Fertilizing Organically

Using Approved Soil Amendments

WHAT ARE ORGANIC FERTILIZERS?
Organically approved fertilizers can sound a bit strange! They can naturally occurring rock powders, like colloidal rock phosphate. They can also be ground-up plant materials like alfalfa meal, or granulated animal materials like bone meal. They can also sourced as liquids. These sources of fertilizers are called "soil amendments". Sometimes they are called "grow powders".

For example, *blood meal* supplies N, *fish bone meal* provides P and Ca, and *greensand* is a mined mineral and is a source of K and several trace elements. Liquid fish hydrolysate contains N, P, K, and many trace elements.

WHY NOT COMMERCIAL, SYNTHESIZED, CHEMICAL FERTILIZERS?
These are recommended or approved for organic certification because, in general, they cause the following problems:

- Deplete soil of organic matter
- Repel or kill earthworms and microbes (e.g. chlorine in KCl)
- Encourage hardpan and contribute to build-up of salts
- Provide only the macro-nutrients of NPK
- Do not supply or replenish micro-nutrients such as manganese, iron, zinc, iodine, sulfur, boron, copper, molybdenum
- Are water soluble; therefore leach and pollute surface and groundwater
- Force feed the plants, rather than feed the soil & soil food web
- Make soil acidic
- Leave crops more susceptible to disease, deficiency, and pest problems
- Require higher and higher doses over time to maintain the same or less crop yield.
- Require high inputs of energy to manufacture and transport.

The GOAL OF THE ORGANIC GROWING METHOD:

- Imitate natural ecosystem sustainability
- Feed the Soil Food Web = avoid force-feeding the plant
- Build balanced macro-nutrients, micro-nutrients (trace elements), microorganisms with high population & high diversity, and organic matter (compost, green manures, manures, humates)
- Steward the soil for long-term health

The aim is to build whole, balanced, alive soil. First, this means never harm or poison the soil with chemically synthesized fertilizers and pesticides that are toxic to soil microbes. "Balance" means don't overdose your amendment applications. Second, this means provide a healthy diet for the soil ecosystem by enriching it with organic matter as well as macro- and micro-nutrients. These ingredients encourage high levels of microorganisms and earth worms. Fertility depends on a thriving the soil food web to release nutrients and make them available to plants. Third, "steward for the long-term" means to maintain these high levels, rather than sacrifice soil health for the sake of cutting costs or maximizing short-term profits.

As a result, healthy soil grows healthy plants that are 1) nutrient-dense, 2) highly resistant to pests, disease, and deficiency, and 3) highly tolerant of heat, cold, and drought.

CHARACTERISTICS OF ORGANIC FERTILIZERS, compared to synthesized ones:

- Slow release
- Provide secondary macro-nutrients (S, Ca and Mg)
- Provide micro-nutrients
- Support/stimulate/sustain beneficial soil microbes, or soil food web
- Not highly soluble
- Build organic matter
- Nurture healthy crops that have minimal disease, deficiencies, and pest problems

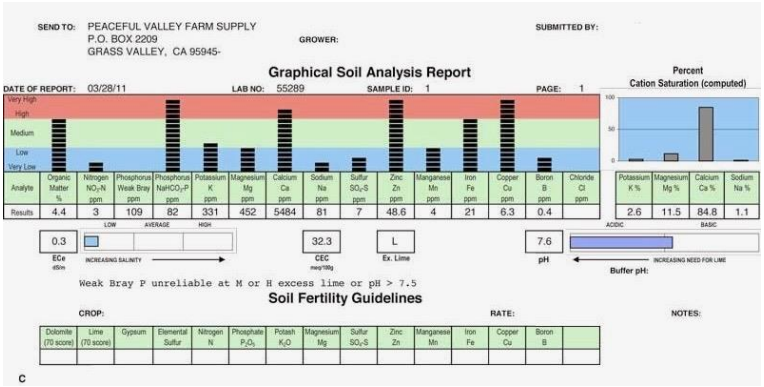
YOU NEED A SOIL TEST Here's why:

To know your available macro- and micro-nutrient levels. What minerals are deficient? What ones are in excess?

To know the balance or ratio of Ca to Mg, and P to K—What needs correcting and how?

To know how much you need, that is, ask for recommended application rates.

To know your soil's pH levels (acidity or alkalinity) and adjustments needed.



SEND TO: PEACEFUL VALLEY FARM SUPPLY
P.O. BOX 2209
GRASS VALLEY, CA 95945-

GROWER:

SUBMITTED BY:

Graphical Soil Analysis Report

DATE OF REPORT: 03/28/11 LAB NO: 55289 SAMPLE ID: 1 PAGE: 1

Percent Cation Saturation (computed)

Analyte	Organic Matter %	Nitrogen NO_3-N ppm	Phosphorus Weak Bray ppm	Phosphorus $NaHCO_3$-P ppm	Potassium K ppm	Magnesium Mg ppm	Calcium Ca ppm	Sodium Na ppm	Sulfur SO_4-S ppm	Zinc Zn ppm	Manganese Mn ppm	Iron Fe ppm	Copper Cu ppm	Boron B ppm	Chloride Cl ppm
Results	4.4	3	109	82	331	452	5484	81	7	48.6	4	21	6.3	0.4	

Potassium K %	Magnesium Mg %	Calcium Ca %	Sodium Na %
2.6	11.5	84.8	1.1

ECe 0.3 INCREASING SALINITY

CEC 32.3

Ex. Lime L

pH 7.6 Buffer pH: INCREASING NEED FOR LIME

Weak Bray P unreliable at M or H excess lime or pH > 7.5

Soil Fertility Guidelines

CROP: RATE: NOTES:

Dolomite (70 score)	Lime (70 score)	Gypsum	Elemental Sulfur	Nitrogen N	Phosphate P_2O_5	Potash K_2O	Magnesium Mg	Sulfur SO_4-S	Zinc Zn	Manganese Mn	Iron Fe	Copper Cu	Boron B	

C

pH LEVELS

Most vegetables grow best in a slightly acidic soil with a pH between 6.3 and 6.8. Most crops will do well even up to a pH of 7.1. See garden reference books and your handout packet for a

list of acid- and alkaline-loving plants. How much adjustment does the soil need? Avoid expensive guesswork. Too much can be as detrimental as too little. For example, a pH level even slightly high or low will vastly affect the availability of minerals, even though they may be present in your soil. Thus the pH will significantly affect plant growth and yield. A soil test from an independent lab will provide far more accuracy than a home test kit (unless it is a LaMotte or Hach kit starting at $70.)

To raise the pH, use ground limestone, commonly called lime. Lime is primarily calcium carbonate with magnesium in it. Avoid hydrated lime, which is caustic and may burn seedlings. Choose between two main kinds— calcitic and dolomitic lime. Calcitic lime (also called high calcium lime or calcite) contains a very low percentage (1-5%) of magnesium (Mg) as well. Dolomite lime has a higher percentage (18-20%) of Mg.

To find out which lime your soil needs, get a soil test that includes Mg. Only use dolomitic lime if your soil needs Mg. Otherwise, do not, or you could seriously disrupt mineral balance and availability. Use calcitic lime or oyster shell flour lime if you already have Mg present. If you substitute wood ash, crushed clam shell, or marl in place of ground limestone, use only a dusting.

To lower the pH, add livestock manure; cottonseed meal, decayed pine needles; oak leaf mold; decayed sawdust from oak, hemlock, or cypress; or peat moss. Or use mined sulfur, according to application rates recommended on your soil test.

MAKE YOUR FERTILIZER BLEND

Follow your soil test recommendations to know what amendments you need, and how much of each you need for your area and crops.

If you don't have a soil test, you can make your own fertilizer blend with organic amendments, by choosing a source of N, P, and K in your handout entitled Organic Fertilizer Tables. Select:

1. one kind of amendment from N sources,
2. one from P sources, and
3. one from K sources.

Try to include choices that will supply Ca as well. Note that application ranges shown in the tables in these tables pertain to nutrient-dense vegetable production, and take into account that many vegetables are heavy feeders and require large amounts of nitrogen.

The amendment application rates provided are for 100 square foot areas. To calculate the quantities of amendments you'll need, determine the square foot area of your growing area by multiplying length times width (in feet). Since application rates are given in pounds per 100 sq. ft., now figure how many 100 sq.ft. units are in your total garden. For example, a 20' X 40' garden = 800 sq. ft. So you'll need 8 times the pounds shown for each fertilizer. If you need 2.5 lbs of fishbone meal per 100 square feet, you'll buy 8 X 2.5 or 20 lbs total of fishbone meal.

WHAT IF YOU DON'T WANT TO MAKE YOUR OWN FORMULA?

For those who would rather buy a blended formula than mix their own, please see separate list entitled Fertilizers: Pre-Mixed Fertilizer Blends in this handout packet.

HOW TO APPLY the AMENDMENTS

Weigh your powders or meals for your area. If you're using liquids, follow the directions on the container. Resist the temptation to over-do! Mix them in a wheel barrel. Then sprinkle them evenly on the soil surface. Now cultivate them into the top 5-6" of topsoil. You are ready to plant.

Congratulations! By fertilizing organically, you're replacing used-up nutrients. You are building living and mineral-rich soil. Now your well-fed soil food web can reward you with healthy vegetables, flowers, fruits, lawns, and trees with far fewer pests and less drought damage.

AIM FOR SUSTAINABLE FERTILIZATION

The goal is to bring in less and less purchased fertilizer from outside the garden. Taper off these amounts each year, so that by the 6th year your legumes, cover crops, and compost provide most of your NPK. Additional practices that help maintain soil fertility:

— Recycle as much food and crop waste as possible into compost.

— Rotate crops.

— Add tree leaves to your compost. Their roots bring up nutrients otherwise too deep in the subsoil.

— Grow your own compost crops (plants specifically for making into compost).

— Keep your organic matter levels at the 4- 6% level in the top 6" of your soil. This will encourage microbial life and minimize soil nutrients from leaching out of the soil.

Chemical agriculture— a quote

"Chemical agriculture requires ever-increasing fertilizer at an increasing cost as petroleum supplies dwindle. Use of chemical fertilizers depletes beneficial microbial life, breaks down soil structure and adds to soil salinity. Impoverished soil makes crops more vulnerable to disease and insect attack and requires larger energy input in the form of pesticides to sustain production. Modern agriculture is not ecologically sane."

— John Jeavons in How to Grow More Vegetables p. 192.