

Plant Aloha Sustainable Farming Series

Thursday, February 2nd 2017

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hawaiiansanctuary.com/plantaloha

How to Grow a Complete Diet with Permaculture Principles: Tropical Subsistence Gardening. 24 part permaculture class series

Part 5 of 24 **Organic Soil Amendments & Fertilizers for Hawaii:**

Learn how to correct the most common local ph, mineral, and nutrient imbalances to enhance plant growth. Learn how to fertilize your plants and where to get a soil test.

Acknowledgements:

A special thanks to Hawaiian Sanctuary, County of Hawaii Research and Development (Plant Aloha's main grant funder) and all others involved to make these classes a reality! We are still looking for support to complete and enhance this amazing FREE program. Please give what you can: <http://hawaiiansanctuary.com/donate>

Introduction: Certain nutrients essential for plant growth tend to be leached out of Hawaiian soils by our plentiful rainfall, some nutrients may not be present to begin with. Some nutrients are water soluble and easily leached while others are generally stable once in the soil. Knowing which need to be corrected once and which need periodic replacement is crucial as adding too much of certain nutrients can be just as detrimental as having a deficiency. While we can speak in generalities of how to bring local soils into balance, there are a wide variety of soil types on the island so obtaining a soil test is the most foolproof way to detect deficiencies.

Main Macronutrients:

NPK Nitrogen(N), Phosphorus(P), Potassium(K)

These are the 3 main nutrients that are required in large amounts and most commonly limit plant growth. The numbers tell how much of each nutrient is present as a percentage of the total weight of the fertilizer so a fert with NPK of 4-3-2 is 4% nitrogen.

Nitrogen(N) is responsible for plant growth, leaches easily,

Phosphorus(P) is responsible for developing flowers, fruit, seeds and roots, does not leach easily, rock phosphate, bone meal both slow release. treble superphosphate, non-organic but fast release.

Potassium(K) is responsible for plant health, including strong stems, water movement, and flowering

Secondary Macronutrients:

Calcium (Ca) neutralized by naturally slightly acidic rain, commonly deficient

Magnesium (Mg) generally stable once in soil

Sulphur (S) is necessary for chlorophyll formation, promotes nodulation in legumes

Micronutrients: [copper](#) (Cu), [iron](#) (Fe), [manganese](#) (Mn), [molybdenum](#) (Mo), [zinc](#) (Zn), [boron](#) (B), [silicon](#) (Si), [cobalt](#) (Co), and [vanadium](#) (V). Of these boron is one of the most commonly deficient.

Trace Minerals: 70+ if any of these minerals are lacking they may limit plant growth.

Diagnosing Imbalances: obtain a soil test, check for visual symptoms of nutrient deficiency see further reading below for online pictures that that display different deficiencies.

Common Organic Bagged Fertilizers and amendments available in Hawaii:

Nutrich pelletized chicken manure = 4-3-2 +ca very rapidly available N and P, good for young fruit trees, and vegetables.

Complehumus = 8-8-8 good source of NPK great for mature fruit trees.

Fish Meal 10-4-4 rapidly available N, (can be imported in bulk from Oahu)

Neem Cake = 5-1-2 +ca anti-nematode

Rock Phosphate = 0-15-0 slow release

Calcium Carbonate (crushed coral) = calcium (locally sourced)

Dolomite lime, ag 10 lime, ag 65 lime, high mg content, use once then switch to cal carb to avoid mg overdose

Azomite = 70+trace minerals

Crushed blue rock = trace minerals (locally sourced)

Home sourced Fertilizers and amendments:

Manure- chicken 4-3-1 Very rapidly available N +P Should be composted; fresh manure will burn plants.

Weeds - fresh = 2.4-0.8-3.8, balanced and slow release

Compost - homemade = 1-0.5-1 to 2-1-2 balanced and slow release

Wood ashes - leached = 0-1.6-5 Good source of K and Ca. Will increase pH. Can injure microorganisms. Do not use more than 1/2–3/4 lb per 100 ft²

Wood chips(deciduous) - 0 - 0.2 - 2 Very slow release. Not a significant source of other nutrients. Do not apply without a rapidly available N source. Used to improve soil structure. May take >1 year to decompose.

Worm castings - 0.5 - 0.5 - 0.3 Micronutrients - good for improving soil structure, + plant hormones.

Humanure - ?

Urine - 10-1-4 (dilute to 5 to 10 parts water)

Application: apply to ground around drip line of plants, do not get on leaves (may burn)

Compost teas and foliar feeds can be brewed with water to feed the plant through its leaves.

Frequency of application: depends largely on rainfall and existing nutrient levels in the soil. Follow application rates on bag or contact

Amending and fertilizing fruit trees: apply 4-6 in aged mulch around drip line and calcium carbonate, wait a month for this to wash into the soil, then apply 8-8-8

Adjusting PH: Generally high because of frequent naturally slightly acidic rain. Calcium carbonate helps lower ph this alone can “unlock” other nutrients in the soil.

Balancing soil texture: Depending on your soil type you may want to either increase or decrease drainage. **To improve drainage** of dense, sticky, slow draining soils you can add: black cinder, sand, biochar (also helps lock up residual pesticides in the soil), or perlite. **To decrease drainage** add clay soil such as hamakua soil, and compost.

Further Reading:

Testing Your Soil: Why and How to Take a Soil-Test Sample <http://www.ctahr.hawaii.edu/oc/freepubs/pdf/SCM-9.pdf>

How to Interpret a Standard CTAHR Soil Analysis Report*

http://alohaarbortist.com/wp-content/uploads/2012/06/InterpretaSoilTest_revised1.pdf

Visual indicators of nutrient deficiencies

<https://bigpictureagriculture.blogspot.com/2015/12/plant-nutrient-deficiency-leaf.html>

Organic Soil Amendments for Sustainable Agriculture: <http://www.ctahr.hawaii.edu/oc/freepubs/pdf/pnm15.pdf>

Still have questions? The Master Gardener Helpline, Tuesdays and Fridays: 9:00 am – 12:30 pm 808-981-5199

Homework: Fertilize some plants with any of the above fertilizers.

Next Thursday Feb 9th part 6. Composting, Vermicomposting & Compost Teas: How to make compost from kitchen and yard “waste.” How to build & manage a worm bin and how to use vermicompost to make compost tea.

Contact: Malama Aina Permaculture: Edible Landscape Design, Education & Nursery

We provide consultation, design, install, maintenance, edible plants & work-exchange.

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(Past class notes, registration and links to further educational materials available below)

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