

HOW TO TAKE COFFEE LEAF AND SOIL SAMPLES (rev. 2/8/26)

Proper fertilizer recommendations cannot be provided with just soil samples. Soil and leaf samples should be taken together and submitted on an annual or biennial basis unless there is a nutritional problem requiring diagnostics. Leaf samples should be taken at or just prior to flowering/bloom when nutritional status within a plant is most stable.

The sample(s) should be representative of the area. Or, collect a sample from trees with similar visible problems to determine if there is a plant nutrition, soil pH, or other problem. Select 5 or more trees to sample from. Mark the trees for sampling in following years or to return to and manage the problem.

SOIL

Soil testing typically determines the level of nutrients (Phosphorus, Potassium, Calcium, and Magnesium) and the pH, a measurement of acidity or alkalinity, of the soil.

HOW TO TAKE A SOIL SAMPLE (Fig. 1)

1. Avoid taking samples during a dry period/drought, right after rain, or immediately following a fertilizer application.
2. Use clean tools, buckets, containers, and bags for sampling.
3. Label a clean, water-proof bag or container with your name, date, host plant, and location from where soil was taken.
4. Midway between the trunk and the drip line (fig. 1), clear the soil surface of debris (leaves, fruit, weeds, etc.), rocks, and any fertilizer residue.
5. Dig down to approximately 6-12 inches or until you reach a mass of roots. Sample closer to the dripline if you are unable to find feeder roots at the halfway point.
6. Collect ½ to 1 cup of soil per tree from at least 5 trees, combine in a bucket or container, and mix thoroughly.
7. Place the entire sample or a subsample of at least 2 cups of soil in the labeled bag or container.
8. Refrigeration is not necessary, but keep out of the sun and heat.

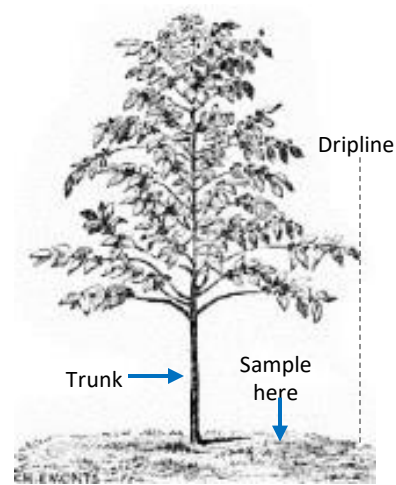


Figure 1: Soil should be sampled from the mid-point between the dripline (widest point of the branches) and the trunk of the tree.

LEAF TISSUE

Leaf tissue testing typically determines the level of nutrients (Nitrogen, Phosphorus, Potassium, Calcium, Magnesium, Iron, Sodium, Copper, Manganese, Zinc, Boron) found in the leaves and nutritional status of the plant.

HOW TO TAKE A LEAF SAMPLE (Fig. 2 & 3)

1. Avoid taking samples directly following a foliar and granular fertilizer application or during drought/dry period or flooding.
2. Use clean bags for sampling.
3. Label a clean, plastic or paper bag with your name, date, host plant, location from where leaves were taken, and any visual plant problems.
4. Take samples pre- or during flowering for best results. This gives you an opportunity to adjust fertilization prior to fruit maturity. Sample also during fruit development if a nutritional problem is suspected.

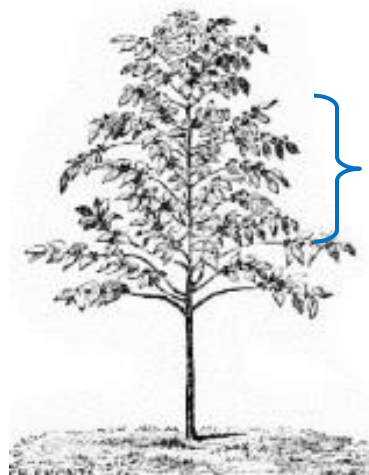


Figure 2: Select leaves approximately mid-way up/down the tree canopy.

5. Select a vertical that is in its second year of growth (first year of cherry production) and then count down from the top of the vertical to the 8th to 12th lateral branch, approximately midway of the tree canopy.
6. Pick one leaf from the most recently matured leaf from the lateral – usually the 3rd or 4th pair back from the branch tip. These leaves should be full-sized, not shaded by neighboring coffee trees, and generally have the same color and texture as older leaves, unless there is a problem.
7. Collect a minimum of 15-20 leaves per sample.
 - Collect 1-2 leaves from at least 15 trees around the farm for a general, representative sample, OR
 - Collect a total of 15-20 leaves when attempting to diagnose a specific nutritional problem.
 - Place leaves in the labeled bag.
8. Keep leaves dry and out of the heat and sun. E.g. Place samples in a cooler and on a light towel covering a bag of ice or an icepack to preserve sample integrity.
9. Prevent decay and rot of leaves. Wipe off any water moisture on the leaves with a clean paper towel and keep in the refrigerator if you are unable to submit the samples (locally) for a few days.
10. Do not freeze samples. Refrigeration is ok, but do not place the sample at the back or bottom of the refrigerator where it may get cold damage (leaves turn brown).
11. If sending leaf samples to the mainland, first wipe leaves of residue with distilled or purified water and a clean paper towel, then oven dry or dehydrate the leaves at 70°C or 158 °F until crispy and dry like paper. This may take 6-12 hours.

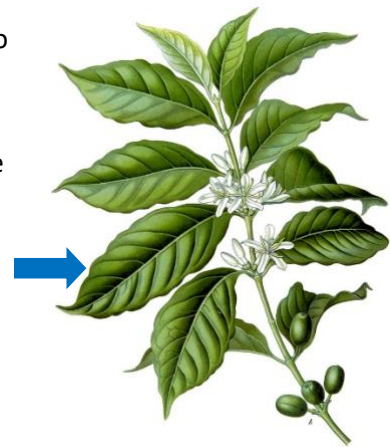


Fig. 2: Some plant nutrients are more mobile or immobile in plant tissues than others. As such, proper selection of leaves from laterals is important for accurate results

LABS & COSTS

As of 9/25/25, these are some options for soil and tissue sampling. Be sure to contact the company for costs which can vary greatly.

- Midwest Laboratories – <https://midwestlabs.com/get-started>
- Crop Nutrient Solutions, Inc. – [Services and costs](#) – From Big Island - NO soil, ONLY dried coffee leaf tissue
Peter Bunn, CPAg; email: pbunn@pixi.com; cell: 808-386-4120; CropNutrientSolutions.com
- Simplot (Kona) - (808) 326-7555
- Nutrien Ag Solutions (Hilo) - (808) 935-7191
- Maintain a copy of all forms and paperwork sent with the samples.
- Contact the labs directly with any questions regarding forms, costs, payment, shipment, delivery, results, recommendations, etc.

RESULTS

Typically, the sample results are mailed and/or emailed directly to the grower approximately 2-4 weeks after receipt; however, if there is a backlog, it may take longer. For any sample inquiries, please contact the labs directly and have a copy of your forms/paperwork on hand.

This publication was created by Andrea Kawabata (UH-CTAHR; andreak@hawaii.edu) and adapted from V. Easton-Smith's Extension Publication. Information and interpretation of Hawaii soil and various crop tissue results can be found in the following publications.

- Adequate Nutrient Levels in Soils and Plants in Hawaii (General Guide) - <https://bit.ly/3g46KdG>
- Testing your Soil - Why and How to Take a Soil-Test Sample - <https://bit.ly/35nrOJY>
- Interpreting Soil Nutrient Analysis Data - <https://bit.ly/3G9nISE>
- Recommended Plant Tissue Nutrient Levels for Some Plants in Hawaii - <https://bit.ly/3raB4d6>



Adequate Nutrient Levels in Soils and Plants in Hawaii (General Guide)

Y. N. Tamimi, J. A. Silva, R. S. Yost, and N. V. Hue
Department of Agronomy and Soil Science

This fact sheet presents a practical guide to the soil fertility status (Table 1) and sufficiency ranges for nutrients in tissues (Table 2) of some crops grown in Hawaii. This information is useful for targeting fertilizer application levels for sustained agricultural production and protecting our environment from pollution resulting from overapplications.

Soils of Hawaii are divided into three main groups: “heavy” soils developed from alluvial or volcanic rocks, “light” soils developed from volcanic ash, and a’ua lava land, predominantly composed of broken lava rocks mixed with some fine soil particles and organic matter. These groups were selected to simplify diagnosis, because soil bulk density, clay mineralogy, and other pertinent soil characteristics affecting soil fertility are relatively similar within each group but substantially different among the groups.

Table 1. Soil analysis levels generally considered adequate for three broad soil bulk density categories in Hawaii¹.

Soil property	Unit	Heavy soils ²	Light soils ²	A’ua land
Acidity ³	pH	5.8 – 6.2	5.8 – 6.2	5.5 – 6.2
Phosphorus ⁴	P (ppm)	25 – 35	50 – 85	80 – 100
Potassium ⁵	K (ppm)	200 – 300	200 – 400	400 – 600
Calcium ^{5,6}	Ca (ppm)	1500 – 2000	3000 – 4000	1500 – 2000
Magnesium ^{5,6}	Mg (ppm)	300 – 400	600 – 800	300 – 400
Salinity ³	EC (mmhos/cm)	< 3.0	< 3.0	

¹These levels are thought to be adequate for vegetable crops, while slightly lower levels may be adequate for tree crops and pastures. Crops with limited root volume or grown in media with a very low bulk density may respond to higher levels of soil-available nutrients.

²Bulk density of heavy soils = ~1.0 g/cm³, light soils = ~ 0.5 g/cm³.

³Measured as paste in distilled water. The desirable level of pH varies among crops. EC = electrical conductivity.

⁴Extracted with the Modified Truog Method (0.01 M H₂SO₄ + 0.02 M (NH₄)₂SO₄ with soil:solution ratio of 1:100).

⁵Extracted with neutral 1 M ammonium acetate with soil:solution ratio of 1:20.

⁶Ca and Mg are generally in the ratio 5:1.

*Replaces Agronomy & Soil Science Fact Sheet no. 3, 10/17/94.

Table 2. Suggested “sufficiency” nutrient levels in tissues of selected crops.

Nutrient	Unit	Crop																																												
		Beans ^{1,2,6}		Corn ^{1,2}		Cucumber ^{1,6}		Tomato ^{1,6}		Chinese cabbage ¹		Lettuce ^{1,6}		Kikuyugrass ²		Bermudagrass ^{1,5}		Banana ^{1,3}		Papaya ¹		Coffee ^{1,4}		Macadamia ^{1,2,4}																						
N	%	3.0	–	4.5	2.6	–	4.0	3.5	–	4.5	3.0	–	4.5	3.5	–	4.0	2.5	–	3.0	4.0	–	6.0	3.5	–	4.0	2.5	–	3.0	4.0	–	6.0	3.5	–	4.0	2.5	–	3.0	4.0	–	6.0						
P	%	0.30	–	0.70	0.25	–	0.50	0.4	–	1.0	0.25	–	0.75	0.4	–	1.0	0.20	–	0.30	0.20	–	0.60	0.40	–	0.60	0.20	–	0.30	0.20	–	0.60	0.20	–	0.60	0.20	–	0.60	0.20	–	0.60						
K	%	1.5	–	4.0	1.5	–	3.0	2.8	–	4.5	3.0	–	5.0	2.8	–	4.5	2.0	–	3.0	1.0	–	3.0	4.5	–	7.5	4.0	–	7.5	2.0	–	3.0	1.0	–	3.0	3.0	–	5.0	3.0	–	5.0	2.0	–	3.0			
Ca	%	1.5	–	2.5	0.3	–	0.8	1.8	–	4.0	2.0	–	3.0	1.8	–	4.0	0.25	–	0.40	15	–	1.0	2.0	–	6.0	1.5	–	2.3	0.25	–	0.40	15	–	1.0	0.25	–	0.40	0.25	–	0.40	0.25	–	0.40			
Mg	%	0.20	–	0.80	0.3	–	0.8	0.4	–	1.2	0.40	–	0.60	0.4	–	1.2	0.25	–	0.40	0.20	–	0.60	0.30	–	0.70	0.36	–	0.50	0.25	–	0.40	0.20	–	0.60	0.25	–	0.40	0.25	–	0.40	0.25	–	0.40			
S	%	0.15	–	0.40	0.16	–	0.50	0.30	–	1.0	0.40	–	1.2	0.30	–	1.0	0.20	–	0.30	0.20	–	0.50	(0.50	–	1.0) ²	(0.25	–	0.50) ³	0.20	–	0.30	0.20	–	0.50	0.20	–	0.30	0.20	–	0.50	0.20	–	0.50			
Fe	ppm	50	–	300	50	–	250	50	–	300	100	–	200	50	–	300	75	–	300	50	–	350	40	–	200	50	–	200	75	–	300	50	–	350	40	–	200	50	–	200	40	–	200			
Mn	ppm	50	–	300	35	–	200	50	–	400	40	–	250	50	–	400	50	–	300	25	–	300	25	–	200	25	–	150	50	–	300	25	–	300	25	–	200	25	–	200	25	–	200			
Zn	ppm	20	–	200	35	–	100	25	–	300	20	–	50	25	–	300	25	–	150	20	–	250	20	–	200	25	–	150	25	–	150	20	–	200	25	–	150	20	–	200	20	–	200			
Cu	ppm	5	–	30	6	–	20	8	–	20	5	–	20	8	–	20	10	–	25	5	–	50	5	–	25	7	–	25	10	–	25	5	–	50	5	–	25	5	–	25	5	–	25			
B	ppm	30	–	75	10	–	25	30	–	100	25	–	100	30	–	100	10	–	25	6	–	30	60	–	100	23	–	50	10	–	25	6	–	30	60	–	100	23	–	50	10	–	25	10	–	25

Crop index tissues and sources from which critical-level data were adapted:

¹Beans: uppermost, most recently fully developed trifoliate leaf. Coffee: 4th pair of leaves back from growing tip. Cucumber: leafblades with midribs, 5th leaf from tip, at pre-fruit stage. Lettuce: pre-heading wrapper leaves. Papaya: petiole from most recently mature leaf. Tomato: compound leaves adjacent to top inflorescence at pre-fruit stage. J.B. Jones, Jr., B. Wolf, and H.A. Mills (1991) Plant analysis handbook. Micro-macro Publishing Inc., Athens, GA.

²Corn: whole ear-leaf at early tasseling. Chinese cabbage: fully mature wrapper leaf. Macadamia: recently fully mature leaf. Kikuyugrass: terminal growth to include 5th–6th leaf. Y.N. Tamimi and D.T. Matsuyama, unpublished.

³Banana: strips from middle of 3rd leaf. Reuter and Robinson (1968) Plant analysis. Inkata Press, Australia.

⁴N.V. Hue, unpublished; Fox and Hue, 1989, J. Plant Nutr.; Hue and Nakamura (1988) J. Plant Nutr.; Hue, Fox, and McCall (1988) J. Plant Nutr.

⁵Bermudagrass (mostly Tifgreen and Tifdwarf for putting greens): leaf clippings. C.L. Murdoch, E.N. Okazaki, and D.T. Shigeta (1983) HITAHR Research

Extension Series no. 025.

⁶Vegetables grown under tropical/subtropical conditions. Fox, R.L., and H. Valenzuela (1992) In: IFA World fertilizer use manual. International Fertilizer Industry Association. p. 293–337.