

# Managing Fusarium Wilt of Watermelon with Soil Fumigation?

Josh Freeman<sup>1</sup>, Bhabesh Dutta<sup>2</sup>, Mathews Paret<sup>1</sup>, Mary Stevens<sup>1</sup>

<sup>1</sup>University of Florida, North Florida Research and Education Center  
Quincy, FL;

<sup>2</sup>University of Georgia, Tifton Campus, Tifton, GA





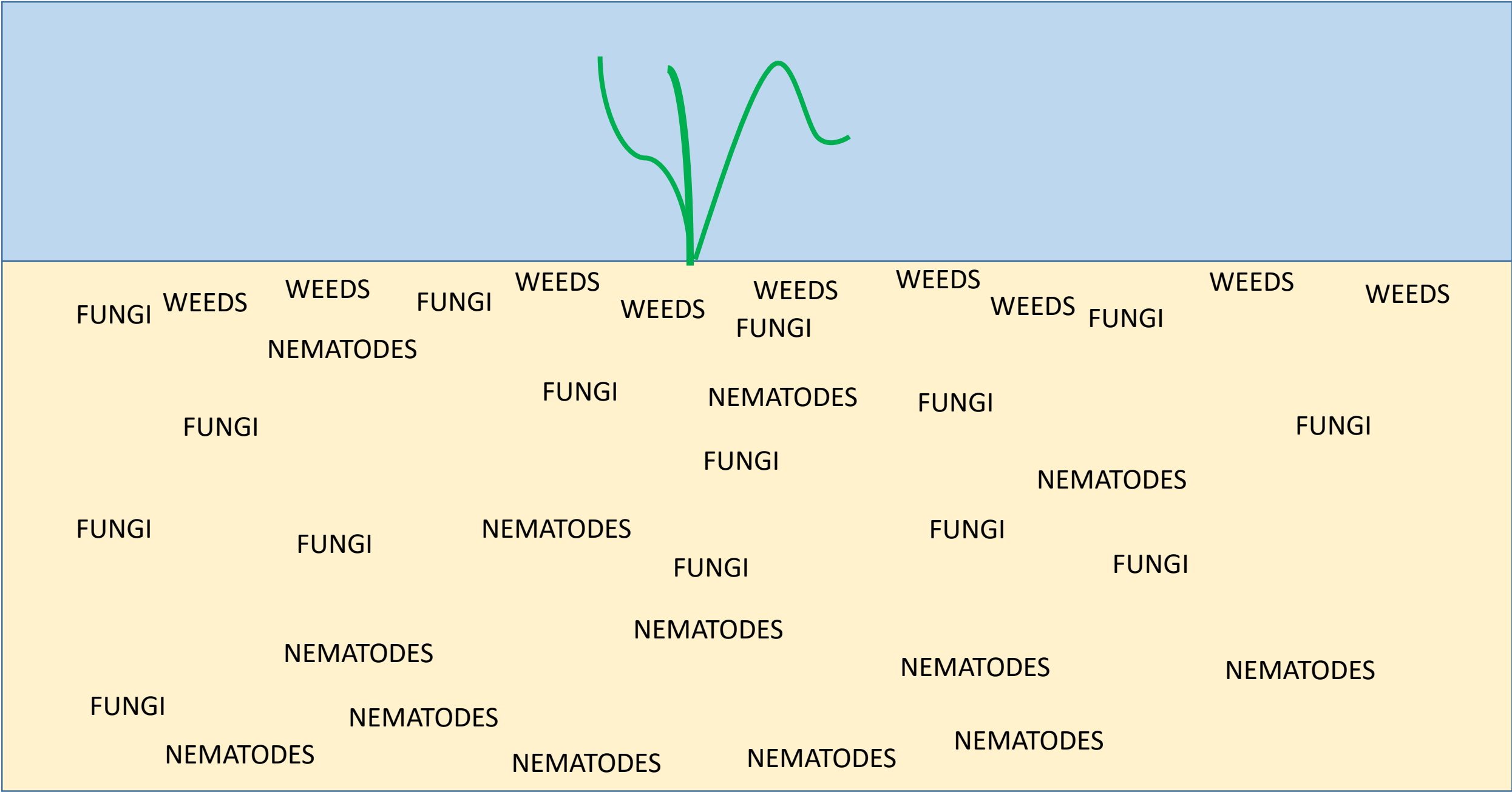


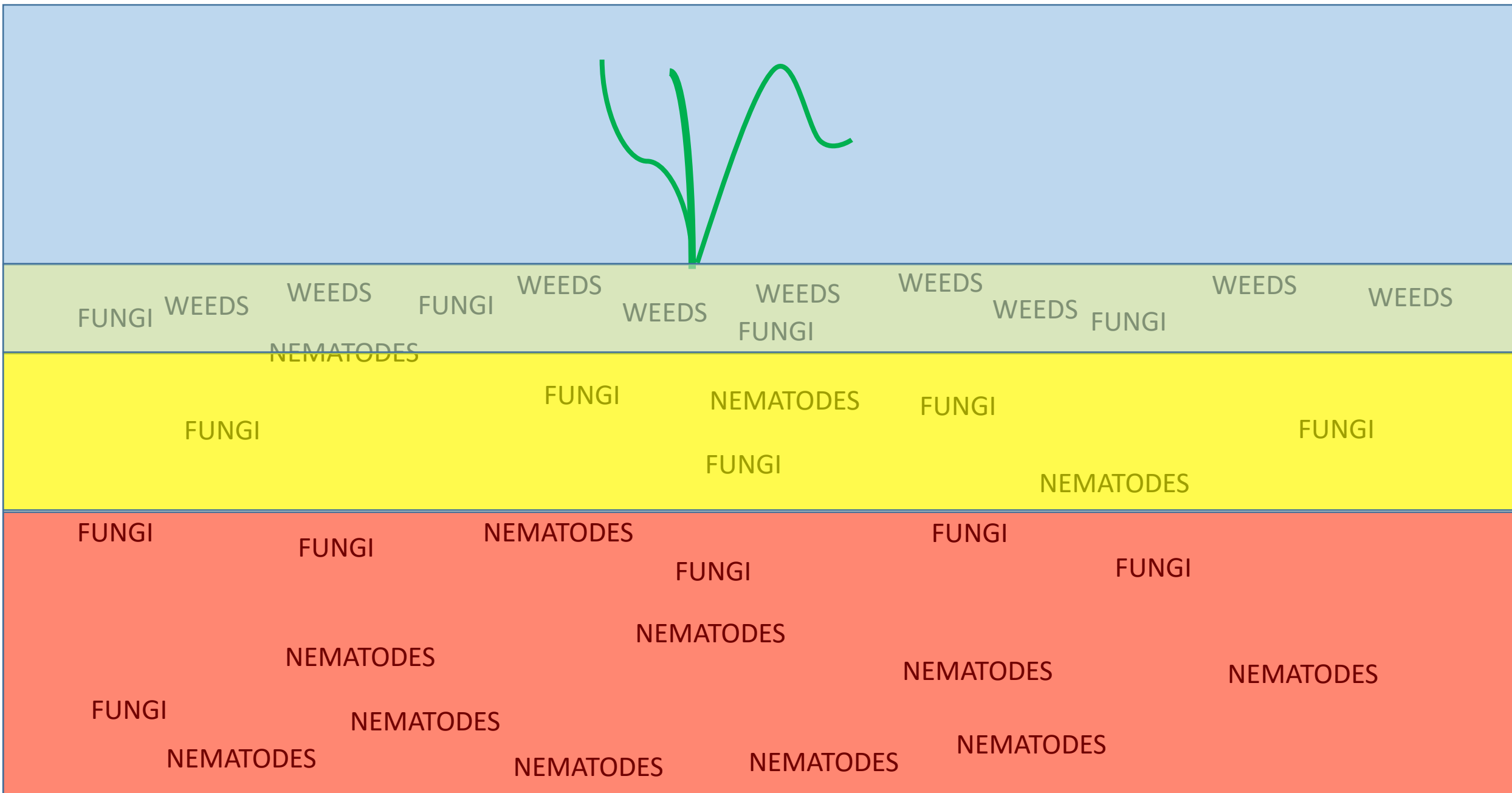


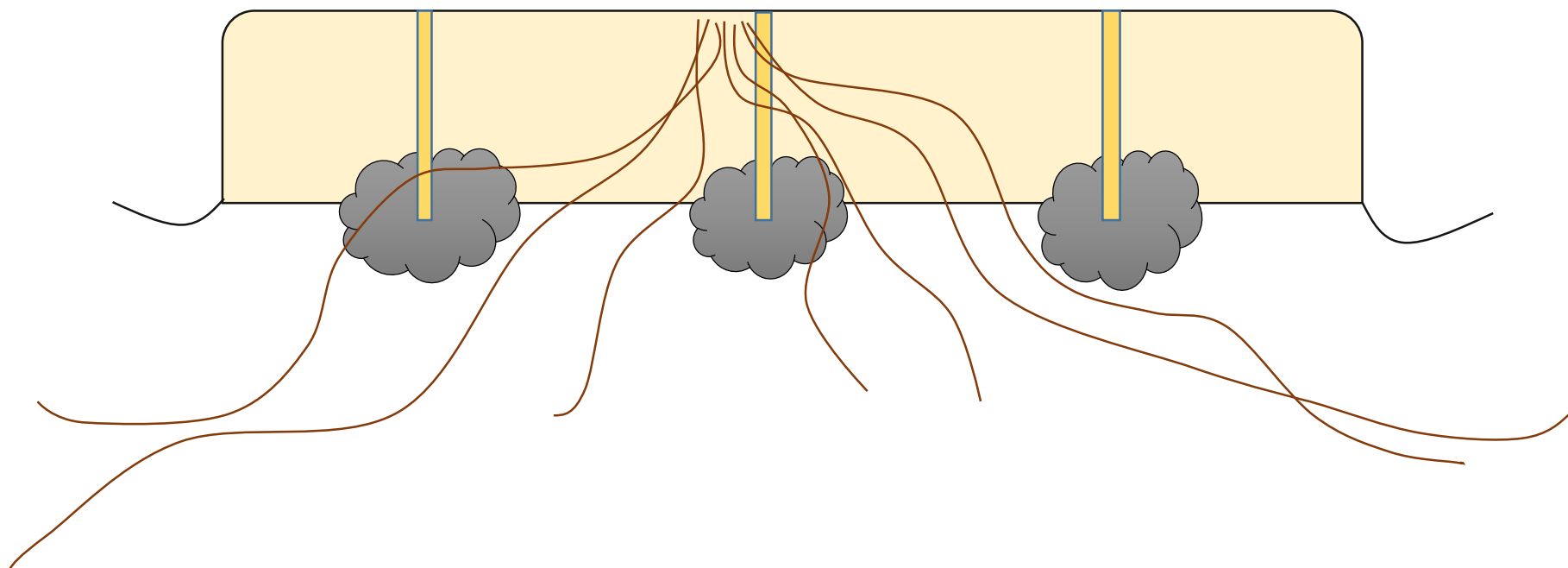


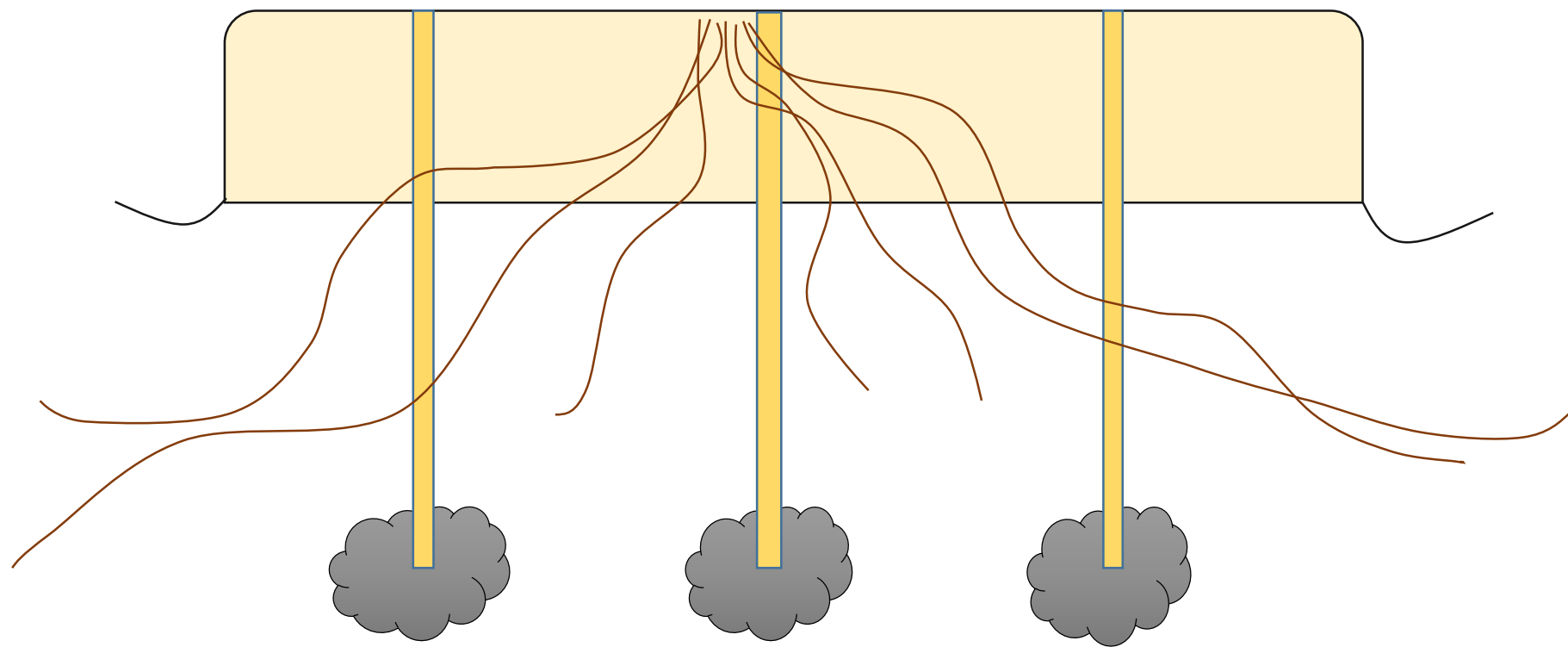
# Fusarium Wilt of Watermelon

- Caused by the fungi *Fusarium oxysporum* f. sp. *Niveum*
- Long lived in the soil environment
- Ideal time for crop rotation is 5-10 years
- Four races of the pathogen are present in the United States
- There are no seedless cultivars available with resistance to race 2-3
- The use of grafted plants is the only option for managing race 2
  - Nematode management is a necessity with current rootstocks

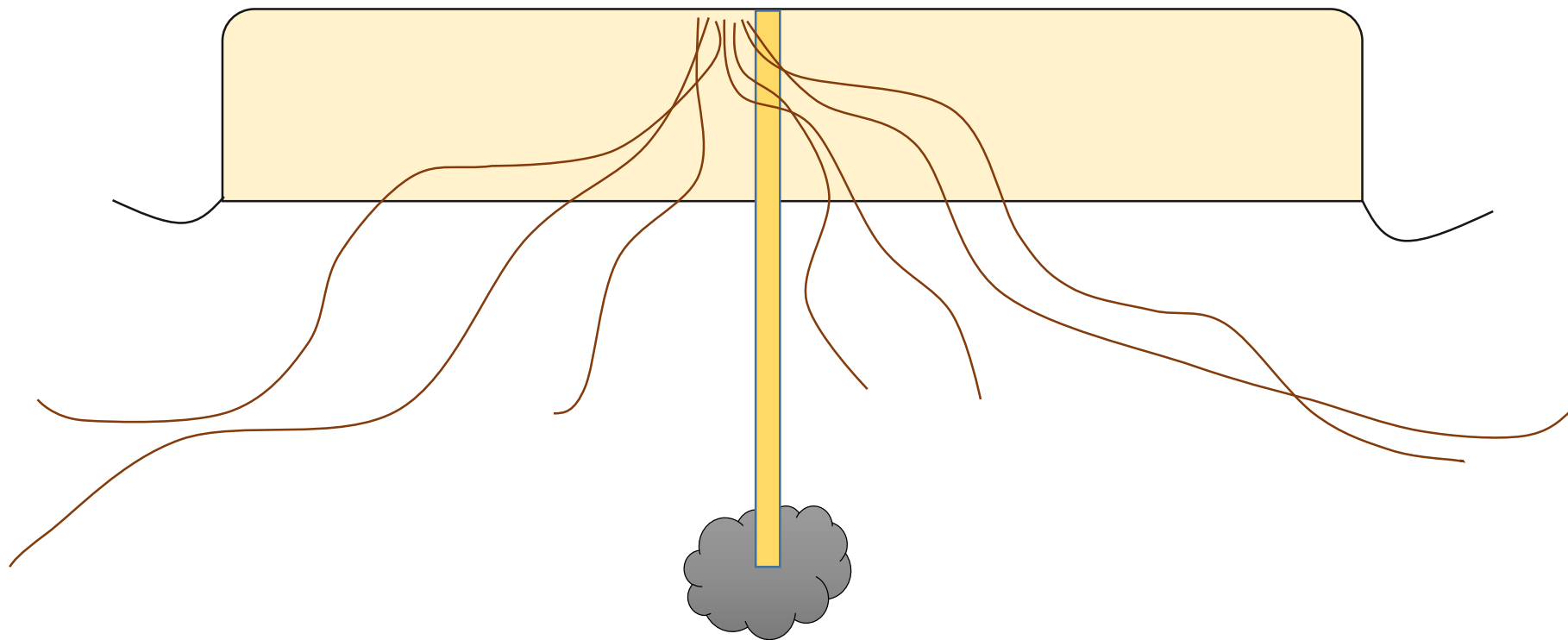


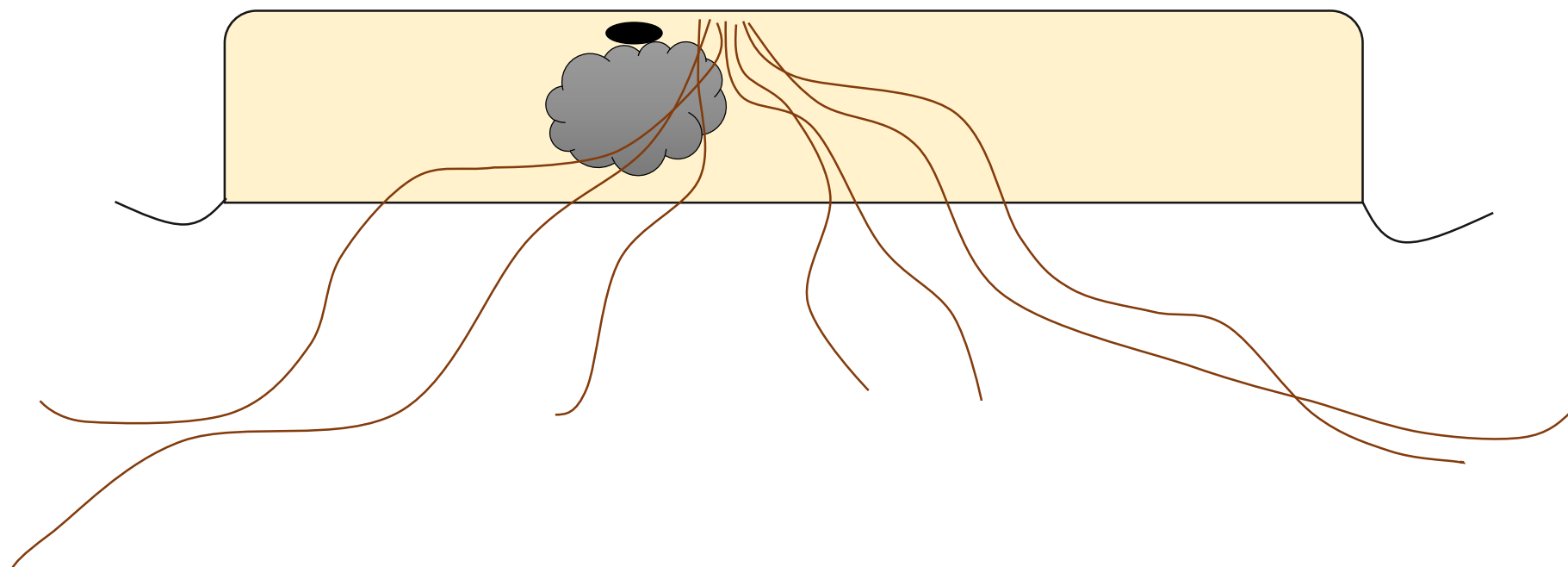




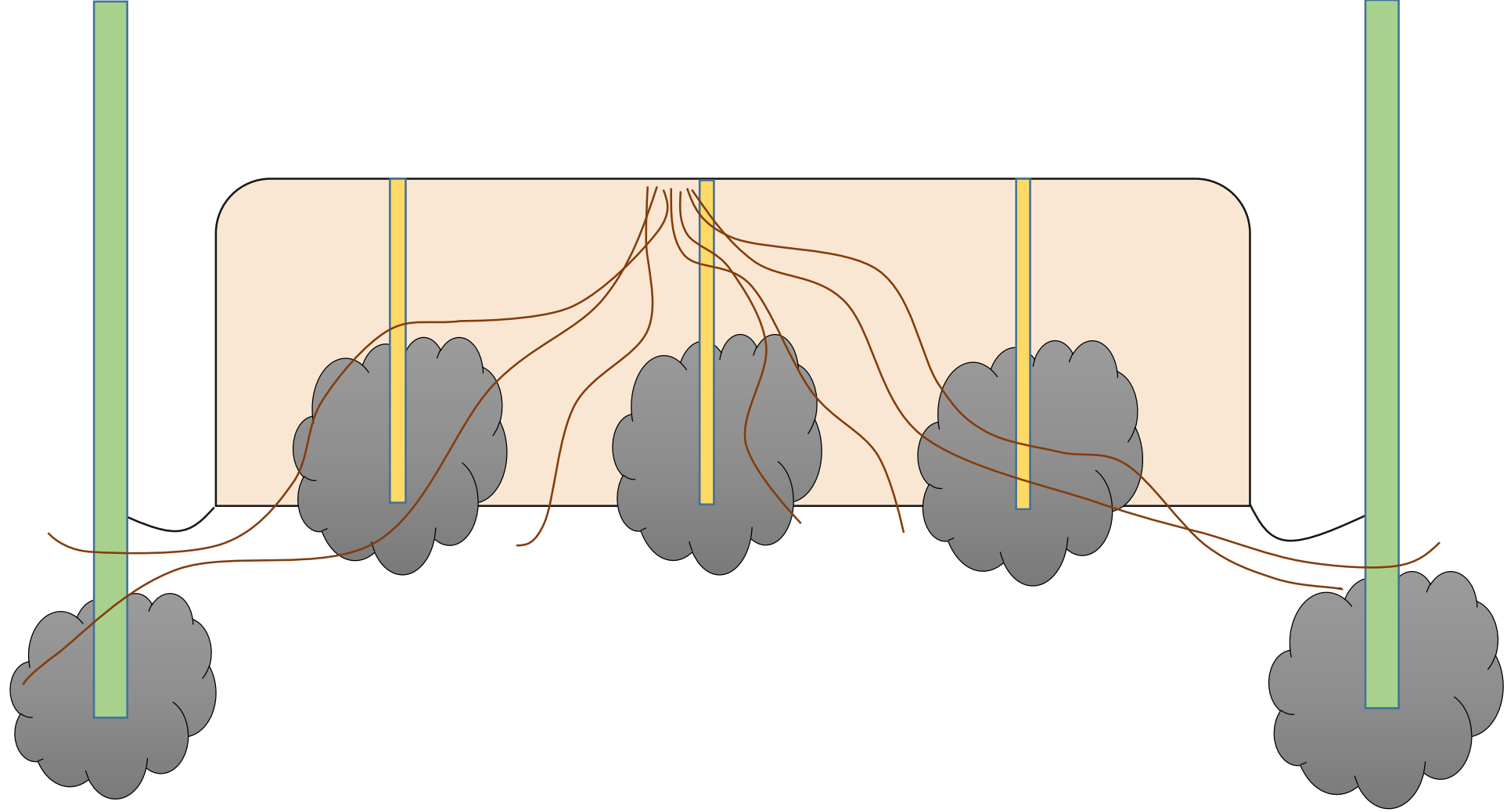


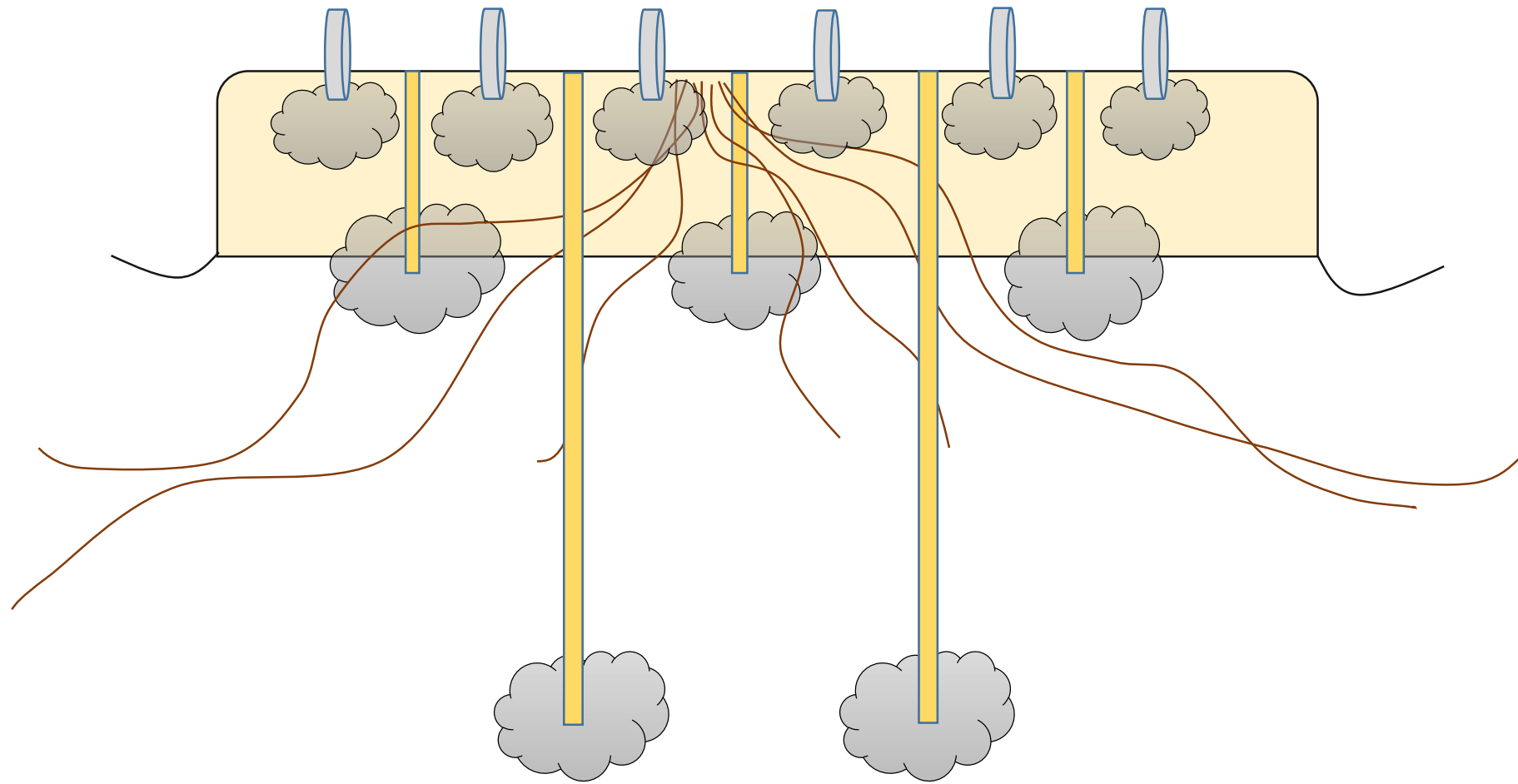














# Materials and Methods

- 1,3 Dichloropropene + Chloropicrin Rate Trial
- Jackson Farms, Grand Ridge, FL
- Fumigated March 13
- Beds 30" wide x 8" tall
- Fumigants were shank applied with three back-swept shanks
- Fumigant deployed 8" deep
- NTC, 125 lb/acre, 250 lb/acre
- Plots covered with 1.25 mil black Berry TIF
- 'Troubadour' set on March 29

# Materials and Methods

- Fumigant + Fungicide Trial
- Jackson County, FL; Crisp County, GA; Toombs County, GA
- Fumigated March 13, 14, 21, 27
- 200 lb/acre chloropicrin
- Beds 30" wide x 8" tall (FL); 18" wide x 4" tall (GA)
- Fumigants were shank applied with two (GA) or three (FL) back-swept shanks
- Fumigant deployed 8" deep
- Plots covered with 1.25 mil black TIF



# Materials and Methods

- Fungicides drip applied at planting, 14 and 28 days post planting
- 5.7 fl oz prothioconazole
- 'Troubadour' (FL), 'Tri-X 313' (GA)
- Disease incidence was rated weekly beginning at disease onset





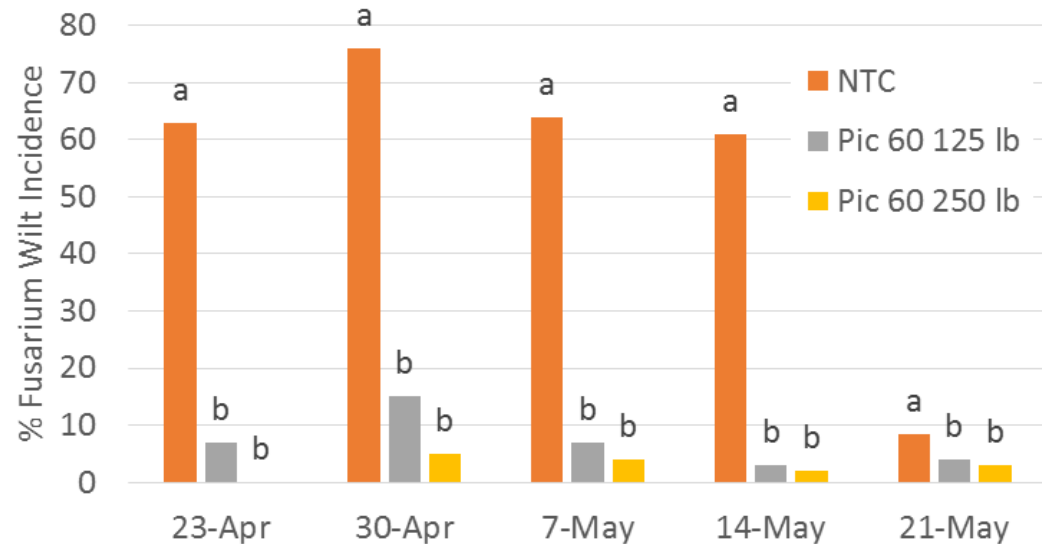




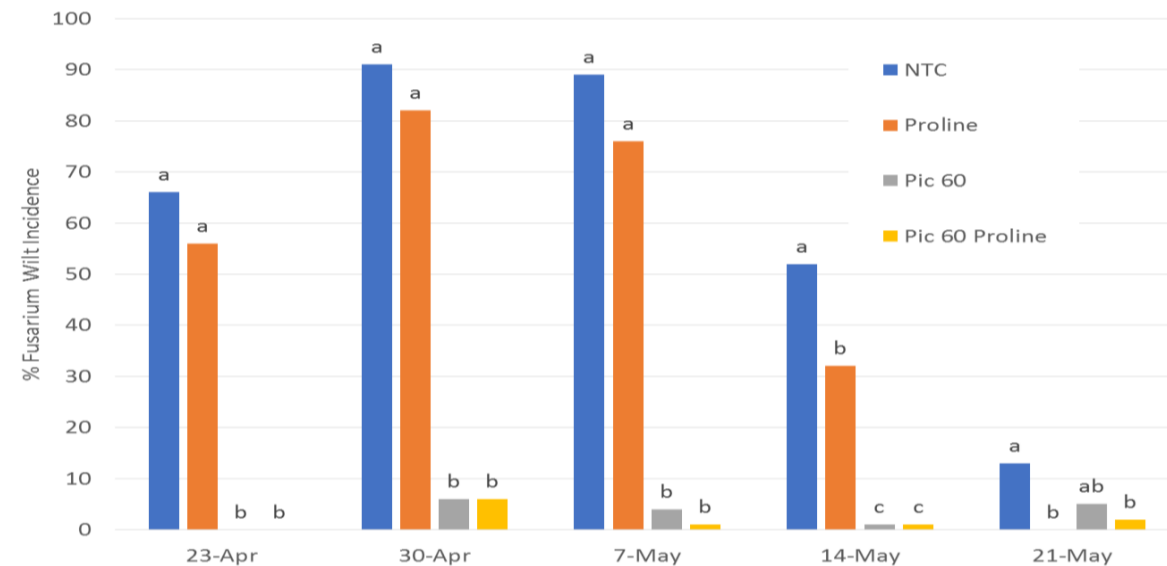




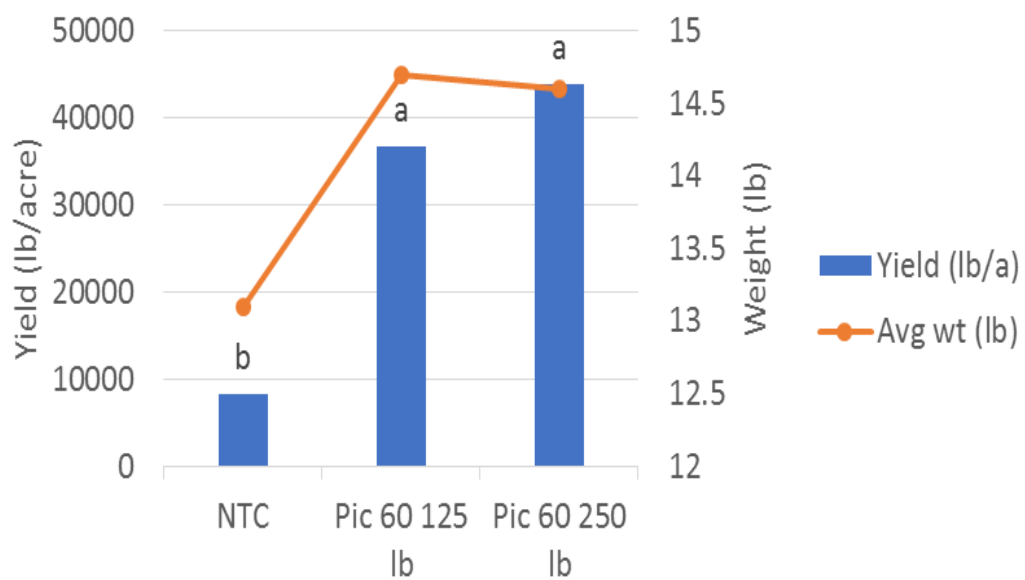
### Effect of Fumigation on Fusarium Wilt Incidence



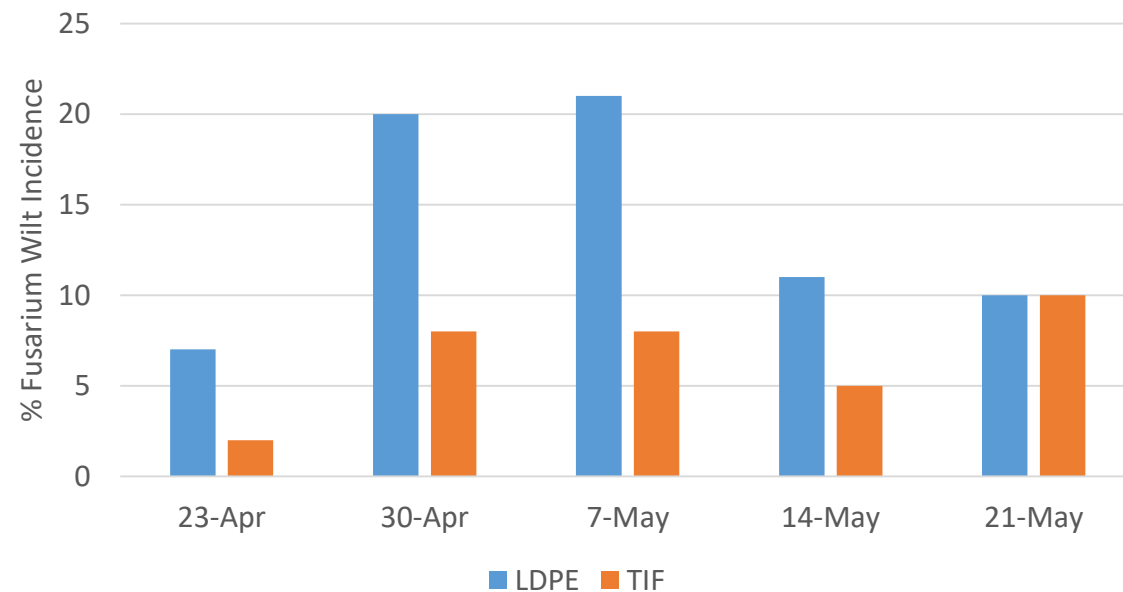
### Effect of Fumigation on Fusarium Wilt Incidence



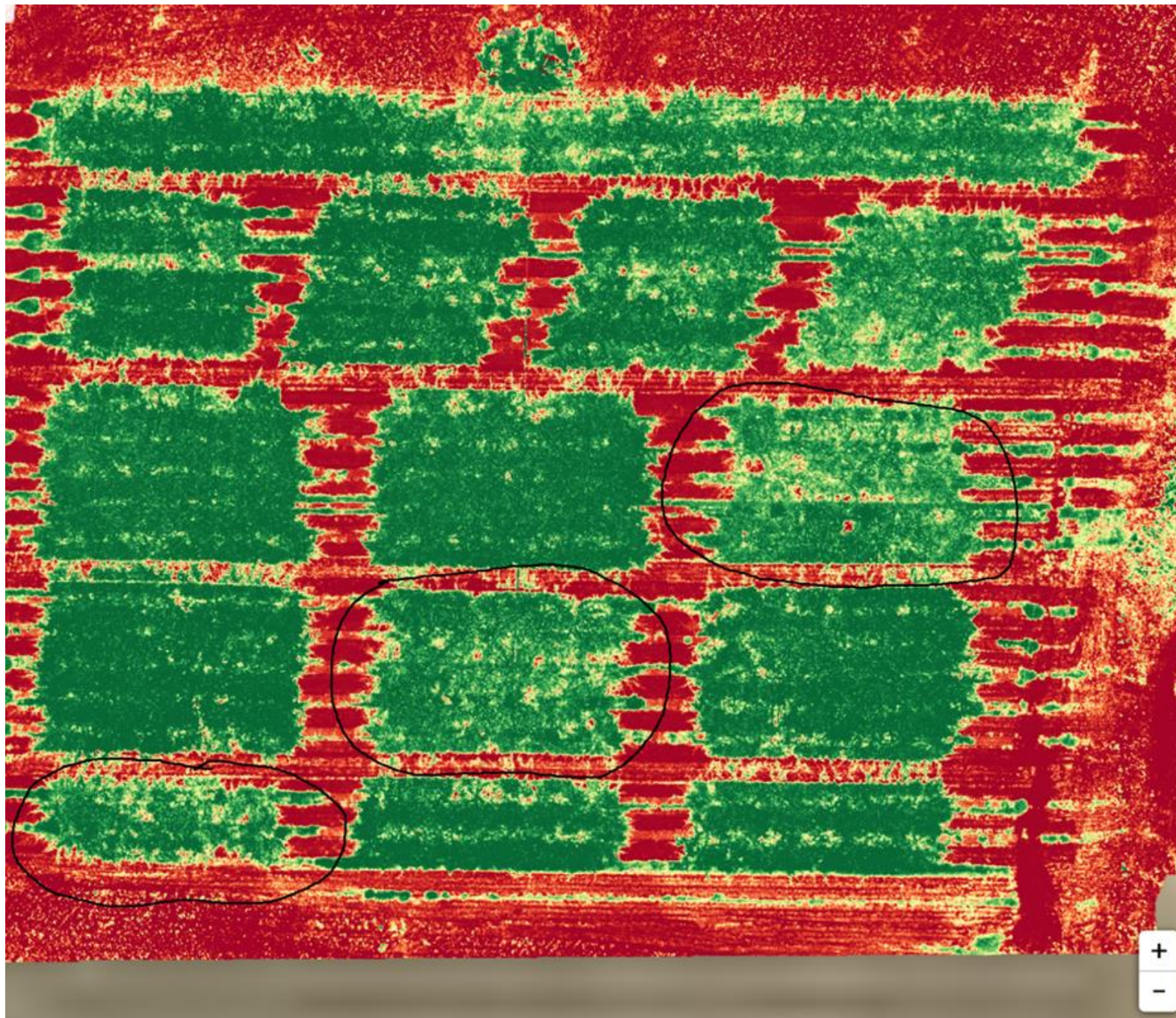
### Effect of Fumigation on Watermelon Yield and Size



### Effect of Plastic Mulch on Fusarium Incidence











Effect of fumigation and fungicide treatment on incidence of Fusarium wilt of watermelon in Toombs County, GA, during 2018.

Treatment and rate per acre		App code <sup>z</sup>	Disease incidence (%) <sup>y</sup>
Chloropicrin (Pic-100)	200 lb	1	34.5 b <sup>w</sup>
Proline 480 SC	5.7 fl oz.	2,3,4	32.8 b
Chloropicrin (Pic-100)	200 lb	1	25.4 c
Proline 480 SC	5.7 fl oz.	2,3,4	
Untreated			48.2 a

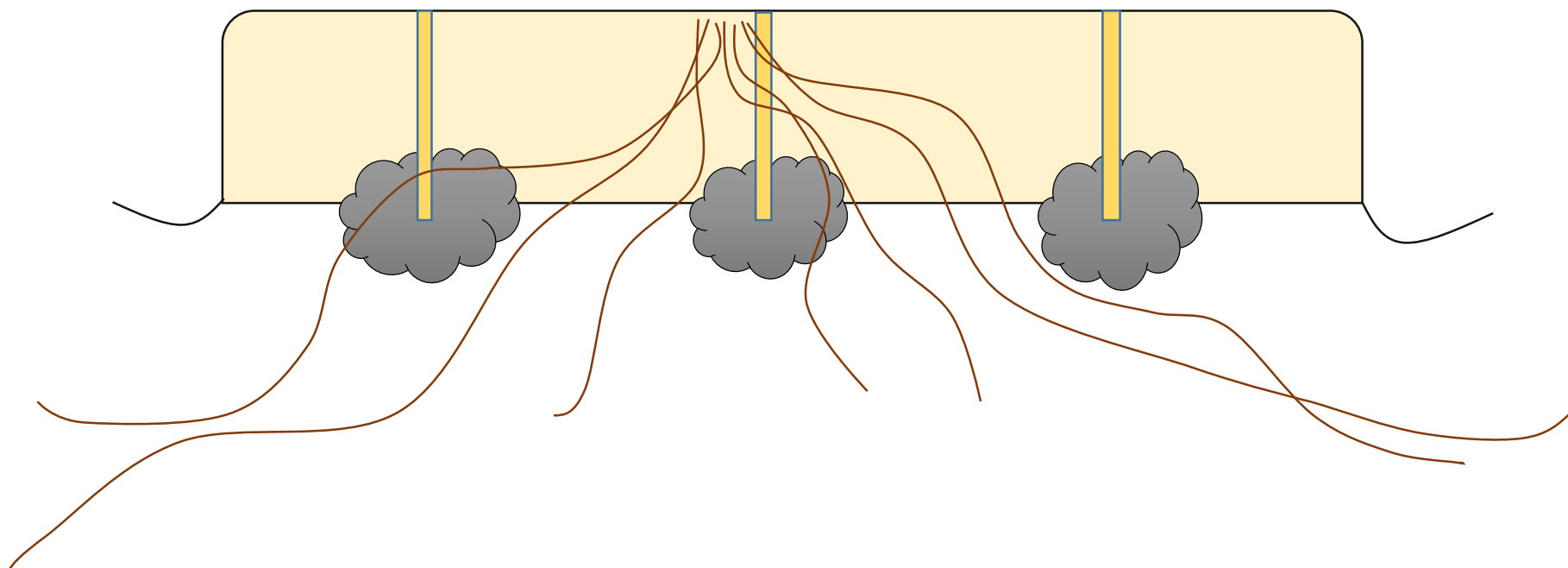
Effect of fumigation and fungicide treatment on incidence of Fusarium wilt of watermelon in Crisp County, GA, during 2018.

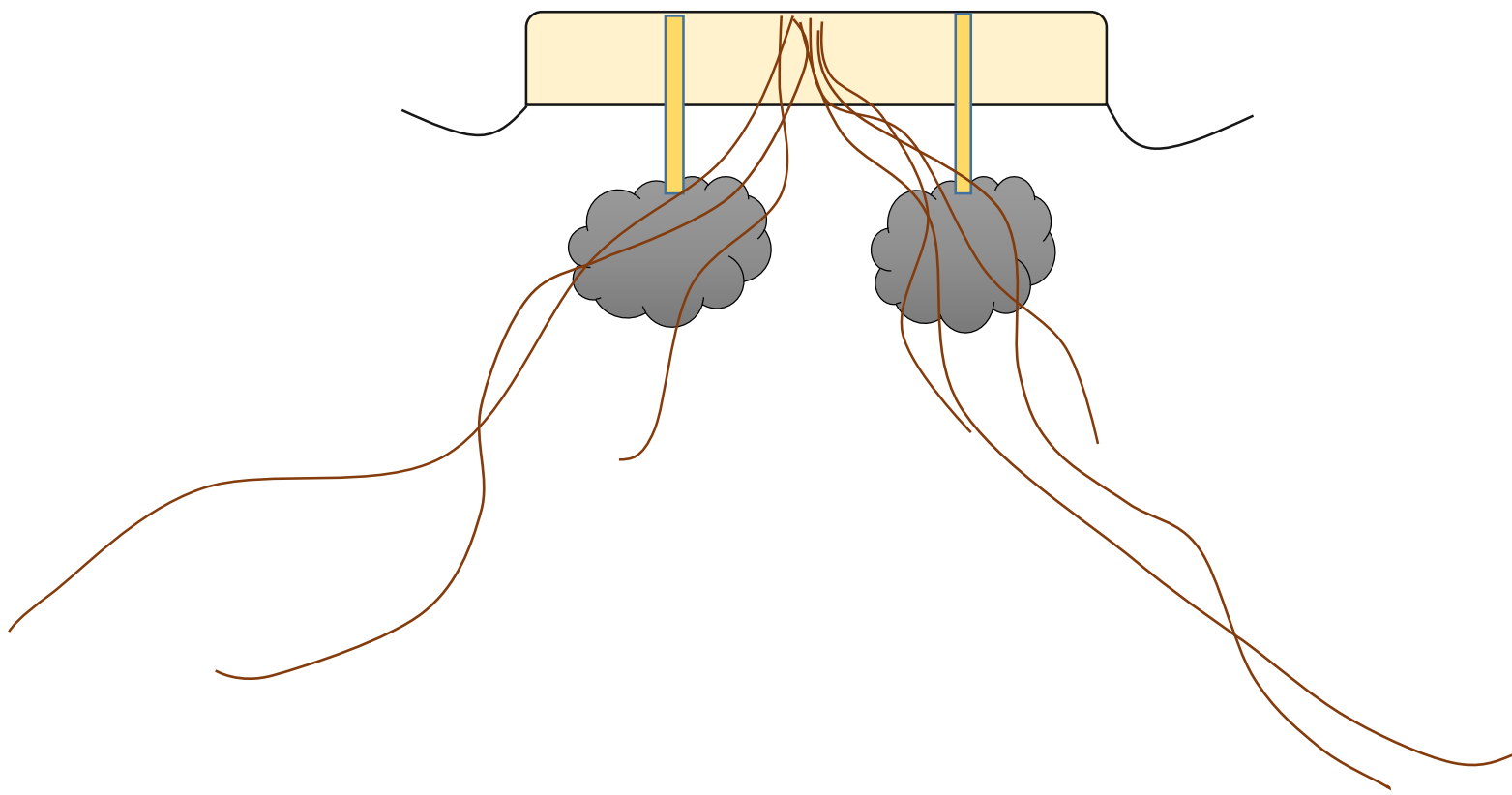
Treatment and rate per acre		App code <sup>z</sup>	Disease incidence (%) <sup>y</sup>
Chloropicrin (Pic-100)	200 lb	1	46.4 b <sup>w</sup>
Proline 480 SC	5.7 fl oz.	2,3,4	41.2 b
Chloropicrin (Pic-100)	200 lb	1	35.4 c
Proline 480 SC	5.7 fl oz.	2,3,4	
Untreated			64.7 a



Effect of fumigation and fungicide treatment on incidence of Fusarium wilt of watermelon in Crisp County, GA, during 2018.

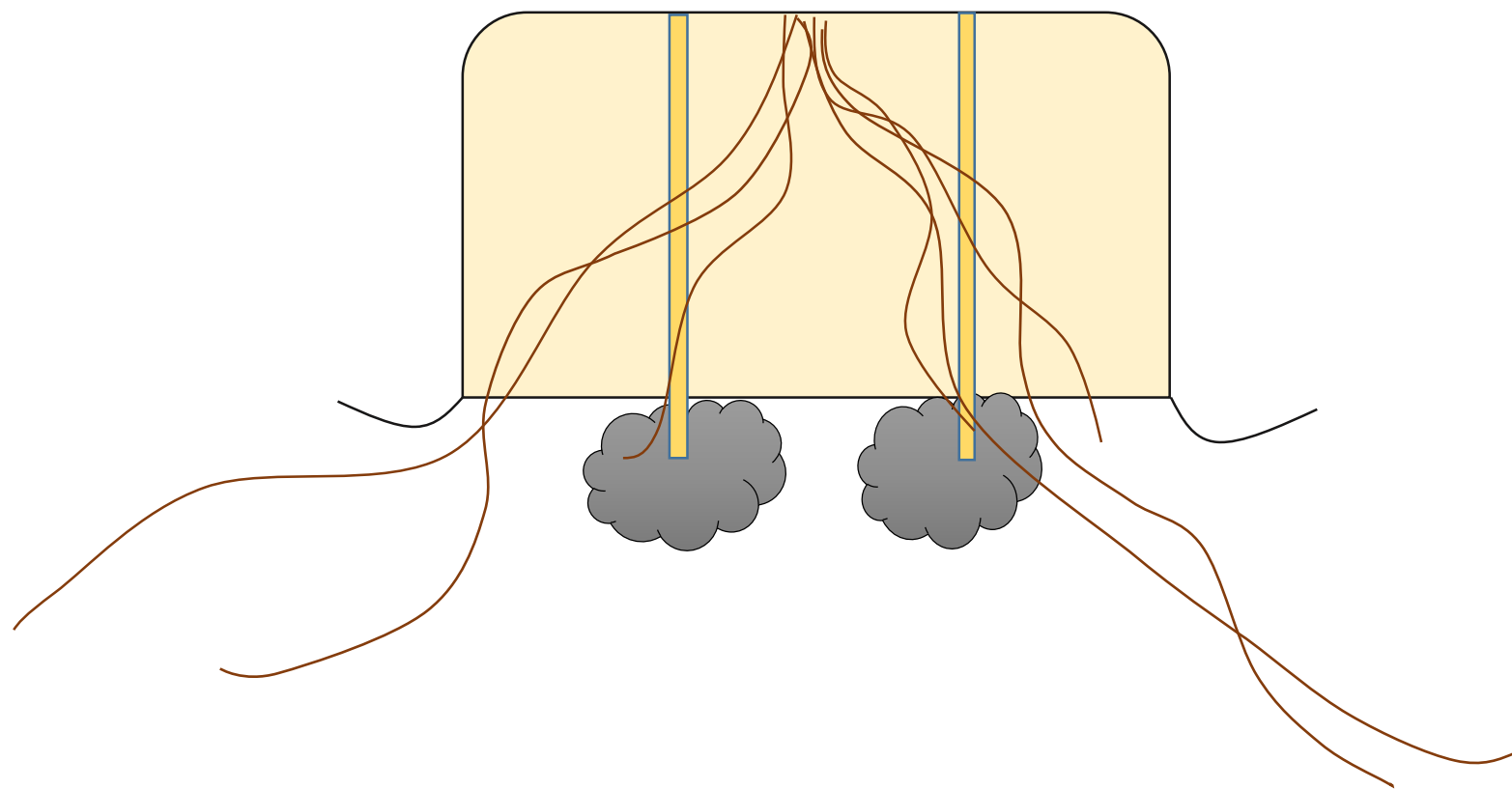
Treatment and rate per acre	App code <sup>z</sup>	Disease incidence (%) <sup>y</sup>
Chloropicrin (Pic-100) 200 lb	1	17.2 c <sup>w</sup>
Proline 5.7 fl oz	2,3,4	40.0 b
Miravis 8.5 fl oz	2,3,4	48.5 b
Propulse 13.5 fl oz	2,3,4	40.0 b
Chloropicrin (Pic-100) 200 lb + Proline 5.7 fl oz	1	8.5 d
	2,3,4	
Chloropicrin (Pic-100) 200 lb +Miravis 8.5 fl oz	1	14.2 cd
	2,3,4	
Chloropicrin (Pic-100) 200 lb +Propulse 13.5 fl oz	1	8.5 d
	2,3,4	
Untreated		68.5 a











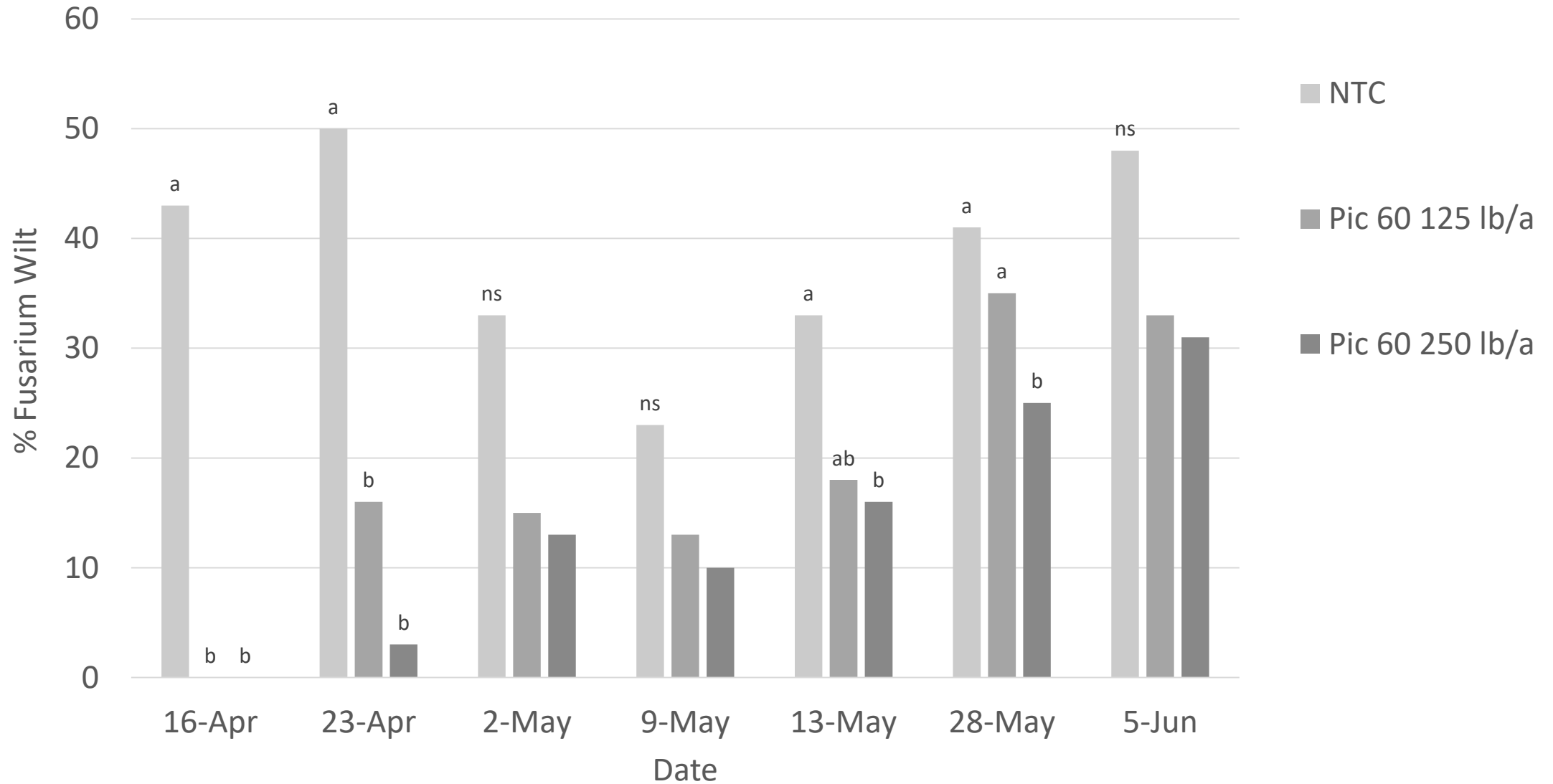






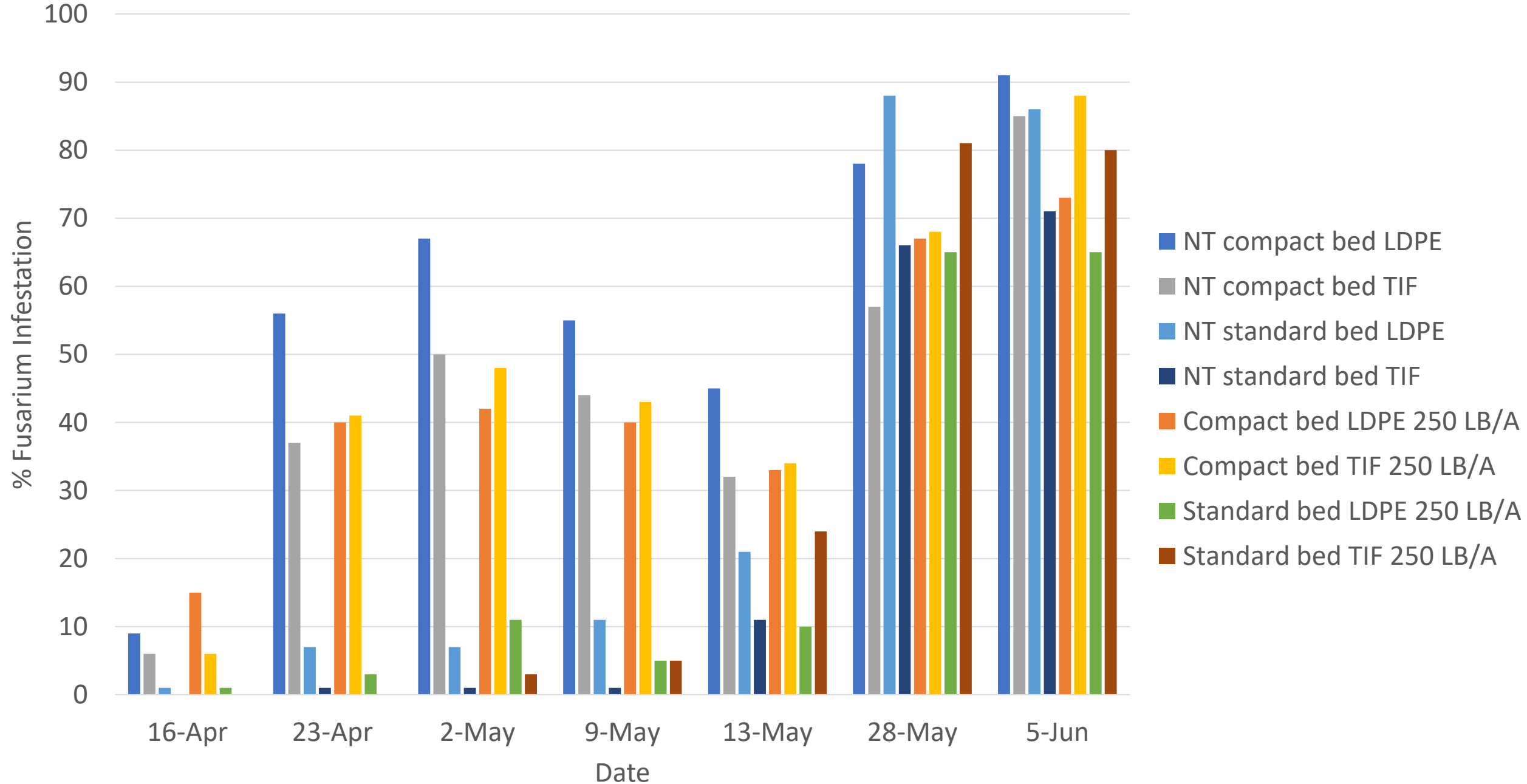


# Effect of Fumigation on Fusarium Wilt Incidence - 2019





# Compact Bed Study – Jackson County 2020



## Nutsedge Control with Compact and Standard Beds – Jackson Farms - 2019

Treatment	nutsedge/sq ft
Non treated compact bed LDPE	0.6
Compact bed LDPE 250 LB/A	0.3
Not treated compact bed TIF	0.8
Compact bed TIF 250 LB/A	0
Non treated standard bed LDPE	0.6
Standard bed LDPE 250 LB/A	0.3
Non treated standard bed TIF	0.6
Standard bed TIF 250 LB/A	0



**Effect of Bed Architecture on Tomato Fruit Yield – NFREC Quincy – Spring 2019**

		Tomato Yield (lb/acre)			
		Medium	Large	Extra-large	Total marketable
<b>1<sup>st</sup></b>	Compact	1843	8955	10951	21750
	Standard	2300	10465	10429	23194
<b>Total</b>	Compact	8701	24363	17947	51012
	Standard	8005	24682	17127	49815



# Compact Bed Geometry

**Standard 30" bed, 250 lb/ac Pic Clor 60  
+ TIF plastic = \$786**



**Compact 15" bed, 250 lb/ac Pic Clor 60  
+ TIF plastic = \$513**





# Fusarium management with soil fumigation?

- Fumigation with chloropicrin has been shown to significantly reduce Fusarium wilt incidence and improve watermelon yield
  - \*certain bed dimensions and plastic are likely required to achieve the best results
- Fumigation with chloropicrin has been shown to have not effect on Fusarium wilt incidence
- Fumigation with chloropicrin alone will likely **HAVE NO EFFECT** on nutsedge pressure
  - Chloropicrin applied with Telone or Paladin under TIF are effective at managing nutsedge
- Fungicides have an additive effect to fumigation but are not effective enough when used alone

# Back to the field

- There are instances of positive and negative results from multiple locations over the last two years
  - Why there is discrepancy in these results is unclear
- Because of fumigation costs, it needs to provide consistent repeatable results to be adopted by stakeholders

# Funding

*Gulf Coast Watermelon Association*



United States Department of Agriculture  
National Institute of Food and Agriculture

Methyl Bromide Transition Program 2016-51102-25814





Questions?