Advancing Use of Cover Crops

Western SARE

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Project background

In Hawai'i, the practice of bare ground fallow is often used to manage weeds and soil pests between crop cycles. However, bare ground fallow poses risks of soil erosion and non-point source pollution and results in a loss of valuable topsoil and diminished soil quality.

Barriers to implementation of cover crops:

1. Cover crop seed can be expensive and scarce.
2. Farmers are afraid to make costly mistakes.
3. Demonstrations and information not specific to farmers' situations.
4. Cost-benefit of cover cropping not well quantified.

The initiative to advance the adoption of cover crops as a Best Management Practice began with a Western SARE Research & Education grant in 1998 (SW97-001, Management of Soil-Borne Plant Parasitic Nematodes for Sustainable Production of Field-Grown Tomatoes and Cucumbers by Cover Cropping). Subsequent efforts, to date, have been funded by: the Hawai'i Department of Health (under the 319(h) program), the American Farmland Trust and the USDA Natural Resources Conservation Service State Conservation Innovation Grant program.

The current effort is funded for three years (October 1, 2007, through September 30, 2010) by the USDA NRCS National Conservation Innovation Grant program.

Work Evolving from a Research & Education Grant

Title: Advancing the Adoption of the Cover Crop Technology Using Sunn Hemp, Oats and Buckwheat in Commercial Rotational Crops in Hawai'i

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Previous **Western SARE Grant, SW97-001**, Management of Soil-Borne Plant Parasitic Nematodes for Sustainable Production of Field-Grown Tomatoes and Cucumbers by Cover Cropping

Weed growth between buckwheat and sunn hemp.

Project Objectives

1. Demonstrate benefits of cover crops on soil fertility levels, beneficial insects, pest reduction, weed suppression and soil compaction to farmers on five islands while, at the same time, documenting any adverse impacts to key cash crops.
2. Quantify the direct cost-benefit for selected cash crops by estimating yield gains (if any) and examining cash crop tissue nutrient levels as a measure of crop vigor and response to improved soil quality. Savings on fertilizer costs will also be calculated.
3. Motivate cooperators to implement cover crops on 10% of their farmed acreage.
4. Guide farmers through the process of using cover crops by providing on-site consultation.

Project Methods

Fourteen field sites on five islands (Kaua'i, O'ahu, Moloka'i, Maui and Hawai'i) are being planted with sunn

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WESTERN SARE
Sustainable Agriculture Research & Education

Western SARE, a USDA organization, funds grants for research and education that develop or promote some aspect of agricultural sustainability, which embraces

- *profitable farms and ranches*
- *a healthy environment*
- *strong families and communities.*

The Western Region, one of four SARE regions nationwide, is administered through Utah State University.

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hemp, oats, buckwheat and combinations of sunn hemp with oats and buckwheat. These will be followed with or planted into papaya, sweet potato, coffee, Hawaiian koa, tomatoes, pineapple and organically grown produce.

O'ahu Resource Conservation and Development Council (O'ahu RC&D) staff and Crop Care Hawai'i, LLC are conducting field plantings, collecting soil and tissue samples for soil fertility analysis and assessing weed suppression and percent ground covered by the use of the selected cover crops.

O'ahu RC&D is staging 14 separate field days at demonstration sites.

Susan Schenck, Ph.D. (Hawai'i Agriculture Research Center) is measuring soil nematode density on all 14 sites before and after cover crop plantings at prescribed intervals.

Mark Wright, Ph.D. (UH – CTAHR) is monitoring insect populations on six sites for five cropping situations (seed corn, sweet potato, papaya, organically grown produce and coffee).

Jonathan Deenik, Ph.D. (UH – CTAHR) is monitoring five sites representing major soil types for soil fertility, bulk density and soil microorganism activity.

Stuart T. Nakamoto, MBA, Ph.D. (UH – CTAHR) is conducting a cost-benefit analysis for each of the seven demonstrated cash crops on selected sites.

Partnering with Waialua High School to provide community capacity building by having junior and senior high school students work with us in all phases of the project. First year's students were: Mike Aphay, Kaikala Carvalho, Josiah Castellanos, Kristian Castellanos, Lōkahi Herrod, Geena Pinacate, Abcde Tantog and Bryce Whittaker. Students were hired and paid by Pioneer Hi-Bred International Inc. as interns.

Anticipated Impacts

- Reduced soil erosion
- Reduced pesticide application due to enhanced weed suppression, reduced nematode populations and increase of natural enemies of the cash crop pests
- Reduced fertilizer requirements due to nutrient cycling and biological fixation of nitrogen
- Reduced nutrient leaching and runoff
- Improved soil quality (fertility and nutrient levels, soil microorganism activity, organic matter content)

Project Progress to Date

12 sites planted: HARC Kunia and Maunawili (sweet potato and Hawaiian Koa); Pioneer Hi-Bred International Inc. in Waialua (seed corn); Mōhala Farm in Waialua (organically grown produce); Dole Food Co. in Helemano (coffee); Lynne and Russell DeCoite in Ho'olehua, Moloka'i (sweet potato); Orlando Manuel Farm on the island of Hawai'i in Pu'uiki in the Puna District (papaya); Alberto Belmes Farm on the island of Hawai'i in Kea'au in the Puna District (papaya); Taiwan Gu Farm on the island of Hawai'i in the Hāmākua District (sweet potatoes); Greenwell Farms on the island of Hawai'i in the North Kona District (coffee); Kaua'i Coffee on the island of Kaua'i in 'Ele'ele (coffee); and Kapalua Farms on Maui in Kapalua (organically grown produce and pineapple).

Pre-plant soil analysis for baseline soil fertility and plant parasitic nematode populations performed at all sites.

Baseline soil microbiological activity at four of five sites performed: HARC Kunia, Pioneer Hi-Bred International Inc., Kapalua Farms and Taiwan Gu Farm. Fifth site to be selected later this year.

Two cover crop disk-down soil samples collected at HARC Kunia and Pioneer Hi-Bred International Inc.

Seed distributed to additional growers interested in cover crop practice: Mary Lorenz (weed suppression in dracaena stock plants in Kea'au, Big Island), Jimmy Bernardo (nematode management in noni in Pāhoa, Big Island), Wei Chong Ho (green manure application in Kahuku, Oahu). Farmer counseling provided.

Insect natural enemy data collected from Pioneer Hi-Bred International, Inc. site in Waialua. Currently sampling beneficial/pest insect populations at Kapalua Farms, Taiwan Gu Farm.

Commercial crop of sweet potatoes planted over cover crop treated plots at HARC Kunia. Seed corn crop planted over cover crop and compost treated plots at Pioneer Hi-Bred International Inc.

Presentation on project at the 2008 Annual Meeting of the Hawai'i Association of Conservation Districts in Keauhou, Kona, June 18.

First project field day conducted at Mōhala Farms, February 16, 2008.

Second project Field Day conducted at the HARC Kunia site, June 24, 2008.

Poster to be displayed at the Hawai'i Ag Conference 2008, September 4, 2008.

Working with UH-CTAHR Sustainable Agriculture program to provide Virtual Field Day video.

Formed strategic collaborative relationship with Dr. James Leary at UH – CTAHR to further expand the adoption of the cover crop practice in Hawai'i.