Soil Amendments

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Soil amendments are really only necessary if you have poor soil, or if you want to boost the fertility of your soil. A healthy soil has a rich community of organisms : microscopic bacteria, insects & earthworms that make the nutrients available to the plants & maintain plant health.

Organic matter : provides food for the microbes which release nutrients to the plants over time so that garden soils become more fertile every year that compost is added. OM improves the water holding capacity & aeration of the soil. Recent discoveries have found how much energy plants use to feed bacterial, fungi & other microbes in the soil. 20% of carbohydrates made by plants, leak into the surrounding soil making nutrients available back to the plants & protect the roots and plant from attack. Fungi also works in this way and forms a net around the roots that extend a long way from the plant often communicating with the nearby plants.

Organic matter is made up mostly of plant materials. It is most fertile once it is composted.

It is best to not disturb the soil too much ie. No double digging, as this destroys the soil structure ruining water pathways, etc.

Compost Types:

Homemade Compost: Use when dark & crumbly & well digested

Commercial Compost: Composted fish and wood waste are good. Avoid bagged mushroom, steer & poultry composts as they are mostly straw or bedding

Municipal Composts: the source of the materials are unknown, so could contain herbicides or weed seeds

Worm Castings: help increase soil's water retention, improve aeration, introduce microbes, bacteria & fungi in the soil. It also feeds beneficial soil microorganisms that produce, store and gradually release nutrients to feed plants. Mix worm castings with soil when planting, and in seeding mixes. It has a neutral pH of 7.0 and won't burn plants. Of course it speeds up decomposition in the compost. Also Compost Tea.

Leaf Mold: Any kind of leaves (except Walnut) can be piled in a bin over winter & left to decompose. Or leave a deep mulch of leaves on your garden beds. Tough leaves can be used on pathways or under shrubs. Leaving Organic matter on top of the soil works faster than digging it in. The worms will do this job for you.

Plant Roots: Leave plant roots in situ to rot. You can plant around those roots without disturbing the soil structure too much. Much less work than dragging to the

compost pile & back. Large roots like cabbage can be chopped around & the core removed, but leave all the other roots to rot

Wood Chips: use only on pathways or under shrubs, not in the vegetable garden. They tend to use up the Nitrogen in the soil to continue to decompose them.

Animal Manure: Fresh cow, chicken or pig manure should be well aged in a HOT compost pile before using. Fresh horse manure should be composted for at least 3 months. It may contain deworming medications & the bedding could have weed seeds or even Roundup if it is not organic straw. Best to buy bagged well-composted manure for the vegetable garden

Green Manure: eg fall rye / clover grown for short time, can then be turned into the soil. Generally, this is not a great idea for the home gardener. It is hard to get the timing just right to turn it in and Fall Rye attracts wireworms.

Coffee Grounds: A good source of Nitrogen, decompose easily, earthworms like them, and rats don't. These can be added to the compost pile, or spread directly on the garden or around acidic loving plants like blueberries, just not too thickly.

Compost Starter: don't use as the native bacteria in your soils are better adapted to your conditions. You can leave a little of the well-rotted compost at the bottom of a new pile to inoculate it.

Methods to make compost:

Chop & drop: just leave the cut top growth of plants on the bed to decompose

Sheet Mulching or Lasagne Gardening: Used for starting a new garden bed.Cover a grassy area with cardboard, newspaper & leaves in the fall, water it well. Uncover in the spring and plant

Cold Composting: This is the most common method for home gardeners. Layer plant material, lawn clippings & kitchen scraps with twice as much dry leaves or shredded paper in a box or pile and leave it until needed. Take the top uncomposted layer off, use the well rotted compost at the bottom. Start a new pile with the uncomposted materials. Don't put lime or wood ashes in the compost – it will inhibit the decomposing process. Only use "finished" compost that is earthy smelling, dark & crumbly to amend the garden. Unfinished compost can be used as a mulch on top of the soil.

Hot Composting: Is very labour-intensive, but this is the only way to compost fresh cow, poultry or pig manures. It also kills all the beneficial organisms in the soil.

Use Compost :

Use well-rotted compost every year on a vegetable garden:

- A new garden with poor soil : turn in 4”
- An established garden : top with 1” annually
- Screened compost for potting soils and seedling mixes
- Coarse, half-rotted compost can be a summer mulch
- Don’t spread compost / manure in the fall as it will leach away in the winter rains.

Fertilizers:

Nitrogen (N): the most used element for rapid leafy plant growth & builds proteins, but must have plenty of organic matter in the soil to be available. Too much N leads to soft growth at the expense of fruit and root development.

Phosphorus (P): promotes flowering, fruiting & strong stems & roots. It doesn’t move much in the soil and is not available unless there is plenty of organic matter in slightly acidic soils. There is usually plenty of P in our soils, but they are not always available to the plants, but be careful not to over fertilize with P as it interferes with the uptake of other nutrients. Better to maintain pH levels between 6.0-7.0 & increase organic matter

Potassium (K): Makes sturdy plants, helps with disease resistance and heat & cold tolerance. Needed by root crops.

Calcium: regulates how plants respond to the climate. Deficiencies show as death of shoot tips, roots and fruit. Horticultural lime added to the soil lowers acidity & supplies calcium. Egg shells / oyster shells need to be ground to a powder to be effective.

Magnesium: is necessary for respiration & photosynthesis. Sandy soils can be deficient, but compost should be enough, and dolomite lime will raise pH and supply enough. This is not usually a problem with soils rich in compost. You can use dolomite lime every few years to make soil less acidic to make magnesium available.

Sulfur: is important for proteins, vitamins and compounds that regulate growth, but is usually present enough with plenty of organic matter & complete organic fertilizers

Silicon: makes strong cells that resist disease & insect attack, help withstand heat & drought. No need to add as it is abundant in good healthy soils

Micronutrients: are essential, but too high amount can be toxic and there should be enough in soils fed with compost & complete organic fertilizers. Kelp / seaweed meal can help, but you can easily toxify your soil by using individual micronutrients.

Fancy amendments: humic acid, compost starters, mycorrhizal fungal inoculants, etc…. are just a waste of money

Lime: A neutral soil (6.5 to 6.8) is best for the bacteria that works our soils. Our gardens tend to be closer to 5.0 to 5.5 due to the high rainfall. Nutrients become more available in a neutral soil. Add lime in spring and check the pH levels every 3-5 years. It takes several years to change the soil pH. Do a Soil Test at a reputable Lab (not DIY kit), then add lime once a year as recommended. 1 pound of lime covers a square yard. Weigh a pound in a yogurt container and draw a line at the level.

- Agricultural lime : is the cheapest, most effective as it also adds Calcium.
- Dolomite lime : also adds Magnesium. Use it every few years, alternating with Agricultural lime.

Potatoes & tomatoes are OK in an acidic soil, but Beets, Spinach, Onions and other root crops don't thrive in an acidic soil.

Soils with a neutral pH still need Calcium, but this can be supplied by adding gypsum without changing the pH.

Organic Fertilizers: Supplements are necessary as fruits & veggies use more nutrients than the ordinary soil can provide. Read the labels and never use more than what is recommended. Consider fertilizers as a supplement to the main food source of mature compost and organic matter. Be sure there is more or equal N in the mix eg. Gaia Green 4-4-4

Alfalfa Meal: 2.5-1-1 a good source of Nitrogen

Blood Meal: 12-0-0 is the highest source of Nitrogen and can be used to boost green leafy crops at planting time or a light sprinkle can be added to the soil for heavy feeders and when sowing winter crops.

Bone Meal: 2-12-0 is high in Phosphorus & has some Calcium, but too much can be toxic and our soils usually have enough. It is very slow acting. We used to put bone meal in with bulbs, but that's not done any more as it interferes with the mycorrhizal fungal uptake of nutrients.

Kelp Meal: 1-0-2 contains a wide variety of naturally occurring plant nutrients & trace minerals essential to plant growth & productivity, but it is not necessary in the garden, only in soiless mixes eg potting soils

Wood Ashes: are high in Phosphorus. This can be sprinkled over the garden in the spring, but never put this in the compost as it inhibits the decay process. Wood ashes are also high in calcium & micronutrients and help make soils less acidic. You can use too much, so limit to 1 kg/sq m in a year. Sprinkle lightly on veggie gardens, but not around acidic loving plants (Blueberries).

Biochar: is rich in carbon and makes carbon available in the soil for thousands of years. It can reduce the need for fertilizer by making the elements more easily available to plants. It is especially good to enrich very poor soils and also helps

speed the composting process by capturing the carbon content of the rotting materials. It is not commonly used in our gardens.

Rock Dust (rock phosphate): 30% phosphates & 48% calcium. It is slow release over years. Roses develop stronger root systems and more buds. In veggie garden – there may be fewer pests, greater yields & richer flavour. Apply in early spring 1lb per 10sq feet. It is most accessible in acidic soils. It is also useful added to the compost. Overuse can lead to chlorosis in the plants and kill beneficial microorganisms and can lead to leaching & polluting water systems.

Seaweed Extracts: can add micronutrients, but are mostly unnecessary. DO NOT take seaweed from the beaches – it disturbs the oceans biome.

Liquid fish fertilizer: is good to use during the growing season if plants look stunted or have yellow leaves.

Greensand: is a source of Potassium and is often used in complete organic fertilizers

Epsom Salts: can provide a quick source of Magnesium to deficient plants, but can easily be overused.

SeaSoil: be sure you are buying just the compost without any additives (soil & peat). Then add amendments as you need. SeaSoil on its own will make too much foliage & not enough flowers & fruit.

Managing Soil Fertility: Whenever a bed is empty. Add 1" of compost, a complete organic fertilizer and lime as necessary and gently work it in. The subsident crops for that bed for the year will not likely need any more amendments unless the previous crop didn't grow well. Use a liquid fertilizer to give a struggling crop a boost during the season if their leaves are looking pale. You won't need to use compost after a few years if you mulch the beds well every year. Don't add amendments in fall as they will be leached away in the winter rains.

Compost Tea: Put a shovelful of compost / horse manure / fish compost in a 5 gal bucket, fill it with water and let it steep for just one or two days when it turns dark brown. To use it, dilute it in water until it's like weak tea and water your plants every week or two as needed.