Evaluation of Strawberry Cultivars in fumigated and non-fumigated beds

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Summary

All cultivars had higher yields in beds fumigated with C-35. Sting nematodes were suppressed by fumigation at mid-season, but populations rebounded by the end of the season.

Background

Sting nematode is the most damaging plant-parasitic nematode in Florida strawberry production. This nematode is very common in Florida strawberry fields and crop failure can reach from 40 to 100% if not correctly managed and depending on the field conditions. Fumigation is the standard practice to manage this nematode. No information is available on differences in susceptibility of Florida strawberry cultivars to sting nematode, and their performance in fumigated versus non-fumigated soil.

Methods

The study was conducted at the University of Florida, Gulf Coast Research and Education Center in Wimauma, FL, USA. The site was a conventional field naturally infested with sting nematode, which population densities reached up to 78 specimens per 200 cm3 in previously strawberry seasons.

The cultivars used were Sensation® Florida127, Florida Brilliance, Florida Radiance, WinterstarTM 'FL 05-107', Florida Elyana, Strawberry Festival, and Florida Beauty. Cultivars were planted on fumigated (C-35 @ 35 gal/A) and non-fumigated rows (300 ft long x 2.5 ft wide). Beds were raised, and fumigant applied through shank application in late September, six weeks before planting. A totally impermeable field plastic (TIF Total Blockade, Berry Plastics Corporation, Evansville, IN) was used to cover the newly raised beds.

The seven strawberry cultivars were ordered from a commercial nursery in California and kept in a cooler (~4°C) until the planting date. Plants were hand-transplanted on October 6th and 10th for the 2020-21 and 2021-22 seasons, respectively, and overhead sprinklers were used to provide sufficient moisture during the first two weeks. Doses and procedures of irrigation, fertilizer, insecticide, fungicides, and herbicides were performed according to the Strawberry production in the Vegetable production handbook for Florida.

Plant vigor was recorded on eight measurement dates in both growing seasons, starting four weeks until 18 weeks after transplanting (WAT) using a Green Seeker™ sensor (Trimble, Sunnyvale, CA). Marketable strawberry fruits were hand-picked once a week and weighted from each plot during 12 weeks in the 2020-21 season (November 16th to February 25th) and 14 weeks in the 2020-21 season (December 10th to March 10th). Soil samples were collected early- (October 9th), mid- (January 6th), and end-season (March 4th) (table 1). A composite sample of six soil cores to a depth of 30 cm and 2.5 cm diameter was collected from each subplot using a cone tube sampler. Free-living and plant-parasitic nematodes were extracted using sugar flotation,

Results

All cultivars had higher yields in beds fumigated with C-35 (Figure 1). Highest yield increases in fumigated rows were noted in the 21-22 season (Table 1). Sensation® Florida127 and Florida Brilliance provided consistent the highest total fruit yield in both seasons.

Soil fumigation provided consistent enhancement of plant vigor (data not given) and suppressed sting, stunt and free-living nematodes until mid-season (Figure 2). By the end of the season, nematode populations had rebounded, and sting populations were similar as in non-fumigated plots. All tested strawberry cultivars were highly susceptible to sting nematode.

Contact

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Figure 1. Effect of strawberry cultivar and soil fumigation on fruit yield in the 2020-21 and 2021-22 seasons. The asterisks indicate a significant ($P < 0.05$) difference between fumigated (black) and non-fumigated (orange) rows

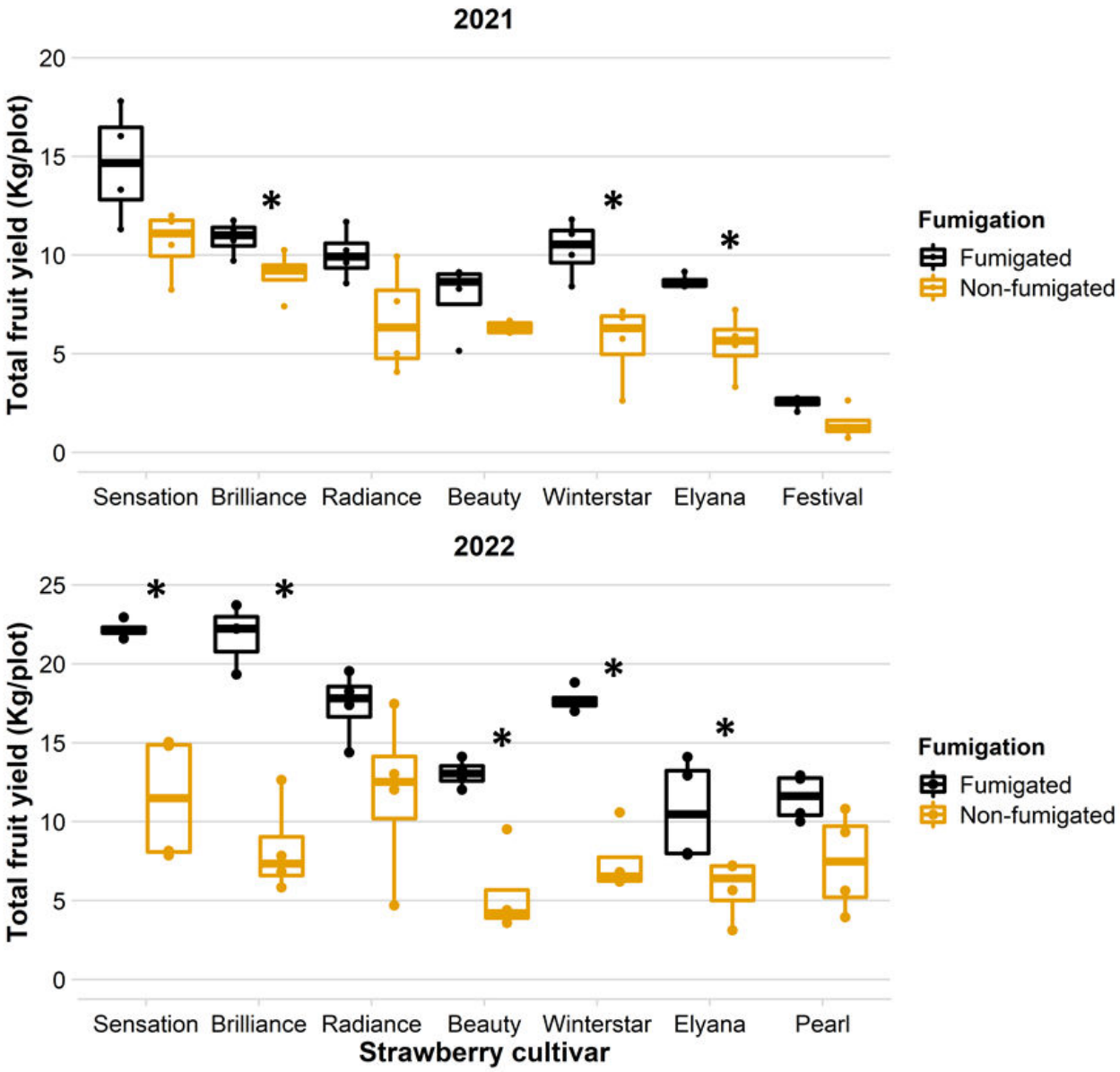

Table 1. Effect of seven cultivars and fumigation on strawberry fruit yield for 2020-21 season. The asterisks indicate a significant ($P < 0.05$) difference and ns indicate a non-significant ($p > 0.05$) difference between fumigated (F) and non-fumigated (NF) rows

2020-21 season								
Cultivar	Fumigation	Total yield		% Yield increased	g/plant		Stand count	
Sensation	F	14.61	ns	37%	497	ns	29.5	*
	NF	10.87			407		26	
Elyana	F	8.66	**	36%	301	ns	28.75	**
	NF	5.47			306		18	
Brilliance	F	10.87	*	20%	372	ns	29.25	ns
	NF	9.02			327		27.5	
Beauty	F	7.89	ns	24%	267	ns	29.5	**
	NF	6.33			232		27.25	
Radiance	F	10.02	ns	50%	352	ns	28.5	ns
	NF	6.67			244		27.25	
Winterstar	F	10.32	**	84%	362	ns	28.5	**
	NF	5.59			243		23.25	
Festival	F	2.52	ns	72%	321	ns	26.5	***
	NF	1.46			96		7	
2021-22 season								
Sensation	F	22.18	**	93%	745	**	29.75	ns
	NF	11.47			413		27.75	
Elyana	F	10.74	*	85%	358	ns	30	**
	NF	5.79			220		26	
Brilliance	F	22.67	***	173%	769	***	29.5	ns
	NF	8.29			316		25.75	
Beauty	F	13.07	**	142%	447	**	29.25	**
	NF	5.38			226		23.25	
Radiance	F	17.39	ns	47%	607	ns	28.75	ns
	NF	11.8			445		26.25	
Winterstar	F	17.71	***	137%	611	***	29	**
	NF	7.46			284		26.25	
Pearl	F	11.55	ns	55%	385	ns	30	ns
	NF	7.44			256		29	

Figure 2. Effect of strawberry cultivar on the abundance of sting nematode (*B. longicaudatus*) in the 2020-21 and 2021-22 seasons. The asterisks indicate a significant ($P < 0.05$) difference between fumigated with Telone® C-35 (black) and non-fumigated (orange) rows