University of California
Agriculture and Natural Resources

UCCE Master Gardener Program
San Luis Obispo County

FERTILIZERS AND AMENDMENTS

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Amendment: Material worked into the soil that indirectly affects plant growth by improving the physical properties of the soil such as soil texture, water retention, aeration and microbial activity. Some amendments, such as composted manure, also serve as fertilizers.

Fertilizer: Material added to soil that directly affects plant growth by the addition of nutrients.

- To improve sandy soils, add decomposed organic amendments such as compost, peat and aged manures.
- Peat will also reduce pH of the soil which is helpful when growing acid loving plants like blueberries.
- To improve clay soils, add compost, composed manure or cover crops. Do not add sand.
- California soils can be high in salts due to our low rainfall. Avoid high salt amendments such as manure-based compost, biosolids, biosolid-based compost and wood ash.
- Changing soil pH is a slow process and best done by adding organic soil amendments (peat) rather than acidifying agents (elemental sulfur).
- (N-P-K): can be organic or inorganic. Most are mixed into the top 4-6 inches of soil and watered in. Some can also be applied to leaf surfaces as a foliar spray, for quick uptake of nutrients.

FERTILIZER	N-P-K	DESCRIPTION
Alfalfa Meal	(3-2-1)	Ground or pellets. Increases organic matter in soil, plant based and contains natural growth stimulant triacontanol.
Ammonium sulfate	(21-0-0)	Fast acting, concentrated N, increases acidity, contains 24% sulfur.
Bat guano	(9-3-1)	Rich in readily available nitrogen, phosphorous and micronutrients.
Blood meal	(12-0-0)	Derived from animal blood, contains readily available N with iron and trace minerals. Lasts 2 months.
Bone meal steamed	(3-15-0)	Good source of slow release P and calcium (15-22%). Good for bulbs and root crops. Lasts 6-12 months.
Chelated iron		Iron is chelated to make it readily available for plant uptake, through leaves and roots.
Compost tea		Made from plant-based compost. Do not use animal manure compost. Apply judiciously to avoid harmful leaching.
Cottonseed meal	(6-2-1)	All-purpose slow release fertilizer for acid loving plants: azaleas, roses, blueberries. Last 6-12 months.
Dolomite Lime		Calcium 23%, magnesium 9.5%, Calcium carbonate 49.8%, magnesium carbonate 32.9%Supplies magnesium and calcium while raising pH. Do not use without soil testing to verify deficiencies and pH of soil.
Epsom salts		Magnesium sulfate highly soluble form of sulfur (13%) magnesium (10%) for leaf growth and plant development. can be applied as foliar spray.
Feather meal	(12.8-0)	High N, slow released over 6-9 months
Fish bone meal	(3-16-0)	Marine based alternative to animal bone meal products. Good source of P and calcium with small amount of N. 14% calcium.
Fish emulsion	(5-1-1)	Source of N and micronutrients. Strong fishy odor.
Greensand		Derived from marine deposits, a slow release P and trace mineral fertilizer. Loosens clay soil and increases moisture holding capacity of sandy soils.
Kelp meal	(1-0.1-2)	Slow acting fertilizer of milled seaweed with micronutrients; nutrients-rich.
Langbeinite	(0-0-22)	Neutral pH won't affect soil pH. Source of soluble potash(K) 22%, sulfur 22% and Magnesium 10.8%.
Manure		Fresh manure is high in salts that can burn plants; use composted manure. Provides macro and micronutrients and conditions soil.

FERTILIZER	N-P-K	DESCRIPTION
Rock phosphate	(0-3-0)	From soft rock phosphate (colloidal phosphate) – 18% Calcium and long-lasting P. 3% P immediately available, the rest released over 3-5 years.
Seabird guano	(0-11-0)	Source of fast acting P and soil builder. Soil or foliar application.
Soybean meal	(7-1-2)	Plant based slow release N. Can inhibit seed germination if applied during planting.
Superphosphate	(0-20-0)	Phosphate rock treated with acid to for water solubility. Contains sulfur and calcium.
Urea	(46-0-0)	Inexpensive, fast acting, concentrated form of N for home gardeners. Good for alkaline soils or acid loving plants as it lowers pH.

AMENDMENT	DESCRIPTION
Compost	Decayed organic materials, improves soil structure, provides slow-released nutrients. Plant based compost recommended over manure-based compost which is high in salts.
Cover crops	Green manures - grains, grasses or legumes planted to improve soil. Choose warm or cool weather crops; annuals or perennials; nitrogen fixing or non-nitrogen fixing. They suppress weeds and are a food source for pollinators; add nutrients, microbes, organic matter to improve soil structure.
Earthworm castings	A soil conditioner - loosens soil, improves aeration, increases water movement and increase soil organic matter.
Gypsum	Mined calcium sulfate, 20% fast-acting calcium and 15-18% sulfur. Helps clay soils high in sodium (sodic soils) or with a low Ca:Mg ratio. Will not help compacted hardpan clay. Added calcium has no effect on pH.
Manure	High ammonia levels, salts, and may contain pathogens and weed seeds. **Do not** add fresh manure to growing plants. **Do** use well-composted or manure aged 6 months. Rabbit, sheep and chicken manure are highest in nutrients.
Mushroom compost	Approx. 2.75-1.5-1.5 - compost used in mushroom farming, can be high in salts. Incorporate and water well before planting. Do not use if soil is high in salts.
Mycorrhizal inoculants	Beneficial soil fungi associated with plant roots, increased water holding capacity, nutrient uptake and defense against pathogens. The fungi do not add nutrients. Most healthy, non-compacted soils contain these fungi, so it does not need to be added. Mycorrhizae is a living organism so many purchased products do not contain viable fungi.
Peat moss	Contains little nutrient value but good soil amendment for sandy soils as it increases water retention. Peat is acidic and will reduce pH of the soil which is helpful when growing acid loving plants like blueberries and azaleas. Do not use as mulch. Dry peat repels water.
Pine needles or shredded bark	An alternative to peat moss that retain moisture. Very acidic.
Sand	Impractical as an amendment as large quantities needed. Adding sand to clay soil will result in a concrete-like soil.
Wood products	Sawdust, ash, wood chips - Do not add as an amendment. These products are high in pH and salts. They will also bind nitrogen in the soil and make it unavailable to plants.

References

- Fertilizer, mulch or amendment? http://celassen.ucanr.edu/files/179761.pdf
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