

线虫综合管理

# Integrated Nematode Management (INM) for Basil Farmers



College of Tropical Agriculture and Human Resources  
University of Hawaii at Manoa



Basil with root galls

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CTAHR

Jan 2024

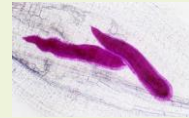


# Root-knot nematode (*Meloidogyne* spp.)

Sandy soil

## 根瘤线虫

J2  
(move inside root tissues until a feeding site is found)



J3-J4  
(sausage shape)

Feeding site undergoes hypertrophy and form giant cells



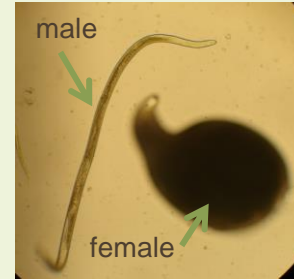
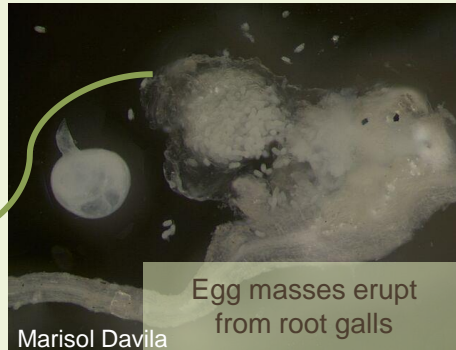
Male spends most time outside of the roots

Root-knot nematodes can produce eggs parthenogenetically (without sexual reproduction)



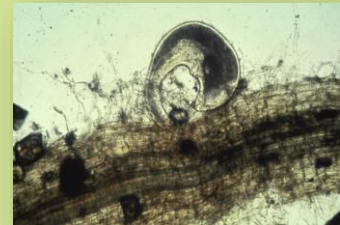
J2  
(infective stage)

egg



High clay soil

## 腎形線蟲





# Principles of INM

生物多样性

天敌

植物抗性

维持养分循环

脆弱阶段

- 1) enhancing high **biological diversity** through polyculture instead of conventional preference of monoculture systems;
- 2) increasing ecosystem community stability by promoting **natural enemies** of multiple pests and pathogens;
- 3) stimulating inherent **plant defenses**;
- 4) improving plant health by maintaining nutrient cycling and energy flow; and
- 5) targeting on **vulnerable stages** of pests or pathogens through the understanding of their ecology.

2 months

# Cover Crops with Allelopathic against PPN

覆盖作物

线虫拮抗作用



孫麻

Sunn hemp  
*Crotalaria juncea*  
-- monocrotaline

*T. erecta* and *T. polynema* are resistant to root-knot but very susceptible to reniform nematodes.



萬壽菊

French Marigold  
*Tagetes patula*  
--  $\alpha$ -terthinyll



芥末

Brown mustard  
*Brassica juncea*  
-- glucosinolate



高粱

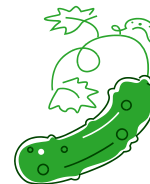
Sorghum-sudangrass  
-- Dhurrin



絨豆

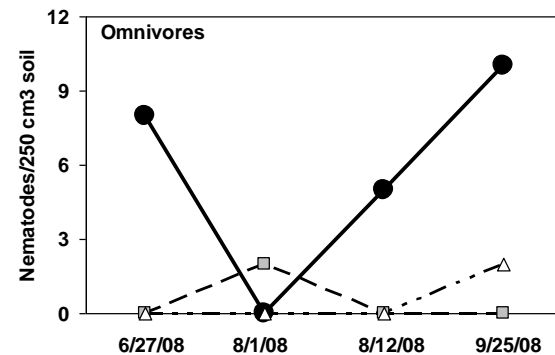
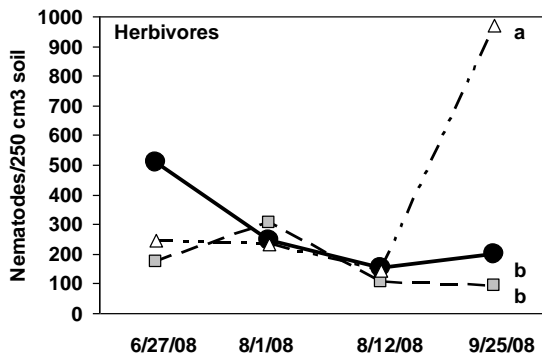
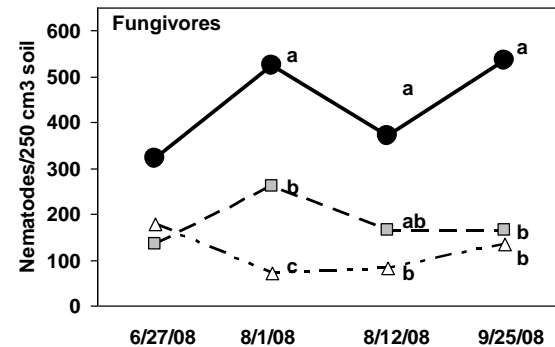
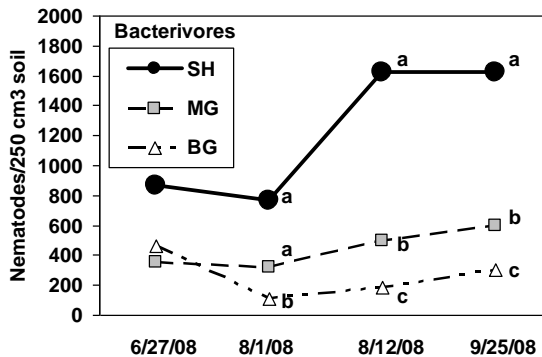
Velvet Bean  
(*Macuna prupriens*)  
-- L-DOPA

# Sunn hemp Strip-Till Cover Cropping



• Preplant Treatment:

- ☐ Sunn hemp (SH): 40 lb seeds/acre
- ☐ Marigold (MG): 2.6 lb seeds/acre
- ☐ Bare ground (BG): fallow with weeds



## Zucchini



untreated



Sunn hemp + Molt-X

## Tomato



Molt-X (once a month)



滴灌

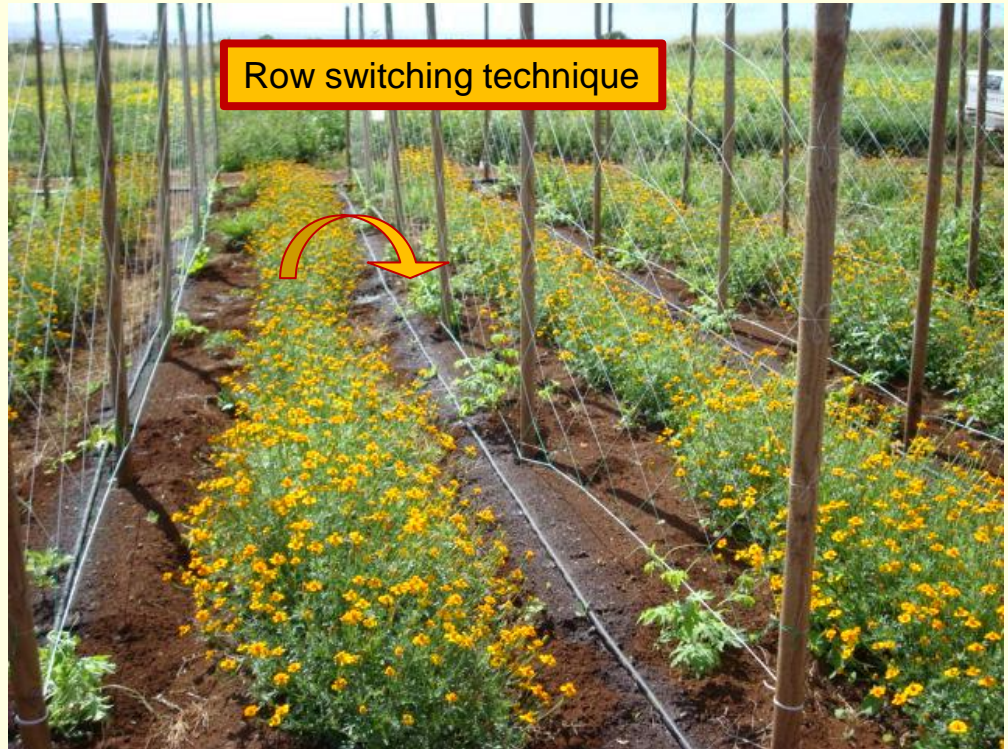


# *How to manage nematode efficiently using marigold?*

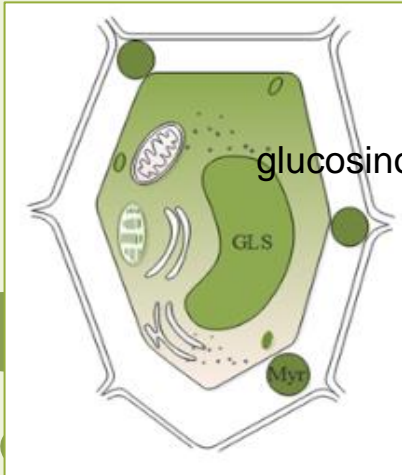
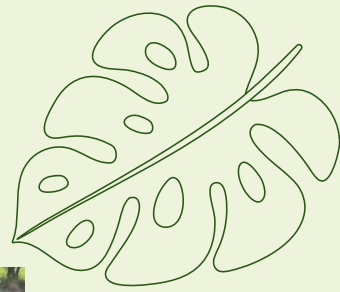


萬壽菊

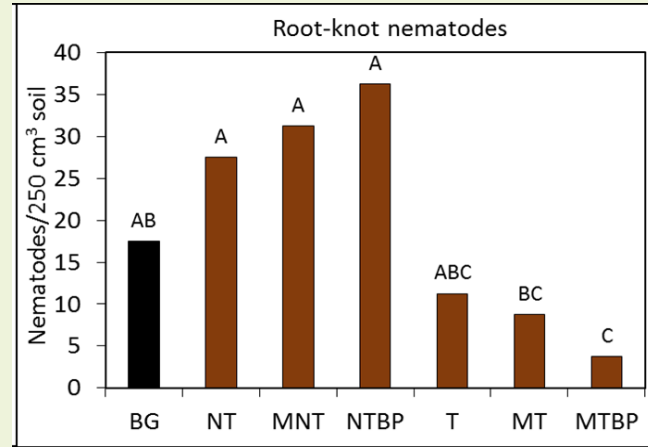
Marigold | Nema-Gone | 2000 See...  
**\$9.95**  
Burpee Gardening



# 'Caliente 199' Brown Mustard Biofumigation



Isothiocyanate





# 'NX-2' Sorghum



> 20 tons/acre in 2.5 months

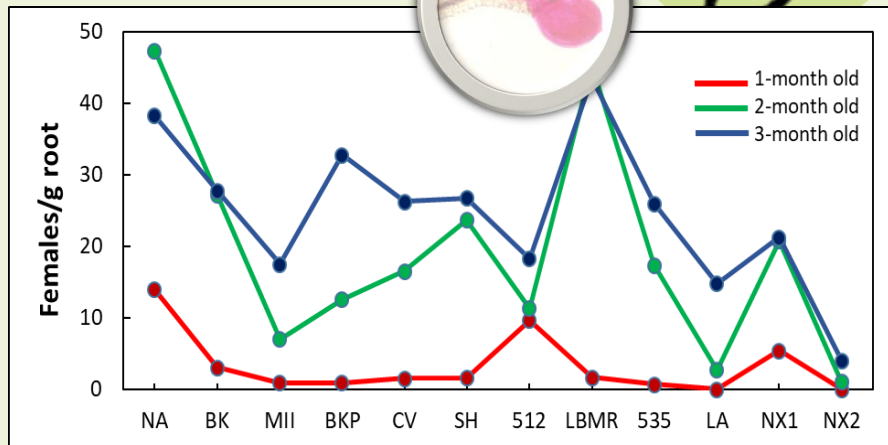
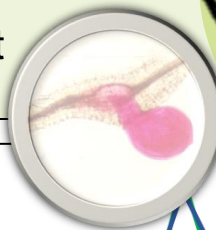


Flail mow and strip-till

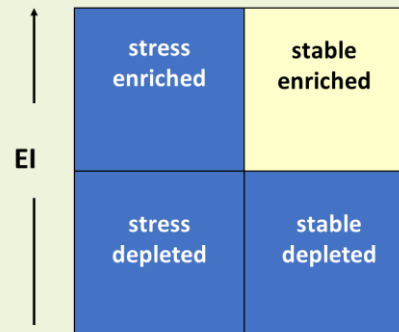


Grow eggplant for 5 months

- Suppress root-knot female development



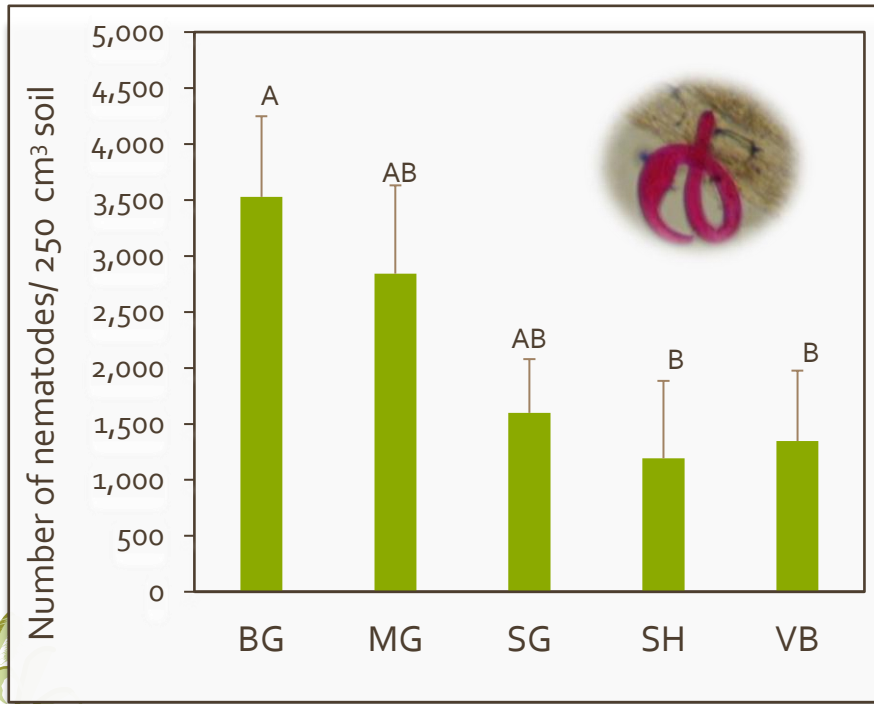
- Increased soil C in 1 year.
- Improved water infiltration in 1 year.
- Improved soil food web structure in 2 crop cycles.
- Improved soil aggregate stability in year 2.



絨豆

# Velvet bean against reniform nematodes 腎形線蟲

5 months after planting sweet potato



Velvet bean (VB):

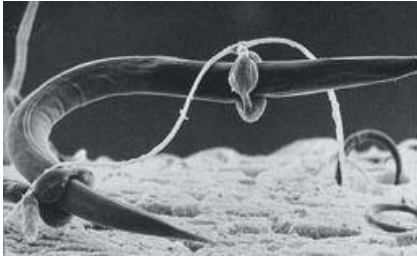
- increased Soil C by 0.38% (3 months after cover cropping).
- Increased water infiltration rate numerically.
- increased ammonia-N in the soil compared (organic N).

BG = Bare ground, MG=Marigold, SG=Sorghum, SH=Sunn hemp, VB = Velvet bean

天敌

# Natural Enemies of Plant-parasitic Nematodes

Take time to build up, best you let basil grow for 9 months before replanting

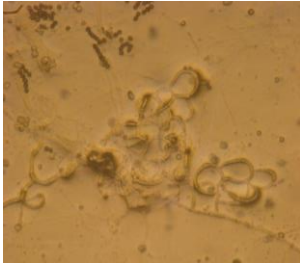
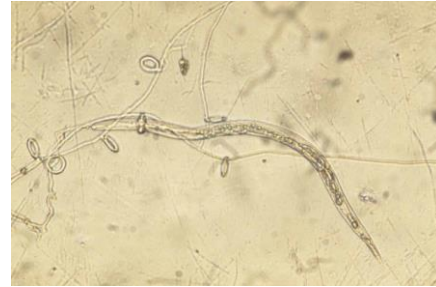


Nematode-trapping fungi  
-- form constricting rings



*Dactylaria ellipsospora*  
-form adhesive knobs

*Arthrobotrys dactyloides*



*A. oligospora*  
-form adhesive 3° nets



*Pasteuria penetrans*

-form adhesive 2° nets



*Purpureocillium*  
(*Paecilomyces*)  
*lilacinum* strain 251  
– egg parasite

MeloCon<sup>®</sup> LC  
BIOLOGICAL NEMATOCIDE



OMRI  
LISTED  
For Organic Use

# Mahalo

Dr. Koon-Hui Wang: Cover Crop  
Information ([hawaii.edu](http://hawaii.edu))  
[koonhui@hawaii.edu](mailto:koonhui@hawaii.edu)



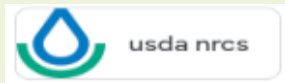
- NIFA OREI (HAW09705-G),
- NRCS CIG (NR1992510002G001 and NR2192510002G002).
- CTAHR Plan of Work (POW16-964), Multi-state (HAW09034-R) and Hatch (HAW09048-H).
- Roshan Paudel, Philip Waisen, Ben Wiseman, Lauren Braley, Jensen Uyeda, Josh Silva, Donna Meyer, Farm Crews from Poamoho Experiment Station.

Please complete a survey at:

[https://docs.google.com/forms/d/e/1FAIpQLSc4p6-IDFZleX7zdkxpqD1ihxyqyqjch8OyKZ13VLe3\\_mYTZg/viewform](https://docs.google.com/forms/d/e/1FAIpQLSc4p6-IDFZleX7zdkxpqD1ihxyqyqjch8OyKZ13VLe3_mYTZg/viewform)

Video: Benefits of Cover Cropping (Chinese narration):

<https://youtu.be/5l8m7F2f1G8>



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