

Western SARE

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SUNN HEMP IN ISLE VEGETABLES

Situation

Plant-parasitic nematodes are serious pests of many cropping systems in Hawai'i and the continental United States. Nematicides are expensive for resource-challenged growers, and several have been banned or are being scrutinized by the EPA because of human health and environmental concerns.

Sunn hemp (*Crotalaria juncea*) is known for its ability to improve soil nutrient status. However, when incorporated into the soil, it releases allelopathic compounds that are toxic to nematode pests. Further, when used in a strip-till cropping system, sunn hemp (SH) residues that remain on the soil as surface mulch can create a habitat favorable for natural enemies of insect



Alternate rows of sunn hemp are strip-tilled and planted with cucumber seedlings. Sunn hemp biomass is clipped and laid down as sunn hemp mulch.

pests and provide a physical barrier to weeds.

The main constraint of using non-chemical approaches for nematode management is their short-term effect (usually one cropping cycle) for pest control. However, because of limited land, many small- or intermediate-scale farmers in Hawai'i tend to grow similar crops continuously in the same fields within the same rows. One goal of the project is to extend the pest-suppressive effect of

sunn hemp cover cropping and soil solarization beyond one cropping cycle.

A more sustainable long-term approach is to alternate rows of sunn hemp and vegetables during each planting. Instead of planting the follow-up crop into the same row as the previous crop, the sunn hemp rows that remained during the initial crop planting would be strip-tilled under (green manure), and the sec-

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Research & Education Grant

Title: Sunn Hemp and Its Allelopathic Compounds for Vegetable Production in Hawai'i and Beyond

Project Number: SW08-037

Principal Investigator:

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Millipedes, isopods and many other soil arthropods that feed on decaying plant or animal material are commonly found under sunn hemp mulch, contributing indirectly to decomposition and soil nutrient cycling.



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.

Western SARE:
<http://wsare.usu.edu>

National SARE
www.sare.org

SUNN HEMP IN ISLE VEGETABLES

and cash crop would be planted into the tilled strips.

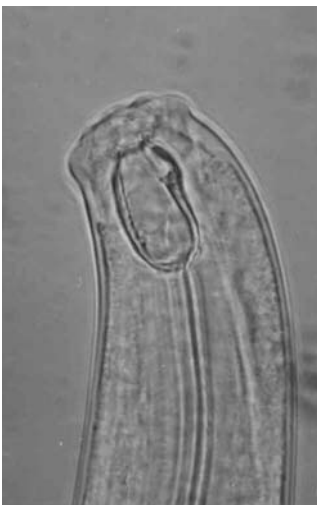
Our approach is to use sunn hemp as an interplanted cover crop and green manure, solarization and a combination of sunn hemp with solarization within the same field.

Objectives

1. Evaluate the impact of using sunn hemp as an organic mulch and green manure, solarization and sunn hemp + solarization on nematode, insect and weed pests during two cropping cycles
2. Examine how SH and solarization impact soil health, pest and beneficial organisms
3. Identify compounds in sunn hemp that are toxic to nematodes
4. Determine the lethal dosage of SH residue required to suppress nematodes and whether solar heat can enhance its effectiveness

Planned Activities

During the project, the ability to enhance the nema-



Soil will be monitored for beneficial nematodes such as *Mononchus*, a predatory nematode that can prey on other nematodes.



Alternate rows of sunn hemp are strip-tilled and planted with cucumber seedlings. Sunn hemp biomass is clipped and laid down as mulch.

tode suppressive capacity of sunn hemp in combination with solarization will be evaluated under laboratory, greenhouse and field conditions. To determine how to maximize sunn hemp's pest-suppressive potential, nematicidal compounds in sunn hemp will be identified in different plant tissues at different stages of its growth.

The proposed cropping strategies, which can be adopted by a wide range of growers, will be tested on commercial farms of different sizes and crop diversities. We will test the most challenging crops listed by the grower participants (eggplant, bitter-melon and Italian parsley) as model cropping systems.

Project findings will be publicized through field days and workshops, extension and journal publications, video and website postings.

Potential Benefits

The project will be evaluated by examining its impact on soil health, beneficial and pest organisms above and below the soil surface, nutrient enhancement, crop yields and profits.

Social impacts and direct impacts such as number of persons and acres impacted will also be obtained. Economic



A nematode-trapping fungus, *Arthrobotrys dactyloides*, forming a constricting ring capturing a root-knot nematode.

analysis will be used to assess the cost-effectiveness of this approach.

We anticipate that this project will increase the confidence that growers need to transition into a sustainable and economically viable production system.



Sunn hemp in flower.