial products containing one or more of the following: beneficial bacteria, growth hormones and stimulants, nutrients, and vitamins. May be useful as a “tonic” for the lawn, seedlings, transplants, and plants languishing in cool soils in the spring. These are unnecessary for backyard compost piles.

**Microp\*:** soil inoculant. When sprayed on the soil these nitrogen-fixing algae grow rapidly and can supply 30 to 60 lbs. of nitrogen per acre, plus producing polysaccharides (the soil aggregating compounds in humus) which combat soil compaction.

**Mycorrhizae\*:** Are beneficial fungi which grow symbiotically on or in roots and extend the root structure by sending out tiny filaments to forage for nutrients. Some crops, like blueberry, rely heavily on mycorrhizae for nutrient uptake.

**Nitrogen-fixing bacteria inoculant\*:** a powder used to coat legume (pea, bean, and clover) seed to increase the growth of nitrogen-fixing nodules on their future roots.

## pH ADJUSTORS

*See also:* Ammonium sulfate, Gypsum, *Miracid*, Shellfish products, and Wood ashes

**Aluminum sulfate\*:** *not* recommended as a soil acidifier because it can cause a toxic aluminum build-up (Maryland soils have adequate aluminum levels). Iron sulfate and elemental sulfur are preferred.

**Iron sulfate\*:** lowers pH. Turns hydrangea flowers blue. It contains 20% iron. Use 3-4 times the recommended amount of “plain” elemental sulfur. (In a medium texture soil, lower the pH by ½ unit by applying 12-14 lbs./1000 sq. ft. of area.)  
*See: Sulfur*

**Lime\*:** raises pH. There are several kinds of naturally occurring mined limestone:

- **Aragonite\* -** or oyster shell lime, is 96% calcium carbonate mined off the coast of Bermuda. Less quickly available than ground ag lime, but it lasts 4-5 years.
- **Agricultural limestone\* "Ag lime"** - a finely granulated calcitic limestone. The finer the grind or mesh size, the more readily it will act to raise soil pH. **Powdered lime** is faster acting.
- **Hydrated lime\* -** calcium hydroxide, produced by adding water to burnt lime. Quick acting. Need apply only 75% of calcitic recommendation.
- **Burnt lime\* -** calcium oxide, very caustic. (Also known as “**quick lime**”.) Produced by heating limestone to a very high temperature. Apply only 50% of calcitic recommendation. Will burn plant roots upon direct contact.
- **Dolomitic lime\* -** contains calcium carbonate and magnesium carbonate. Recommended for raising pH on low magnesium soils.
- **Pelletized lime\* -** very similar to ground ag lime, but easier to apply in this pellet form.
- **Wood Ash -** See page 3

**Sulfur\*:** elemental sulfur, sold as “flowers of sulfur” or micro-fine sulfur, is used to lower soil pH. At pH above 6.0, iron sulfate lowers pH more quickly than sulfur.

### Soil pH

*Soil pH is a measure of the hydrogen ion concentration of soil. A pH value of 7.0 is neutral. Readings below 7.0 are acidic and those above 7.0 are alkaline. Soil nutrients are most available to plant roots and microbial activity is greatest when soil pH is in the 5.5 to 7.0 range. Plants may show symptoms of nutrient deficiency or toxicity at very high or low soil pH. For example, azaleas grown in high pH soil may have yellow leaves due to a deficiency of iron (iron chlorosis). Liming is best accomplished in the fall, because lime requires time to change pH.*

## POTTING MIXES

*See also:* Peat moss

**Perlite\***: a very lightweight heat-expanded volcanic mineral which provides drainage and oxygen space in soils. Does not hold nutrients or water but is especially effective for increasing the porosity of potting media.

**Potting soil\***: a generic term used to describe products that vary widely in composition, weight, and nutrient content. Some are dense and not good for growing seedlings.

**Soiless mix\***: a sterile mix of peat moss, perlite and vermiculite. May also contain coir, compost, bark, and chips and other ingredients. Recommended for growing seedlings. Also fine for indoor and outdoor container gardening. Soiless mixes, like *Pro-Mix*, *Reddi Earth*, and *Sunshine Mix*, have a small amount of added fertilizer, so they can sustain a crop of flower and vegetable seedlings for 4-6 weeks without the need for additional fertilizer. Work water into these mixes by hand prior to use.

**Vermiculite\***: mica-type mineral heated in high temperature furnaces to form sterile, expanded, fan-like particles with many air spaces which promote aeration and water movement. Absorbs and holds nutrients and water (unlike perlite). Also rich in trace elements.

## FERTILIZER GUIDELINES BY PLANT GROUP

Good health in plants depends on a continuous supply of available nutrients from the soil or, in the case of container plants, the growing media. Nutrient needs vary from plant to plant and the ability of the soil to supply those nutrients varies from site to site.

Take a soil test of major areas of your landscape — front and back lawn, vegetable garden, large flower beds — every 3-4 years to determine nutrient levels. (*See HG 110a Selecting and Using a Soil Testing Laboratory- <http://extension.umd.edu/hgic - Library>*). Nutrients levels are often in the “excessive” range in older and well-tended landscapes. This is not a problem for plants. It simply means you don’t need to add these nutrients for some time.

Most garden and landscape plants grow best in a soil pH range of 6.0-7.0. Many nutrients become either unavailable or overly-abundant outside this range. Pay close attention to your soil pH readings and be prepared to adjust them according to your soil test recommendations.

Fertilizers won’t necessarily help sick plants, if the cause of poor growth is related to insect, disease or environmental problems and not to a lack of nutrients. Overuse of fertilizers can lead to weak, succulent growth, encourage insect pests and disease problems, and contribute to water pollution.

### 10 Ways to Conserve Nutrients, Prevent Pollution, and Improve Soil

1. Take a soil test every 3 to 4 years. Fertilize according to soil test recommendations. For lawns, follow University of Maryland Extension recommendations. Do not exceed label directions.
2. Keep fertilizers off hard surfaces. Rain water will carry fertilizer salts into storm drains and surface waters and contribute to nutrient pollution of our waterways.
3. Keep bare soil covered with a mulch or plant a cover crop or ground cover. Over time, rainfall causes bare soil to erode and become compacted. Grow ground covers in place of turf in deep shade.
4. Leave grass clippings on your lawn (grasscycling.) They are a source of nitrogen for your lawn and will not contribute to thatch build-up in fescue or bluegrass lawns.
5. Keep stored manures and compost covered to prevent leaching of nutrients.
6. Incorporate or compost plant residues. However, discard plants with serious disease problems.
7. When appropriate, substitute slow-release fertilizers for those that are highly soluble and substitute locally available organic fertilizers like farmyard manure, backyard compost, and municipal leaf compost for manufactured chemical fertilizers.
8. Avoid excessive foot or equipment traffic to prevent soil compaction, especially when the soil is wet.
9. Avoid cultivating soils on steep slopes. Construct terraces where appropriate.
10. To melt winter ice, use calcium magnesium acetate (CMA), potassium chloride (KCl), or calcium chloride (CaCl<sub>2</sub>). Do not use sodium chloride, urea, potassium nitrate, or other chemical fertilizers containing nitrogen or phosphorous. The salts in these fertilizers may burn the foliage and roots of adjacent plants and wash into and pollute waterways.

*Home gardeners tend to over-fertilize flower and vegetable beds. Plan to reduce or eliminate fertilizer applications in these areas if an inch or more of organic matter is incorporated into the soil of established beds at least once a year.*

Use the information below as a starting point for planning how to fertilize your plants. **In all cases, organic fertilizers (e.g. soybean meal) can be substituted for inorganic fertilizers (e.g. 10-6-4).**

#### Trees:

- Healthy, mature trees do not usually benefit from fertilization. Trees in the landscape receive nutrients from turf fertilization, grass clippings, fallen leaves and natural soil fertility.
- Tree spikes are not recommended.

#### Shrubs:

- Shrubs that are surrounded by fertilized turf receive adequate nutrients and don't require additional fertilizer. The breakdown of organic mulches also contributes nutrients.
- Where growth is lagging, top-dress shrub beds with well-decomposed compost or apply a balanced fertilizer (e.g. 5-10-5, 10-6-4) in the late fall or early spring at the rate of 1 lb. per 100 sq. ft. of area.

#### Annual flowers:

- No fertilizer may be necessary if beds are heavily amended with organic matter. However, flower size and overall production can be increased with supplemental fertilization.
- In new gardens low in organic matter, apply 2-4 lbs. of 5-10-10 per 100 sq. ft. of area or other comparable fertilizer. Incorporate fertilizer into the top 6 inches of

*Sweep or wash granular fertilizers off foliage to prevent leaf burn.*

soil in early spring before planting.

#### Herbaceous perennials:

- No fertilizer may be necessary if beds are heavily amended with organic matter.
- In new gardens low in organic matter, apply 2-4 lbs. of 5-10-10 per 100 sq. ft. of area or other comparable fertilizer. Broadcast the fertilizer lightly around plants in early spring.

#### Vegetables:

- No fertilizer may be necessary if beds are heavily

amended with organic matter.

- In new gardens low in organic matter, apply 2-4 lbs. of 5-10-10 per 100 sq. ft. of area. Fertilizer should be applied and incorporated into the top 6 inches of soil in early spring.
- Early season crops benefit from quick-acting foliar or liquid fertilizers, or compost tea.
- Perennial crops, like asparagus and rhubarb, are fertilized in early spring and after harvest.

#### Fruit:

- Most fruit plants are fertilized at flowering. June-bearing strawberries are fertilized in July after harvest.
- Peaches require annual applications of fertilizer. Apple and pear trees should not be fertilized if the trees are healthy and productive (making 18-24 inches of new shoot growth each year.)
- Blueberry plants require a soil pH in the 4.5-5.0 range and should be fertilized each spring after bloom with ammonium sulfate.

#### Houseplants:

- Fertilize with a commercial fertilizer containing micronutrients or add a small amount of well-composted, screened leaf mold or other compost each year. Compost tea is also commonly used.
- Because magnesium leaches from the soil at each watering, replace it with a solution of 1 teaspoon Epsom salts per gallon of water. Water with this solution two times each year or use the solution as a leaf spray.
- During the winter months, houseplants don't need fertilizer because reduced light and temperature result in reduced growth. Fertilizing at this time could harm some plants, unless they are actively growing.
- Monthly applications of a dilute liquid fertilizer in the summer months will keep most plants healthy.
- Excessive fertilizer results in the buildup of salts (as evidenced by a white coating on the inside of pots) leafburn, and excessive, leggy growth. Flush out excessive salts by pouring a large amount of water through the growing media.

#### Herbs:

- Apply fertilizers sparingly. Many herbs, especially the "Mediterranean" herbs, such as basil, thyme, rosemary, oregano and lavender, grow best on sunny, dry sites in light (sandy) soil. Heavy applications of fertilizers or organic matter may lower the plant's essential oil content and encourage root and stem rot diseases.

**Turf:** See HGIC website for current recommendations (<http://extension.umd.edu/hgic>).

**Do you have a plant or insect pest question?**

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**and click [Ask Maryland's Garden Experts](#)**

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