

**N, P, & K**

Fertilizer labels have 3 numbers on their label, their “N-P-K”, which describes how much Nitrogen, Phosphorus, and Potassium are in the product. For example, a typical chemical fertilizer is 16-16-16, which means it contains 16% N, 16% P, and 16% K. Which also means that if this is a 50# bag, 16% of that bag would be 8#, so there are 8# each of N, P, & K in that bag.

Nitrogen promotes shoot, stem, and leaf growth. This will make plants get taller and leafier. This is the major nutrient used for fertilizing grass, trees, fruiting shrubs/vines, and leafy green vegetables.

Too much nitrogen can make plants get too tall, leggy, and leafy, with too few fruits. Nitrogen moves through the soil relatively quickly, so of the three nutrients here, it is often applied the heaviest and most often (leads to leaching, pollution). Examples of Nitrogen rich natural soil amendments: Feather Meal, Fish Meal, Blood Meal, or Seed Meals (cottonseed, linseed [aka flaxseed], canola, or soybean meals). Some Bat and Seabird Guanos also come in Hi N varieties. Guano’s are also exotic, come from far away, and are often comparatively expensive.

|                        |             |
|------------------------|-------------|
| cottonseed             | 5-2-1       |
| linseed                | 6-0-0       |
| canola                 | 5-0-0       |
| Soy meal               | 7-0-0       |
| Fish meal              | 10-4-1      |
| feather                | 12-0-0      |
| blood                  | 13-0-0      |
| Bat and Seabird Guanos | Up to 15% N |

Phosphorus promotes development of the actual fruit or vegetable part of the plant that you plan to eat. It aids the development of the reproductive organ of the plant, like the tomato, cucumber, or apple. Phosphorus also promotes flowering, so gardeners are sure to add phosphorus to get big and bountiful blooms. Phosphorus is neither particularly fast nor slow to leach through the soil, but most edible crops require it, so it is applied relatively often &/or heavily. Phosphorus is found in Bone Meal, Fish Bone Meal, Rock Phosphorus, some Guanos, and Eco-Nutrients liquid fish. The natural fertilizers highest in Phosphorus are Bone Meal & Fish Bone Meal, and Hi-Phos Bat Guano. Rock Phosphate is an Animal-free Phosphorus fertilizer, but it very low in Phos, and very slow to release.

|                        |            |
|------------------------|------------|
| Fish bone              | 4-22-0     |
| Bone meal              | 3-15-0     |
| Rock Phos              | 0-3-0      |
| EcoNut liq fish        | 2-4-0.2    |
| Bat and Seabird Guanos | 7 – 20 % P |

Potassium is needed in the lowest amount of these nutrients. Most soils here (Portland area) already have sufficient potassium, and since it moves very slowly through the soil, and it is bad to have too much of it, it is best to add little or none unless you have done a soil test and you know that you need it. Potassium promotes root development and growth, and has some effect on plant sexual reproduction (fruit/flower development). It is bad to have excessive Potassium, because high Potassium can tie up other nutrients and make them unavailable. Potassium can be obtained from Kelp meal or extract, or from Jersey Greensand, K-Mag, Sulfate of Potash or wood ashes.

|                 |        |
|-----------------|--------|
| Kelp Meal       | 0-0-3  |
| Greensand       | 0-0-3  |
| K-Mag           | 0-0-20 |
| Sulf. of Potash | 0-0-50 |

Trace Minerals – TMs are minerals that are very important to plant life, that are needed in lower amounts than N, P, or K. They are very important for growing healthy, tasty, fragrant, colorful, nutritious, vigorous and stress resistant plants. Plants that have access to adequate trace minerals are able to live up to their genetic potential. Soil Amendments containing Trace Minerals are: Gaia Green Glacial Rock Dust, Central Oregon Basalt Rock Dust, Azomite, Kelp, Jersey Greensand, and Live Earth Humates.

|                                 |
|---------------------------------|
| Gaia Green Glacial Rock Dust    |
| Central Oregon Basalt Rock Dust |
| Azomite                         |
| Greensand                       |
| Live Earth Humates              |
| Kelp                            |

## **pH adjustment, Calcium, local conditions:**

### Lime

With our rain and clay soils, we often suffer from poorly draining acid soils, which most of our vegetable and some ornamental plants don't like.

Add lime 50# to 500-1500 sq ft to counteract PNW soil acidity. Lime also prevents moss in grass, and specifically the Calcium part of Lime, prevents blossom-end rot in tomatoes.

Lime is made of ground limestone rock. There are two kinds of limestone.

- Calcium Carbonate limestone is known as Calcitic Lime, Lawn & Garden lime, or Ag lime, and currently we stock Microna brand calcium carbonate limestone. This is the type of limestone that I recommend and use.
- Dolomite Limestone is made of Calcium Carbonate & Magnesium Carbonate. Most Ag textbooks recommend this type, but where they were published this kind of limestone is prevalent. Most soil tests will specify Dolomite lime, but if you actually look at the Magnesium component of the test, Magnesium may not be lacking. Magnesium moves very slowly through the soil, and becomes problematic when its levels are too high, because it binds with other minerals, making them unavailable to plants, therefore we rarely recommend using it.
- Both Calcium Carbonate Lime & Dolomite Lime are also available in Pelletized or Prilled forms, which go through drop spreaders and aren't so dusty. These also cost more.

Oyster Shell – is made of Calcium Carbonate, and may be used like lime in powdered or chunky (Lay-Blend) forms.

### Gypsum

Add Gypsum at the rate 50# to 500-1500 sq ft to loosen up clay soils over time. Add every year if you want to improve clay soils.

Gypsum is Calcium Sulfate.

Use gypsum, specifically the Calcium component in the Gypsum, to prevent blossom end rot in tomatoes, if your soil pH is already good and doesn't need to be changed.

Use gypsum if your soil/plants need Sulfur or Calcium, but you don't want to change soil pH.

Gypsum is available in Powdered or Pelletized forms.

**PLEASE DO A SOIL TEST!** Prevent over-fertilization, save money, and be a successful gardener or farmer! We are very happy to help you interpret your soil test, too (“Graphical Analysis w/ Recommendations”, please!).

**A & L Labs, Portland Office (503) 968-9225 <http://www.al-labswest.com/sections/anservices/soil/fees> (get: “Graphical Analysis with Recommendations!” S3C + Recommendations, Graphical)**

HINT: If you use the Modesto CA location (**see below**), rather than the Portland OR location, and ask for "Organic Recommendations", you will get information tailored for your natural or organic garden or farm.

A & L Western Ag Labs, Mike Buttress Agronomist

1311 Woodland Avenue, Suite 1, Modesto, CA 95351 (209) 529-4080

### **FEED THE SOIL, WHICH FEEDS THE PLANT**

We believe in feeding the beneficial organisms in the soil (fungi, bacteria, earthworms), who feed the plants. Microorganisms break down organic fertilizers into plant available forms which the plants may take up as they need to. These nutrients are held in stasis in the soil until they are needed. Microorganisms create porosity in the soil, which keeps it well drained, and hospitable to plant roots. Organic matter, from compost or cover crops, along with minerals and natural fertilizers, are the food these microorganisms need to live. If your soil is lacking microorganisms or organic matter, both may be reintroduced, and a healthy soil life-cycle may be reestablished.

Till are rarely as you can, tilling can actually be destructive to established, healthy organic/natural soil systems. Rather than tilling, cover-crop, add organic soil amendments when planting, or “top-dress”.