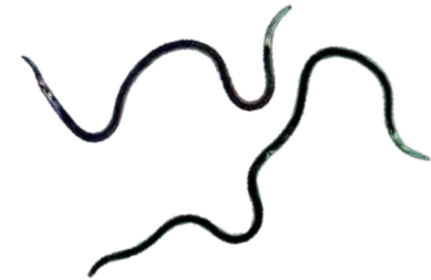




Struck by Lightning*

Sting nematodes laying waste to organic strawberries

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Gulf Coast Research and Education Center, Wimauma
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* J.C. Neal, 1889 - The Root-knot Disease of the Peach, Orange and Other Plants in Florida, Due to the Work of Anguillula. Bulletin 20, Division of Entomology, US Department of Agriculture.

Sting nematode damage in two organic fields ... January '23



Plants won't grow – severe root pruning - no root growth



Sting nematode – *Belonolaimus longicaudatus*

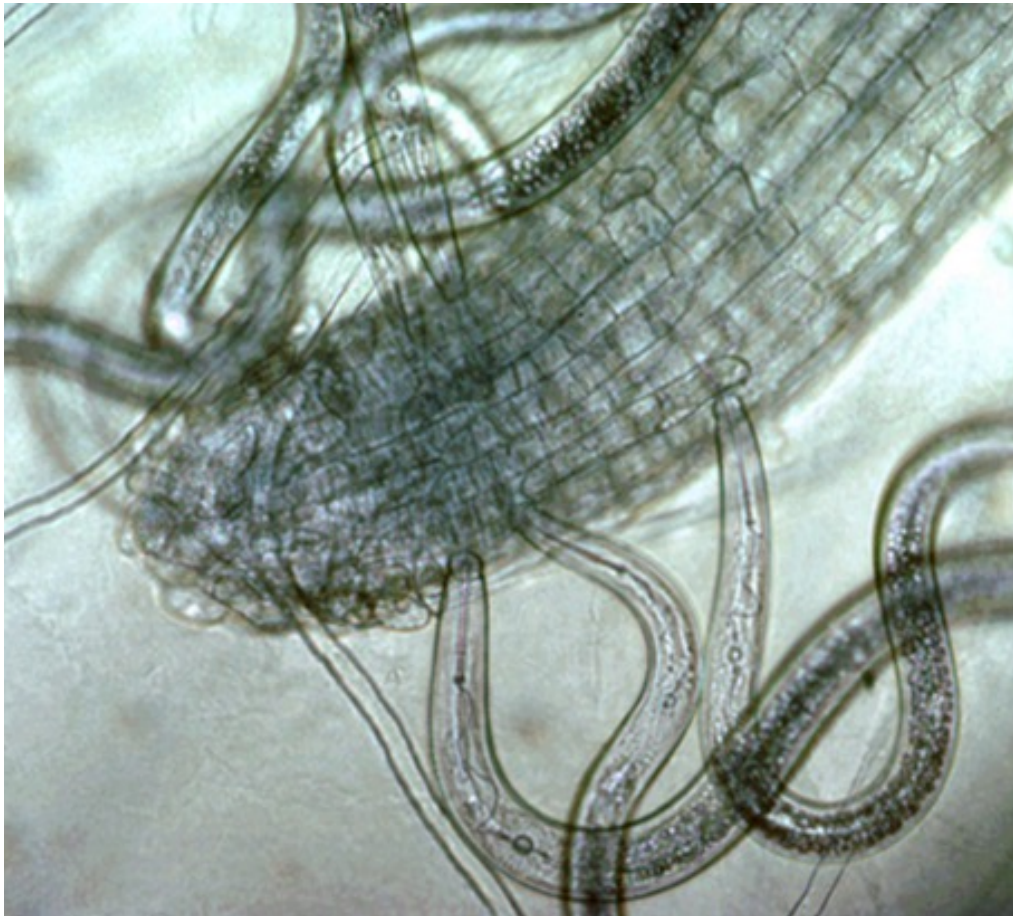
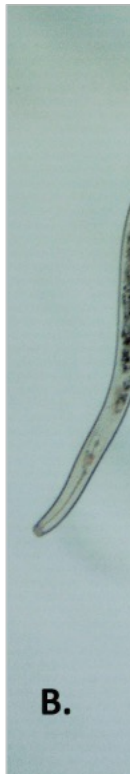


Photo – J. Ole Becker, UCR

- First discovered from a pine tree in Marion County, FL
- Does not enter root, feeds from outside
- Long spear allows for deep feeding in root tissue
- Has a high preference for sandy soils and does not do well in soils containing even small amounts of silt, clay, or organic matter.
- Appears to be very sensitive to sudden changes in soil conditions such as rapid drying.

Sting nematode causes damage to many different crops

Sting nematode on citrus (Larry Duncan, UF)



Sting nematode on organic broccoli



Sting nematode causes damage to many different crops

Sting nematode on
peanut (Zane Grabau, UF)

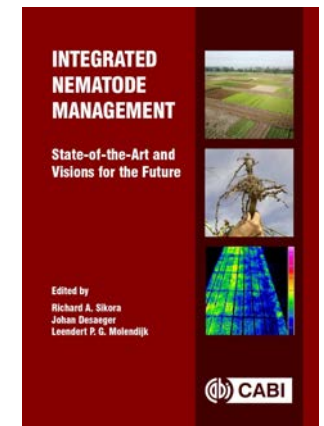
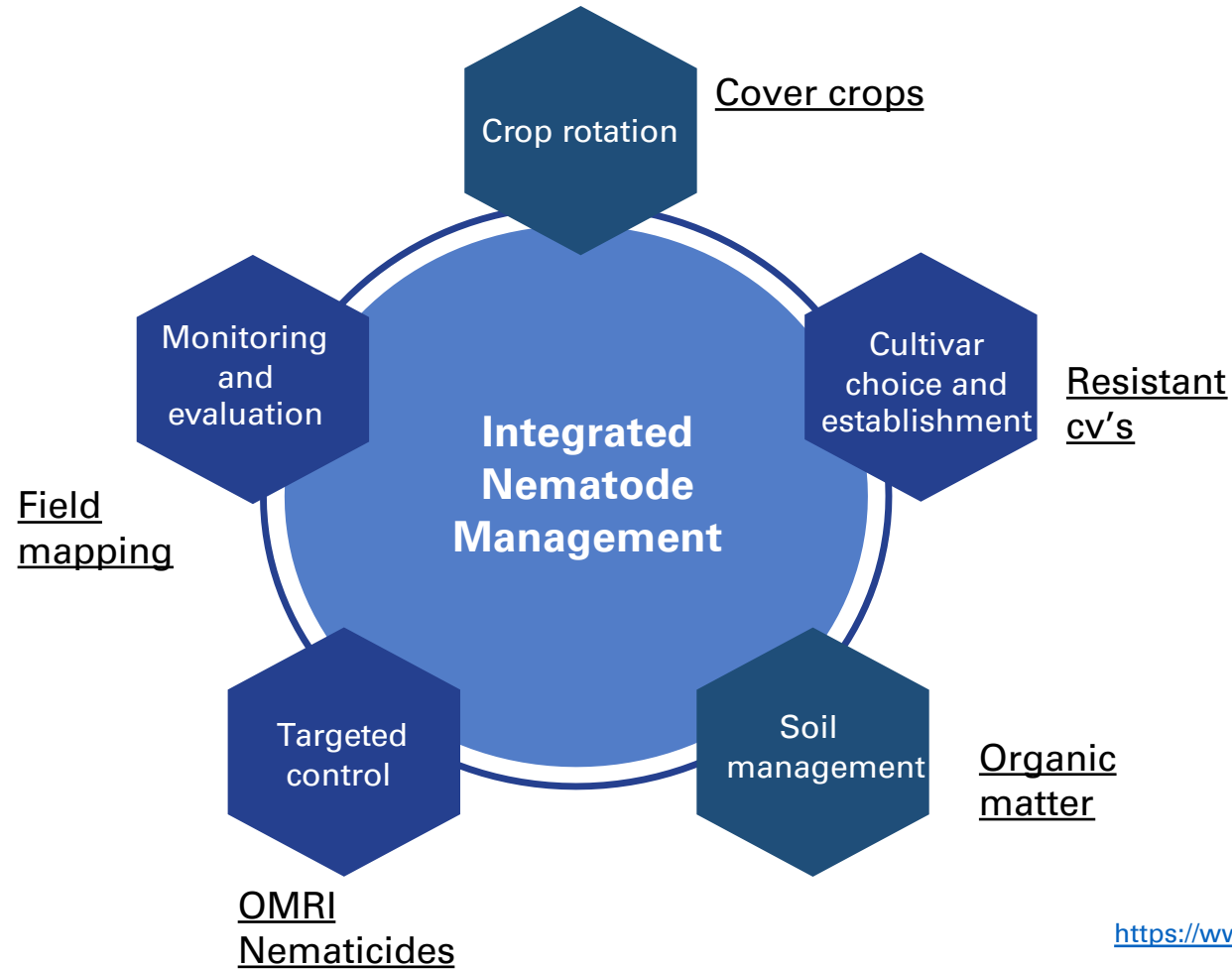


Sting nematode on
CORN (T. Jackson, NE, S.
Bissonette, IL)



Especially in organic fields

Integrated Nematode Management



<https://www.cabi.org/bookshop/book/9781789247541/>

Cover crops as nematode management tool



- Cover Crop is a non-host
- Cover Crop is used as a "Trap Crop"
- Cover Crop has toxic root exudates (marigold) or breakdown products (sunn hemp, sorghum, mustard)
- Activity in the Soil Food Web is increased

Nematode Host Status of Common Summer Cover Crops in Florida

- **Root-knot nematodes**

- ↓ Sunnhemp and sorghum sudangrass
- ↑ Sunflower
- ↑ cowpea (depending on cv. and nematode sp.)



- **Sting nematode**

- ↓ Sunnhemp
- ↑ Sorghum sudangrass



- **Stubby root nematodes**

- ↑ Sorghum sudangrass

- **Lesion nematodes**

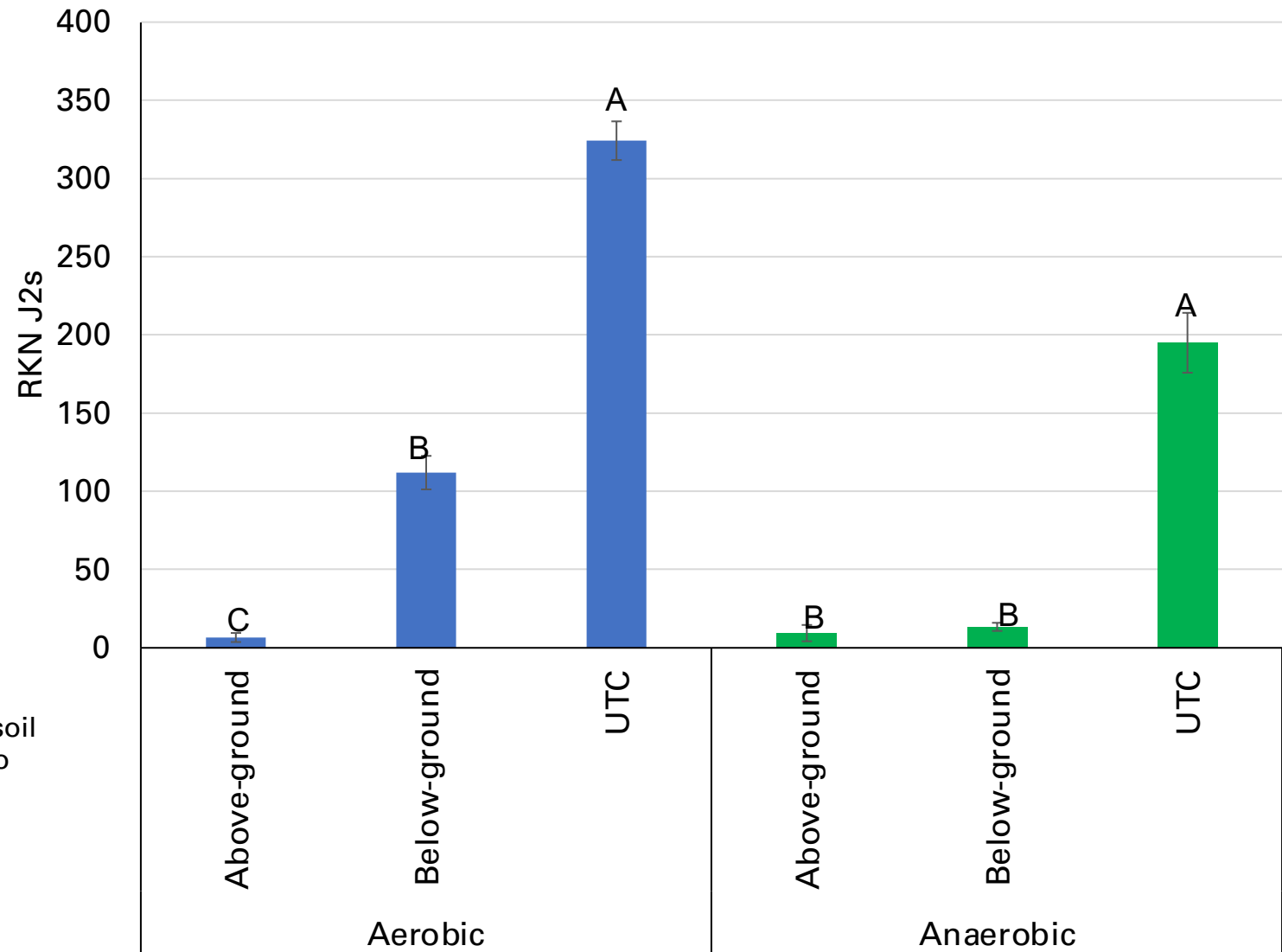
- ↑ Sunnhemp and sorghum sudan

Sunn hemp also produces compounds toxic to nematodes during degradation

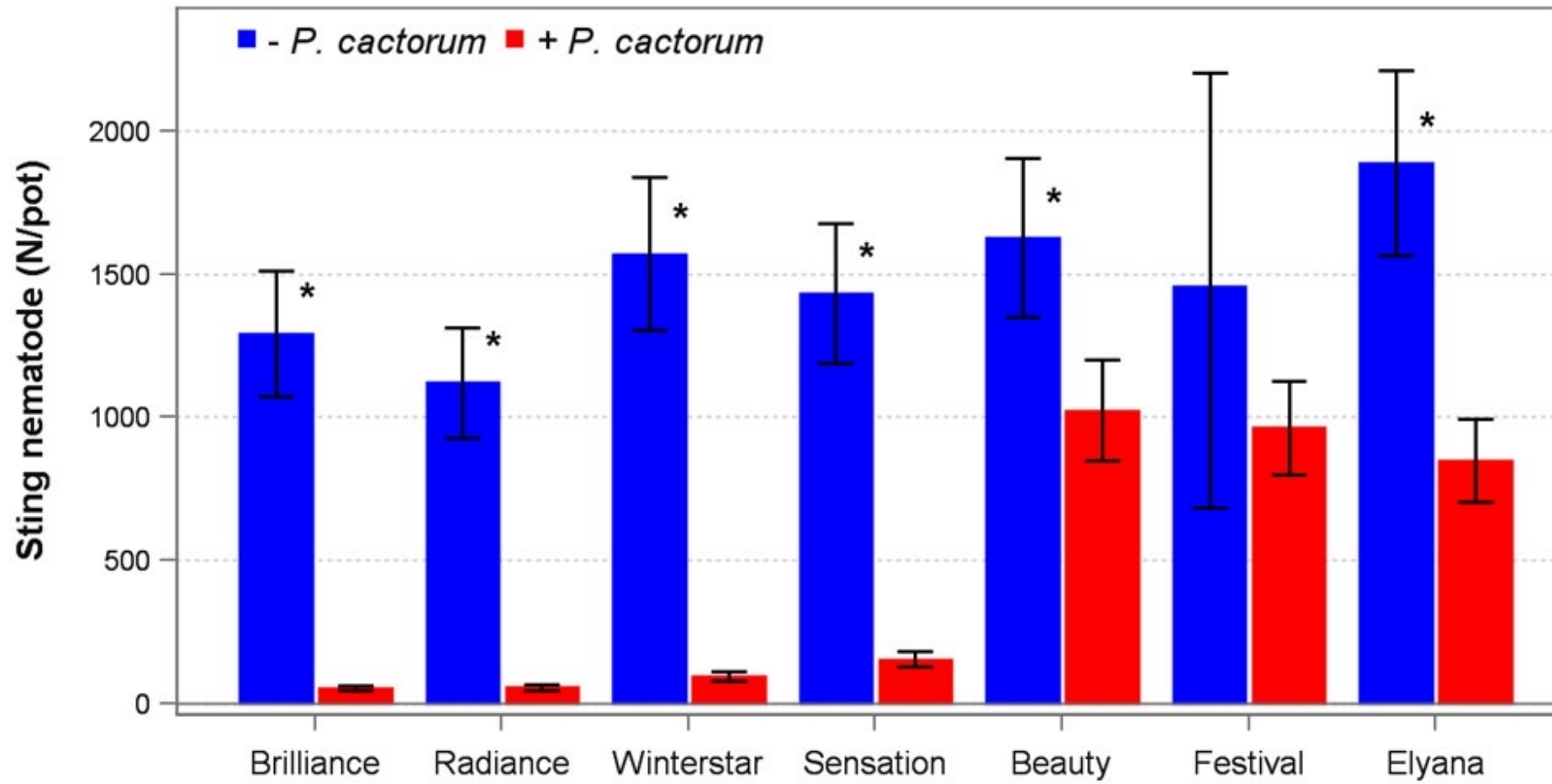
(Hung Bui, GCREC)



The experimental design from left to right: untreated control, soil mixed with the below-ground part, and soil mixed with the above-ground part of sunn hemp. Two conditions were tested: aerobic and anaerobic.



All strawberry cultivars are very susceptible to sting nematode (c. Oliveira, UF)



Cv. Sensation yielded highest in organic field

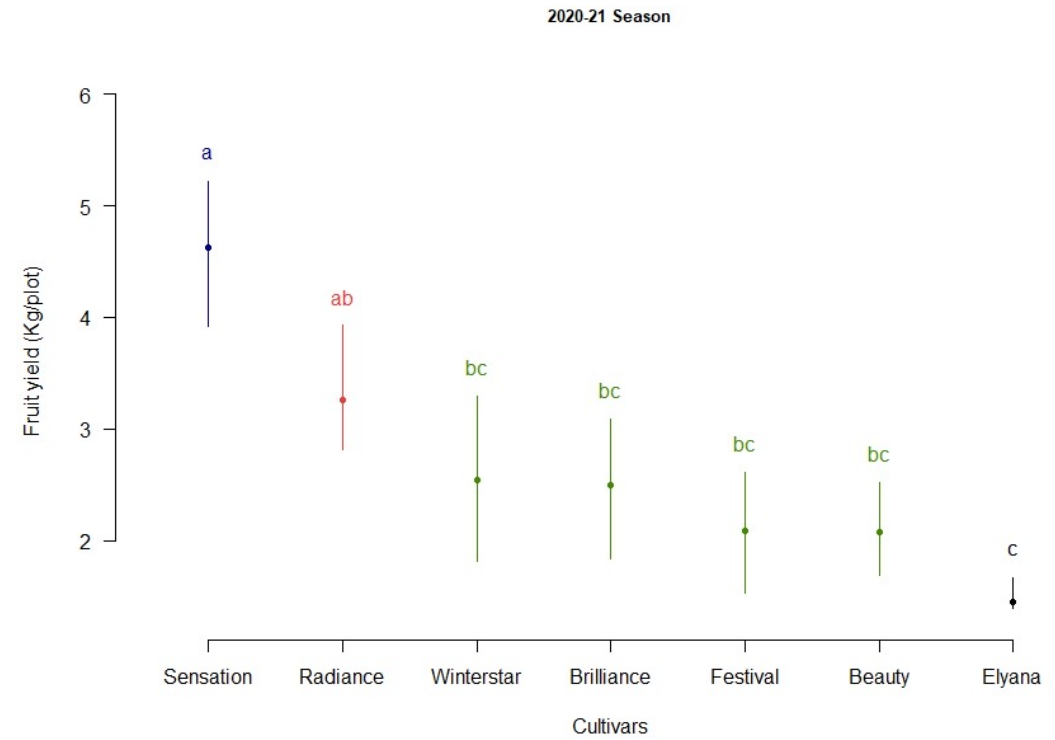
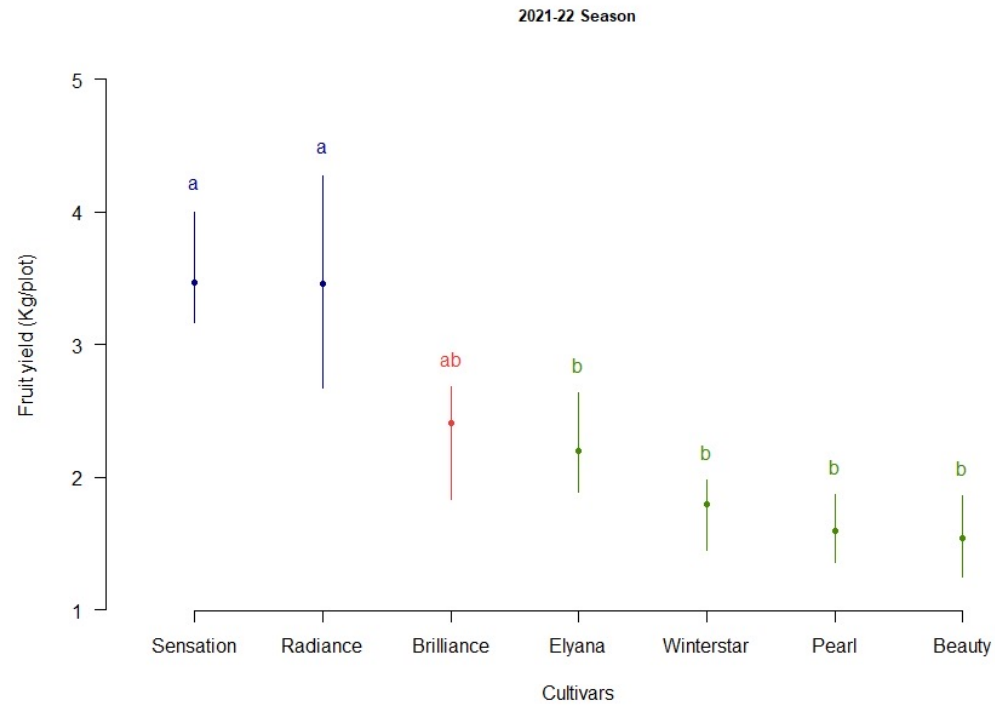


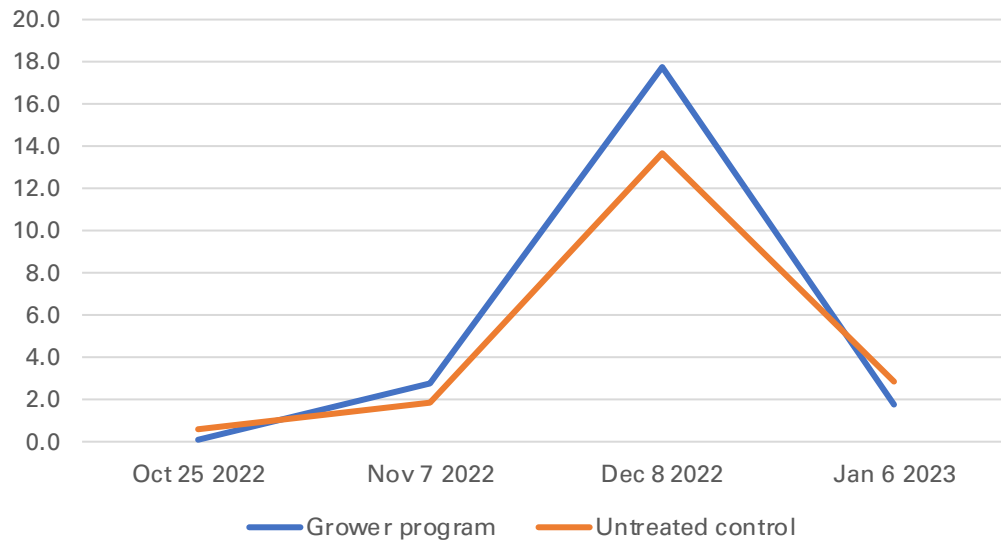
Table 3. Effect of OMRI nematicides on strawberry's yield in the season 2022-2023

Treatment	Product(s)	Rate/A	Application timing	(Dec) (kg/plot)	(Jan) (kg/plot)	(Feb- March) (kg/plot)	Total yield (kg/plot)
1	Dazitol	6.25 gal	At plant	0.51 a	1.48 ab	4.61 a	6.60 a
	Dazitol	1.5 gal	3 wap				
2	TerraMG	20 gal	10 dbp	0.67 a	1.54 ab	5.70 a	7.91 a
3	Ecozin	22.5 oz	At plant + 3 wap + 6 wap	0.53 a	1.75 ab	7.35 a	9.63 a
4	Majestene	2 gal	At plant + 3 wap + 6 wap	0.66 a	2.03 ab	7.96 a	10.65 a
5	Melocon	10.25 oz	At plant + After plant at 4 wap + 8 wap + 12 wap	0.64 a	1.30 b	3.95 a	5.89 a
6	ProMax	1 gal + 0.5 gal	At plant (drip + root soak) + 4 wap + 8 wap + 12 wap	0.67 a	2.36 a	4.89 a	7.93 a
	Fertigold	1 gal + 0.5 gal	1 wap + 5 wap + 9 wap + 13 wap				
7	Kyte Gold	2 qt	At plant + 4 wap + 8 wap	0.62 a	1.28 b	4.16 a	6.06 a
8	CrabLife Powder	80 lb	1 wbp + 5 wap + 8 wap	0.79 a	1.78 ab	8.17 a	10.74 a
9	Velum	6.8 oz	At plant + 4 wap	0.72 a	1.89 ab	7.41 a	10.02 a
10	KPAM	30 gal	3 wap	0.78 a	1.68 ab	6.69 a	9.16 a
11	UTC	---	---	0.52 a	1.44 ab	4.80 a	6.76 a
P-value	---	---	---	0.83	0.03	0.02	0.04

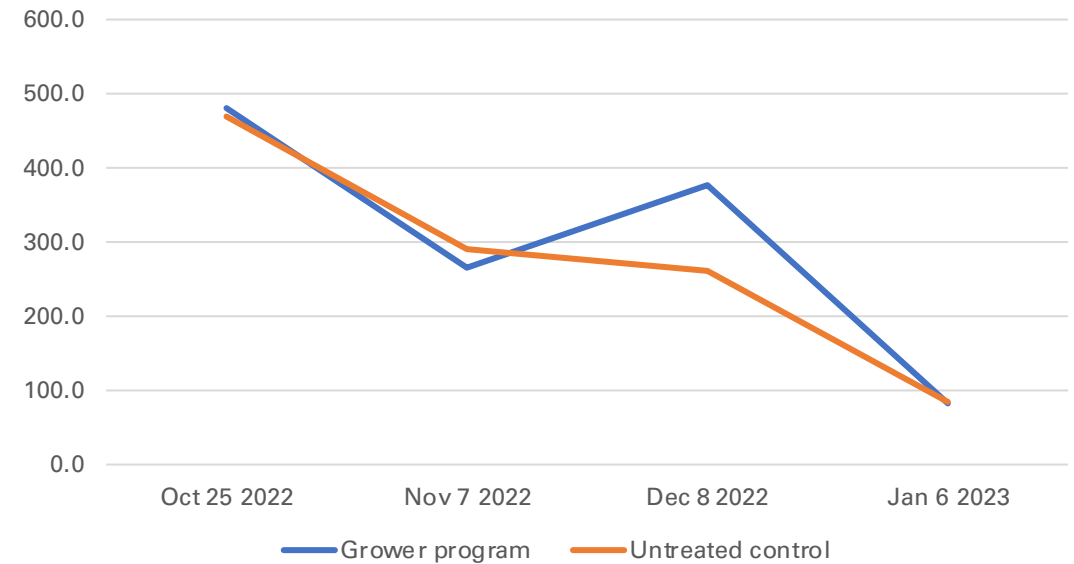
Within columns, treatment means with same letters indicate no statistical significance (P-value > 0.05) according to Tukey's HSD.

Organic nematicide program in grower's field (2022-23) – Effect on sting and non-parasitic nematodes

Sting nematode



Free-living nematodes



Other non-chemical soil disinfestation: Soil heating – solarization or steaming – Flooding - ASD



Solarization - GCREC crew laying clear solarization plastic
– 4-8 weeks, soil should be moist

FLOODING TO CONTROL ROOT-KNOT NEMATODES By LLOYD N. BROWN (USDA) (1933, J. of Agric. Research) Four months' submergence of soil killed the larvae, but the eggs remained viable. About 4 months of submergence kills root-knot larvae, but not eggs (2 years needed)



Soil steaming - tractor with a boiler that heats steam to more than 300 degrees F. Ten-inch spikes inject steam into the ground (Fennimore, UC)

Anaerobic soil disinfestation (ASD), known also as biological soil disinfestation (BSD) is a pre-plant non-fumigant soil disinfestation practice first developed in Japan and the Netherlands (2000) (Erin Roskopf, USDA, FL)

In Summary

- Sting nematodes are a major problem in organic strawberries in Florida and no effective/practical/economical management is available at this point
- Best current recommendations are 1) crop rotation with sunn hemp in summer, 2) increase soil OM, 3) use vigorous transplants, 4) stimulate early root growth

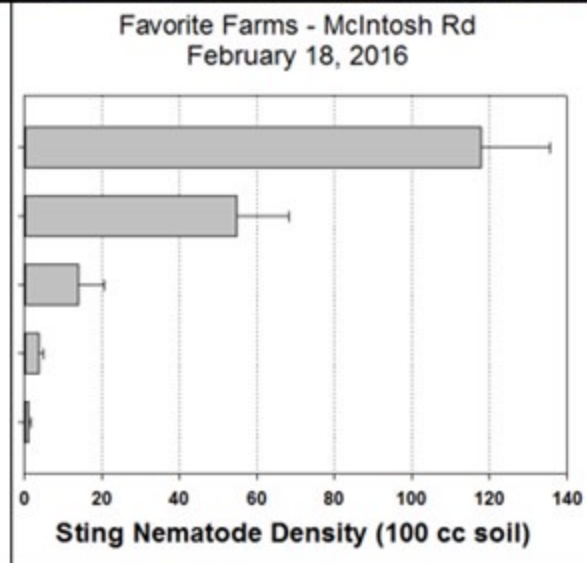
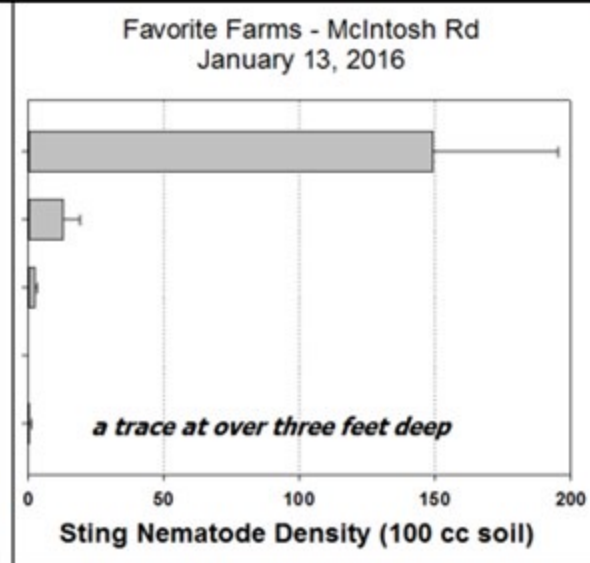
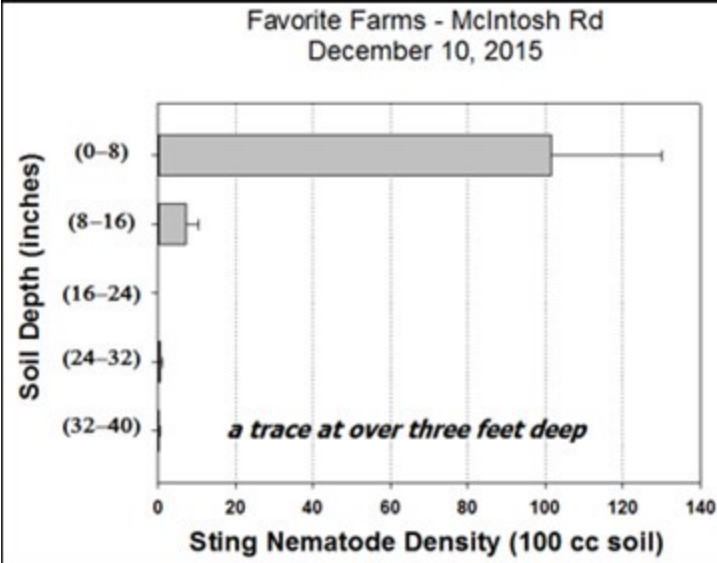
**Thank you to GCREC nematology staff, FSGA for funding,
Dr. Vance Whitaker for providing transplants**





The Probinator has allowed us to conveniently ask:

Where do Nematodes occur in the soil profile, and WHEN?



**Sting Populations decline with soil depth !
Population increase with time at all depths !**

