






## Getting to the Root of the Problem: Soilborne Disease in Processing Vegetable Production

DE Ag Week: Processing Vegetable Session  
January 12, 2022

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### Soilborne Diseases in Processing Vegetables



### Root Knot Nematodes

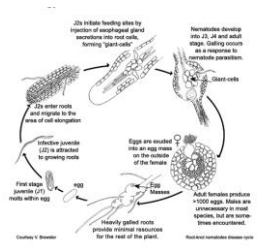




### RKN Life Cycle



Southern Root Knot Nematode  
*Meloidogyne incognita*





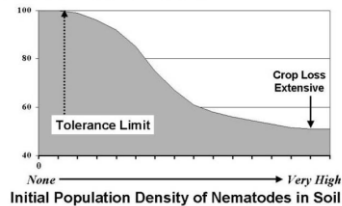
### RKN –What to look for?

- Patchy distribution
- Stunting
- Leaf yellowing/ chlorosis
- Mid-day wilting
- Leaf drop
- Galling of roots when dug up
- Yield loss





### RELATIVE CROP YIELD (%)





### Crop Rotation

- Very wide host range, but some plants are worse hosts than others (reduces populations but does not eliminate)
  - Small grains
  - Sorghum
  - Alfalfa



### Lima Bean Host Resistance



- Reduction in galling
- Reduction in egg production

### 2021 Lima Bean RKN Resistance Trial

- Cypress
- Cypress + Experimental nematocide
- DE1306583
- DE1306583 + Experimental nematocide
- DE1306635
- DE1306927
- C-Elite
- Planted in our RKN screening field and inoculated at seeding

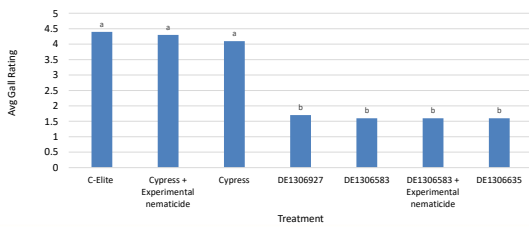


### Data Collection

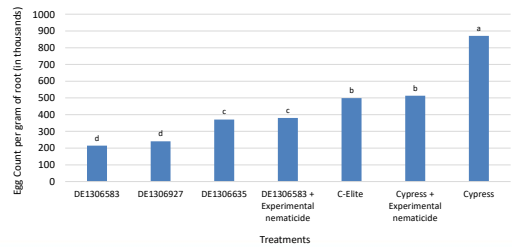
- Yield
  - Days to harvest, % full, flat, dry
- Root Galling
  - 0-10 Bridge and Page Scale
- Egg Counts

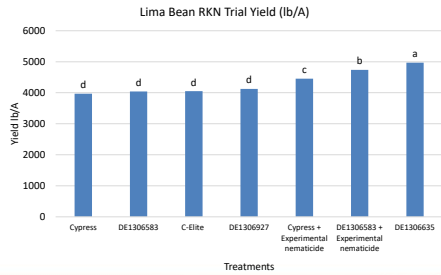


Avg Gall Rating Lima Bean RKN 2021



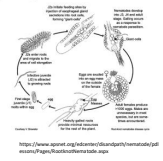
Lima Bean RKN Trial Avg Egg Count/gram of root 2021





## Chemical Management

- Nematicide vs. Nemastat
  - Nematicide kills nematodes
  - Nemastats reduce body movement, mating, mobility, root penetration, feeding may delay egg hatch and molting
    - Death is often a result of disorientation and starvation
    - If exposure is short and/or low concentration effects may be reversible



## Fumigant v. Nonfumigant

- Fumigant nematicides – (ex. chloropicrin, 1,3 dichloropene) are formulated as liquids that vaporize and move through open air spaces in soil as a gas.
- Nonfumigant nematicides - (ex. Mocap, Vydate, Nimitz, and Counter) generally formulated as either granules or liquids and move by downward percolation in soil water.
  - Often further classified as contact or systemic depending on whether they kill nematodes in soil by contact or are taken up by the plant first and affect nematodes when they feed from cellular fluids within the plant.

## Nonfumigant Options – Pickling Cucumber

- Vydate (oxamyl)
  - Carbamate insecticide/nematicide, soil systemic and foliar translaminar
  - Vydate will concentrate in new root tissue (feeding site of nematodes)
  - Acetylcholinesterase, temporarily paralyze nematodes
- Velum Prime (fluopyram)
  - Fungicide/nematicide, systemic through plant tissue
  - Immobilize nematodes
- Nimitz (fluensulfone)
  - Nematicide in fluoroalkenyl thioether group, systemic
  - Kills by inhibiting acetylcholinesterase activity (motility, egg hatching, and survival)

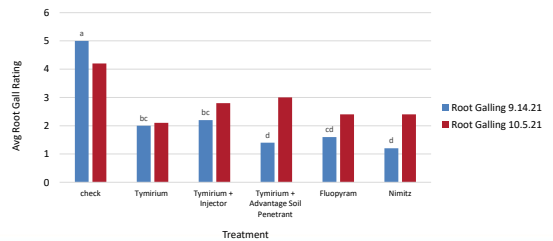


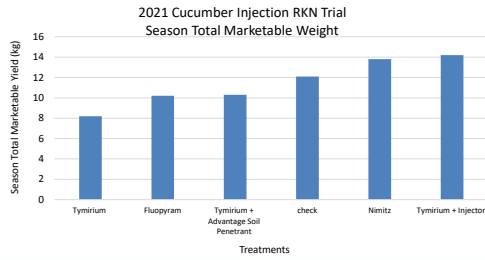
## Experimental Nematicide Trial

- Check
- Tymirium (cyclobutrifluram)
- Tymirium + Injector
- Tymirium + Advantage Soil Penetrant
- Velum Prime (fluopyram)
- Nimitz (fluensulfone)
- Planted in our RKN screening field and inoculated at seeding
- Products injected through drip line



2021 Cucumber RKN Injection Trial





### Evaluation of Selected Nonfumigant Nematicides on Increasing Inoculation Densities of *Meloidogyne incognita* on Cucumber

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- Salibro – novel sulfonamide nematicide
- Active substance fluzaindolizine (Reklemel active)
- Unknown mode of action
- Impacts motility, mobility, and infectivity

Table 2. Percent reduction of root gall index and final nematode population, and percent increase of cucumber yield, when compared with the untreated control in melon plants infested with different inoculation densities of *Meloidogyne incognita* and treated with nonfumigant nematicides. Data are the means of two trials.

Inoculation density (nematode/plant)	Nematicide	% Reduction	
		Gall index	Final population density
1,000	Quaziflup	76	73
	Flupyram	79	78
	Fluzaindolizine	81	78
5,000	Quaziflup	83	81
	Flupyram	43	60
	Fluzaindolizine	68	77
10,000	Quaziflup	75	82
	Flupyram	77	94
	Fluzaindolizine	33	67
20,000	Quaziflup	59	74
	Flupyram	67	82
	Fluzaindolizine	76	95
Control	Quaziflup	36	64
	Flupyram	60	79
	Fluzaindolizine	72	81
Control	Quaziflup	78	94
	Flupyram	78	94
	Fluzaindolizine	78	94

<https://apsjournals.apsnet.org/doi/pdf/10.1094/PDIS-04-19-0836-RE>

### Damping-off

- Death of a seedling before (pre) or after (post) emergence
  - Fusarium* species
  - Rhizoctonia solani*
  - Phytophthora* species
  - Pythium* species



### *Pythium* in Sweet Corn

- Favored by wet conditions
- Usually worse in early planting
  - Soil temps <55
  - Slower germination
- Multiple species, can be favored by cool or warm weather



### Seed Treatments for Sweet Corn

Product (active ingredient)	<i>Rhizoctonia solani</i>	<i>Pythium</i> spp.
Allegiance (Metalaxyl and methyl ester)		X
Apron XL (mefenoxam)		X
Dynasy (azoxystrobin)	X	
Maxim XL (fludioxonil and mefenoxam)	X	X
Thiram (Thiram Tetramethylthiuram disulfide)	X	X
Vitavax	X	

### Diagnostic Resources

US PLANT DIAGNOSTIC CLINIC



Contact Us  
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## Acknowledgements

- John Bickel
- Joe Cinderella
- Lexi Kessler
- Maddie Henrickson
- Eboni Traverso
- Chris Holton



- Dr. Emmalea Ernest
- Carvel Research and Education Farm Crew

- UD Research Foundation
- Industry Support for trial entries

## Questions?

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