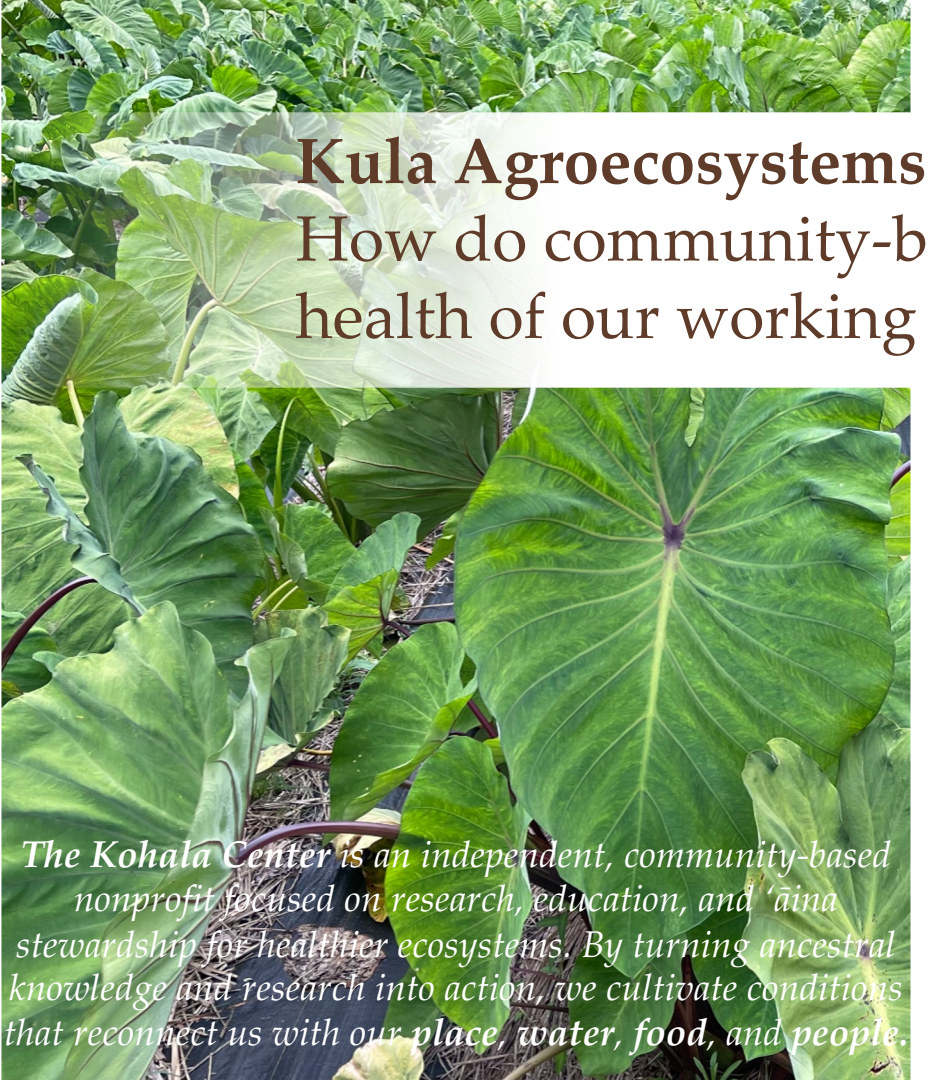

Kula Agroecosystems question:

How do community-based food systems nurture the health of our working lands and people across moku?

The Kohala Center *is an independent, community-based nonprofit focused on research, education, and ʻāina stewardship for healthier ecosystems. By turning ancestral knowledge and research into action, we cultivate conditions that reconnect us with our* ***place***, ***water***, ***food***, *and* ***people****.*

- Rural and Cooperative Business Development Services
- Ōhāhā Mahi ʻAi Agricultural Training and Education Program
- Hawaiʻi Public Seed Initiative
- NRCS Cooperative Agreement for Technology Development and Conservation Assistance

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Soil health and soil functions:

"Soil health is the capacity of soil to function as a living ecosystem that sustains plants, animals, and humans."

- Regulating water
- Sustaining plant/animal life
- Filtering/buffering pollutants
- Cycling nutrients
- Physical stability/support
- Habitat for biodiversity

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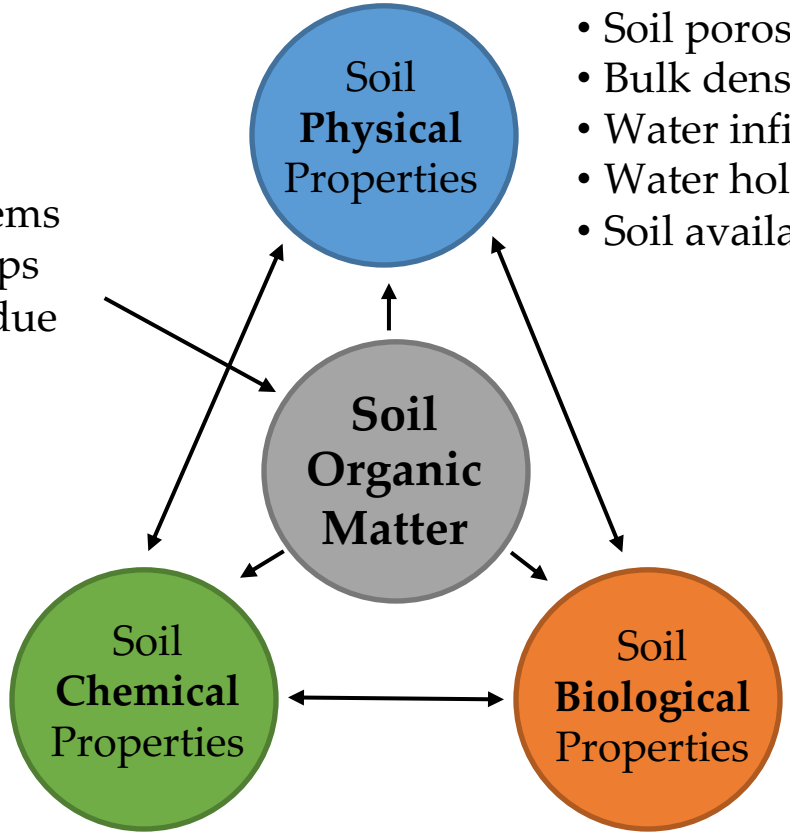
Soil health indicators

Indicators:
- Aggregate stability
- Soil structure
- Soil porosity
- Bulk density
- Water infiltration
- Water holding capacity
- Soil available water

Inputs:
- Root systems
- Cover crops
- Crop residue
- Compost



Indicators:
- Total carbon
- (In-)organic N, P, K
- Soil pH
- Cation exchange capacity

Indicators:
- Earthworms
- Microbial biomass
- Soil organic carbon
- Soil respiration
- Soil enzymes

Soil health principles & practices

Minimize soil disturbance:
- Reduces loss of organic matter and compaction; protects soil surface

Diversify soil biota with plant diversity:
- Increases soil function, reduces input costs, increases profitability

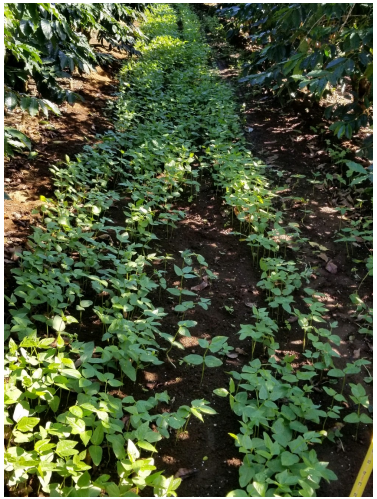
Provide continuous living roots:
- Provides food source for soil microbes, which helps them cycle nutrients

Maximize soil cover:
- Provides erosion control, weed suppression, fertility, reduces compaction

Ka‘u cover crop project

Ka‘u United Farmers Cooperative; supported by the USDA/HDOA Specialty Crop Block Grant Program

Stylo
30 lbs/acre



Cowpea
100 lbs/acre

Perennial peanut
40 lbs/acre

Red clover
40 lbs/acre

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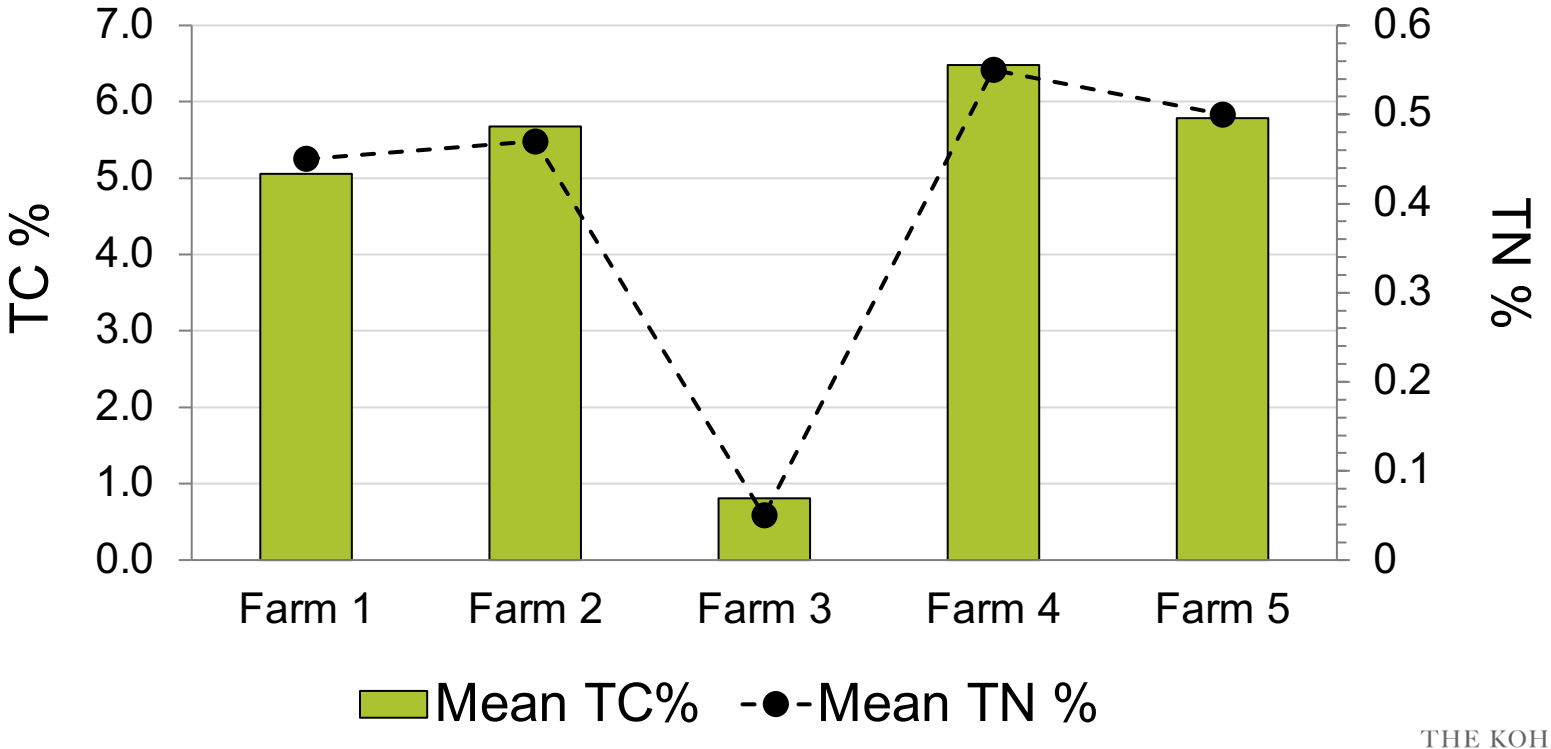
Soil carbon & nitrogen of five Ka‘u coffee farms



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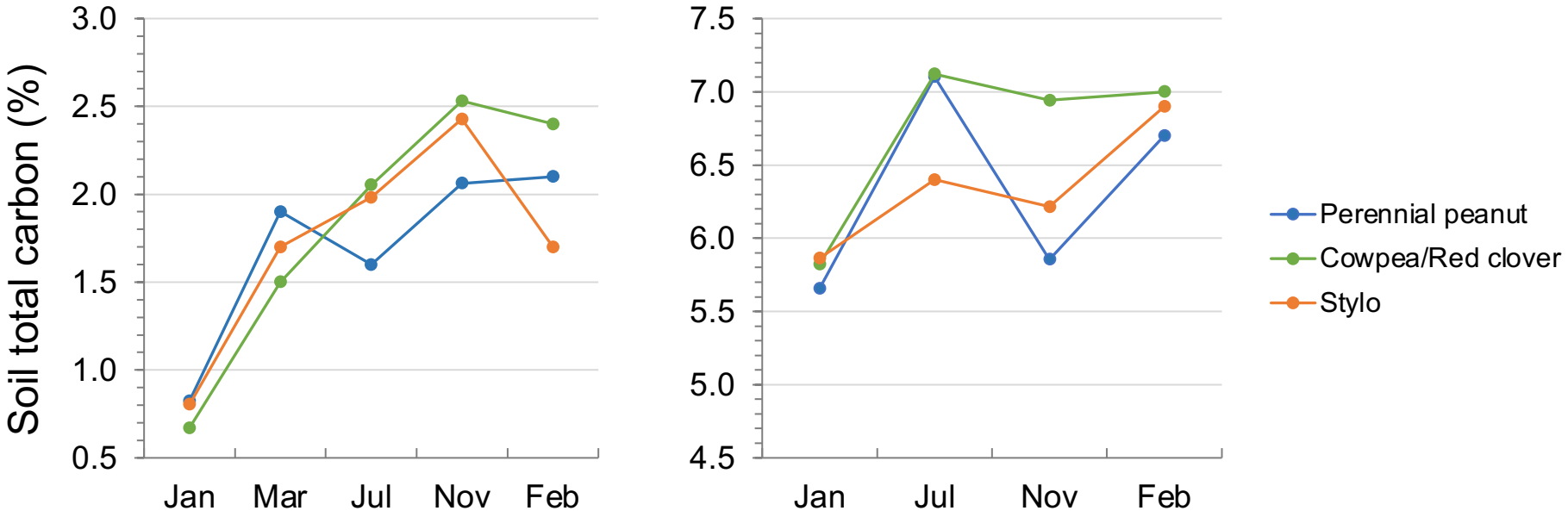
Changes in soil carbon on two Ka‘u farms



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USDA-SCBGP cover crop project

- Germination/establishment:
  Red clover > p. peanut (sprigs) > stylo > p. peanut (seed)
- Weed suppression:
  P. peanut > Red clover > stylo
- Perennial peanut sprigs > seeds
- Cowpea unsuitable for coffee orchards
- Increase red clover seeding rate
- Spring/summer planting & mulch application

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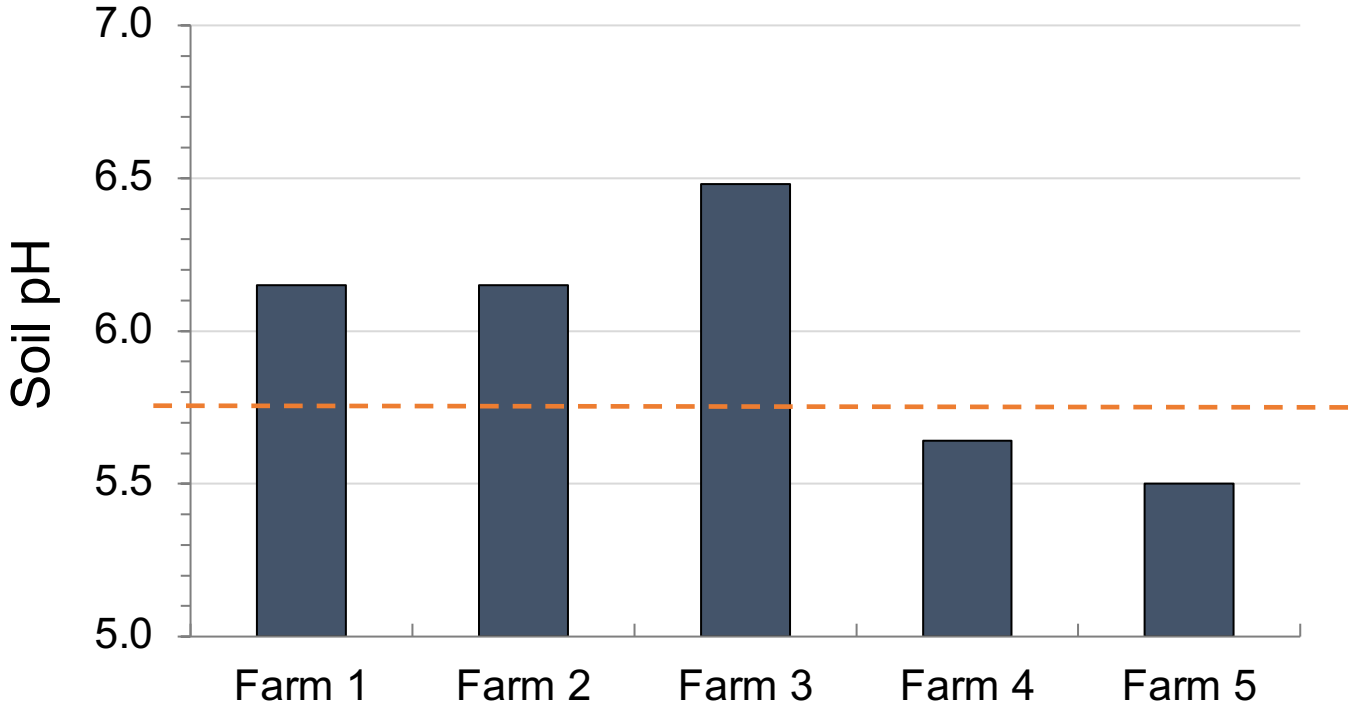
Soil pH baseline of five Ka‘u coffee farms



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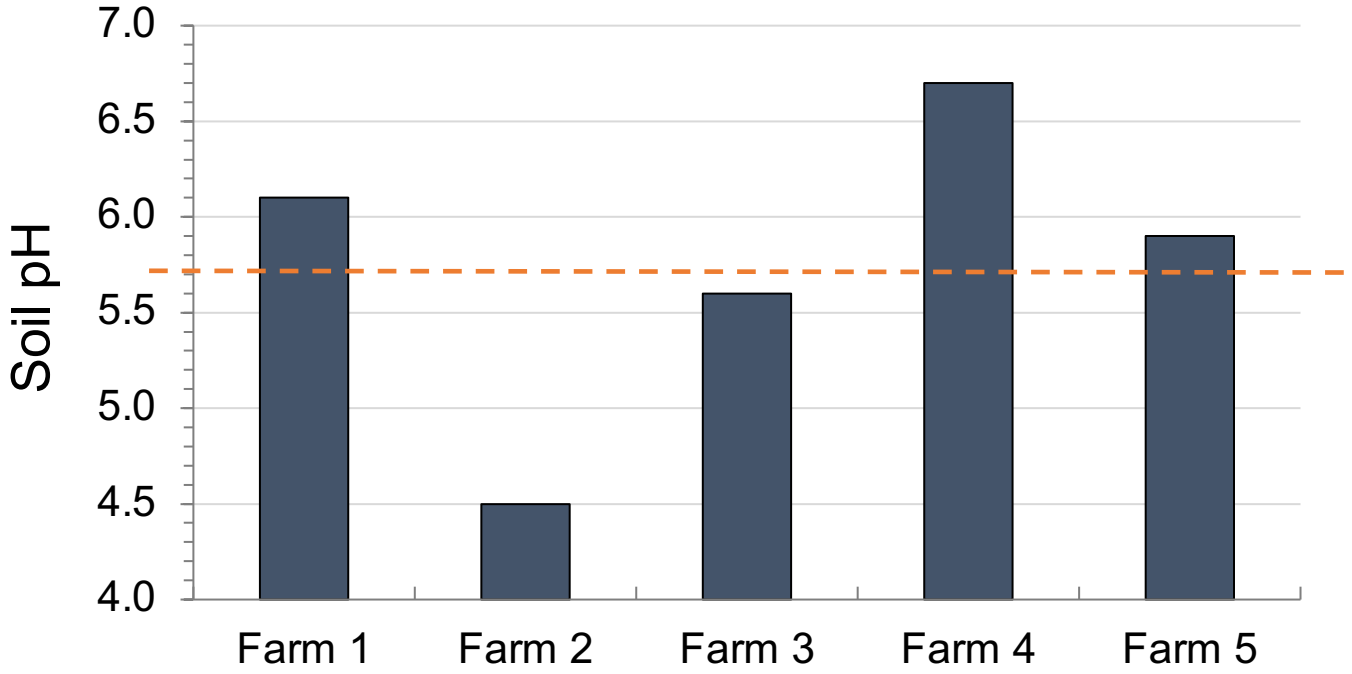
Soil pH levels of five Kona coffee farms



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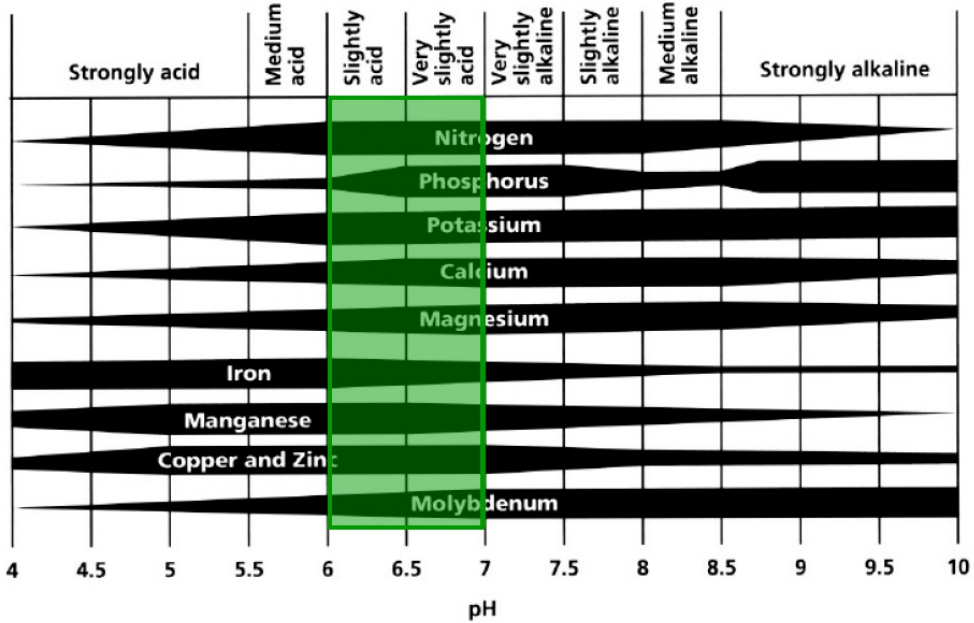
Soil pH and plant nutrient availability



pH < 5.5

- P, K, Ca, Mg deficiency
- Al, Mn toxicity

pH > 7.5

- P deficiency
- Fe, Cu, B, Mn, Zn deficiency
- Salt problems

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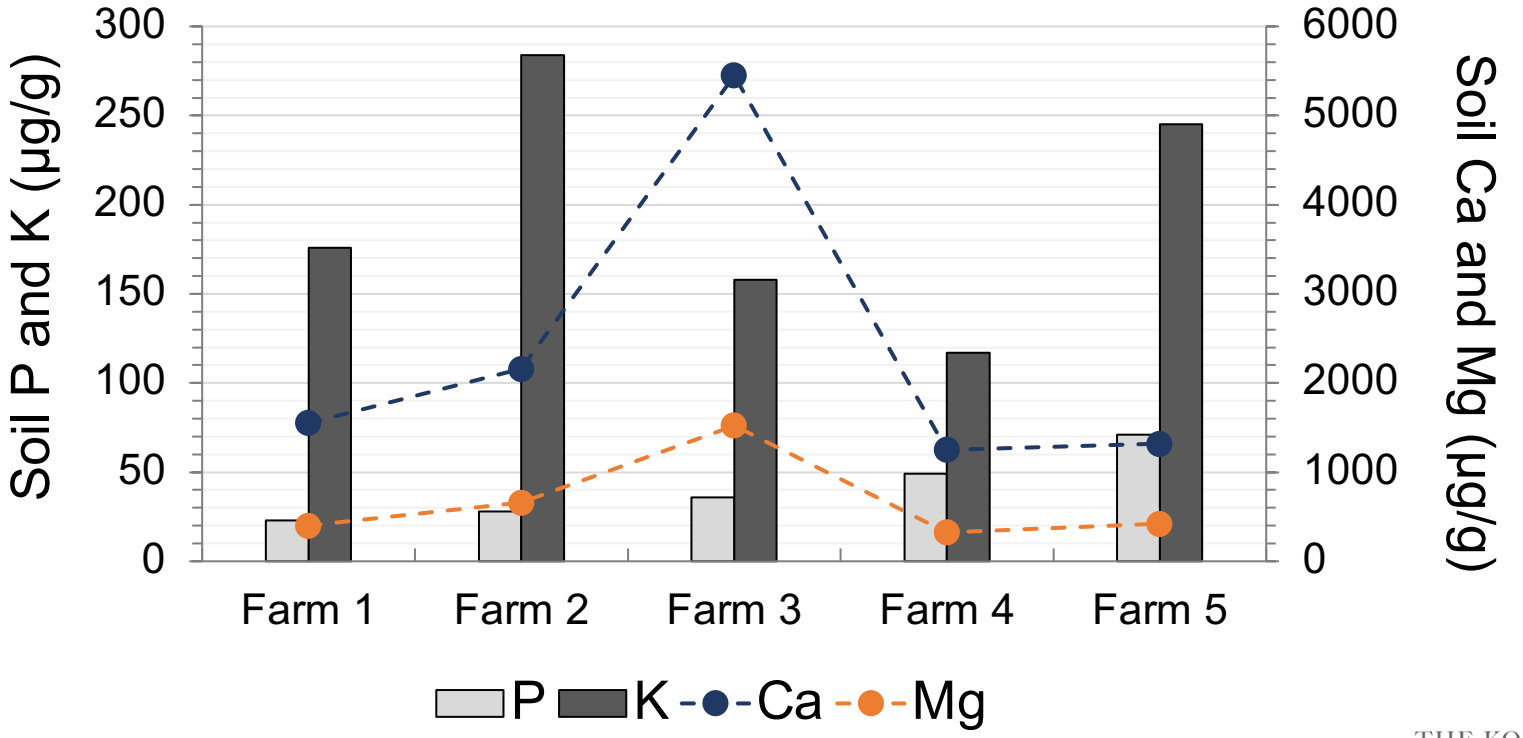
Soil nutrient contents of five Ka‘u farms



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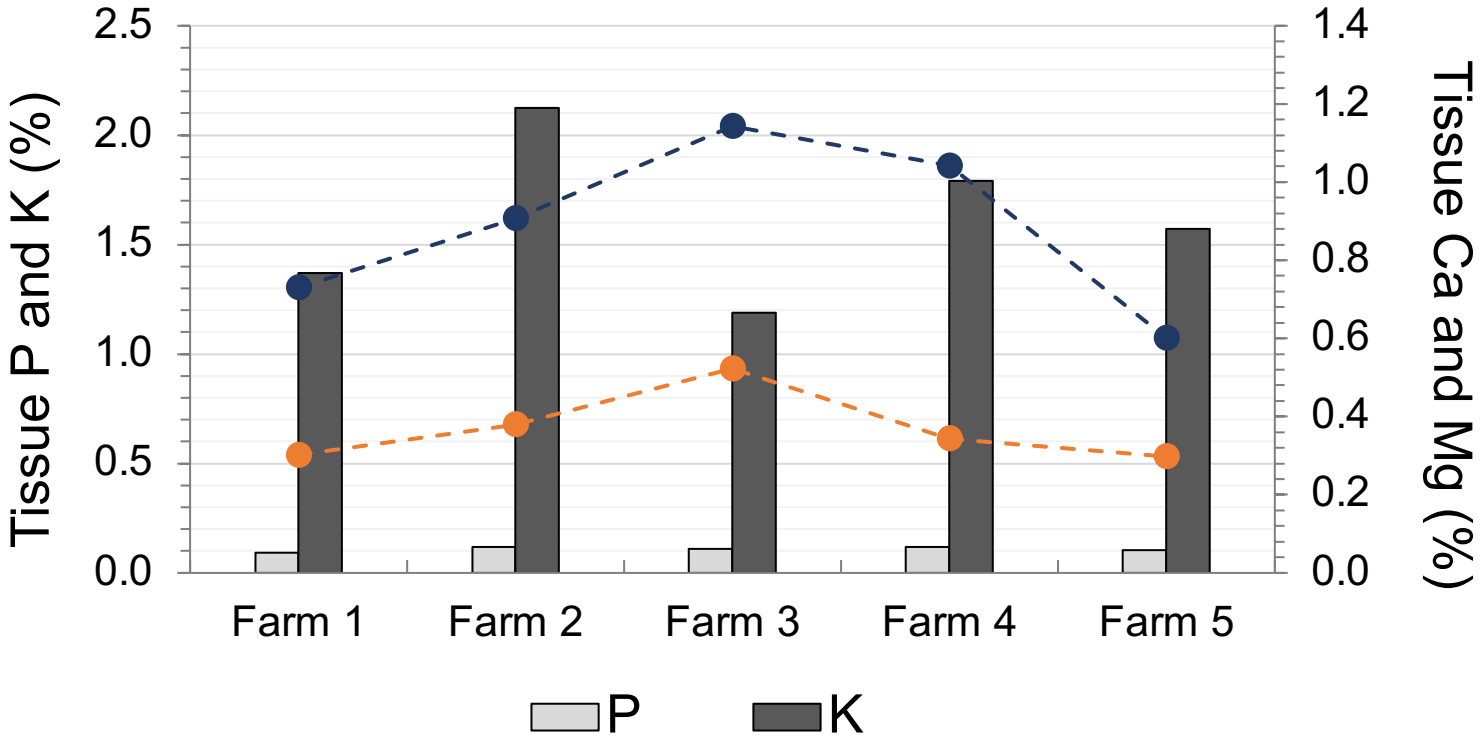
Tissue nutrient contents of five Ka‘u farms



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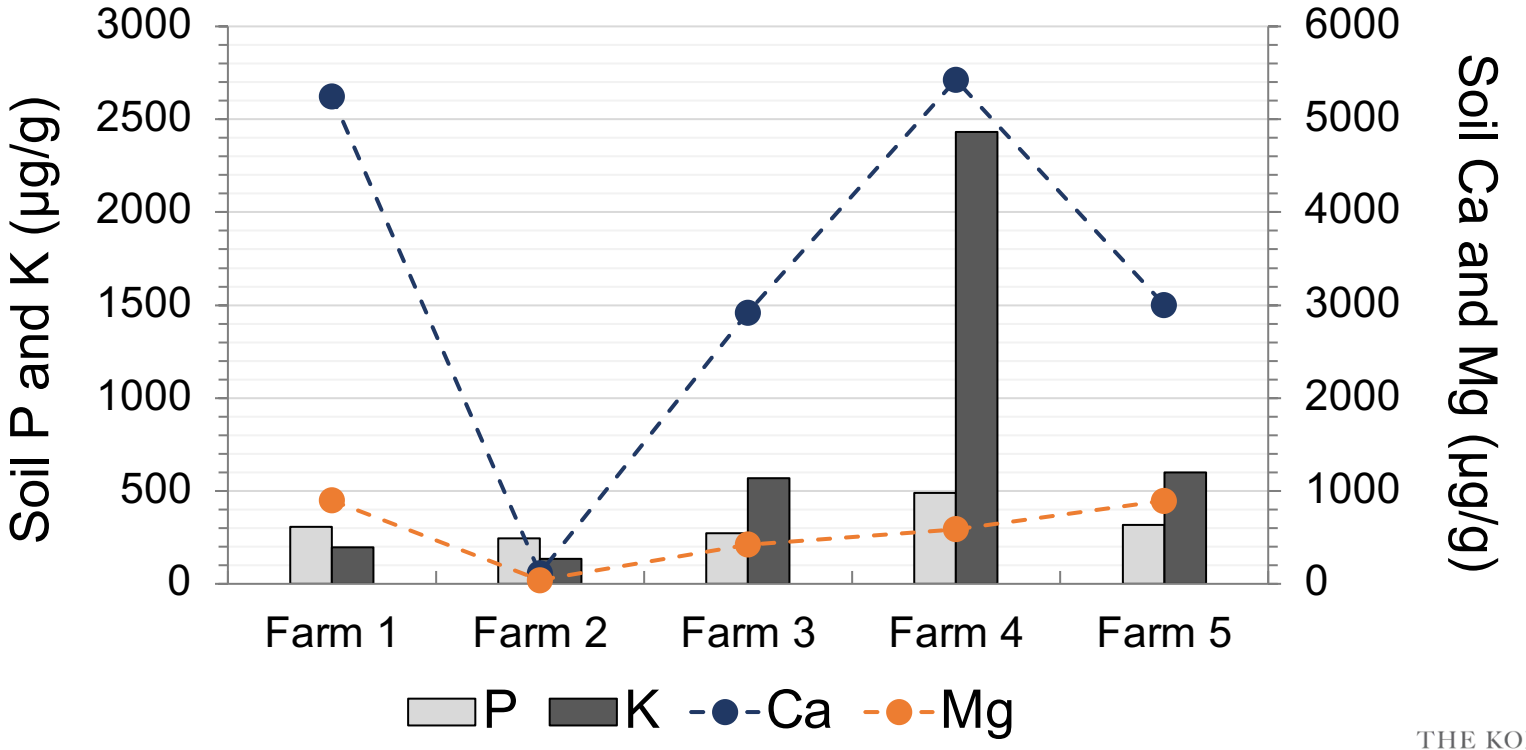
Soil nutrient contents of five Kona farms



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Soil nutrient and plant tissue testing

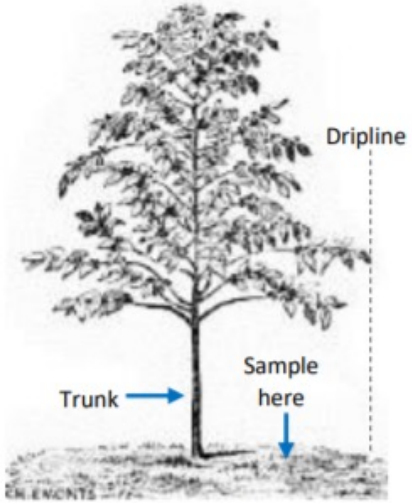

Fig. 1: Soil is sampled from the mid-point between the dripline (widest point of the branches) and the trunk of the tree.

Fig. 2: Select laterals around the mid-point between the lowest and

From: "How to take coffee leaf and soil samples (rev. 9/6/18)" by Andrea Kawabata

https://www.hawaiicoffeeed.com/uploads/2/6/7/7/26772370/how_to_take_coffee_leaf_and_soil_samples_090618.pdf

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Contact:
Dr. Melanie Willich
Director of Applied ʻĀina-based Agriculture
mwillich@kohalacenter.org