

## Evaluation of products for the control of powdery mildew in annual strawberry, 2020-21.

During the 2020-21 strawberry growing season, the efficacy of products to manage powdery mildew was evaluated in a replicated experiment conducted at the University of Florida Gulf Coast Research and Education Center in Wimauma, FL. Bare-root, green-top plants (Sensation® 'Florida127') from a nursery in Canada were transplanted into raised beds covered with new black plastic mulch on 16 Oct 20. Beds were 32 in. wide at the base on 4 ft centers and were previously fumigated with Telone C-35 (300 lb/A). Plots were 7.5-ft long and contained 12 plants in two staggered rows spaced 15 in. within rows and 12 in. between rows and were separated by a 5-ft gap. Treatments were arranged in a randomized complete block design consisting of four blocks in adjacent beds. After transplanting, plants were overhead irrigated during the day with 15-min intermittent intervals for 10 consecutive days to enhance plant establishment and then irrigated and fertilized through a central drip tape in each bed. Treatments were applied weekly or at 2-wk intervals from 20 Nov 20 to 15 Jan 21 with a CO<sub>2</sub> back-pack sprayer calibrated to deliver 100 gal/A at 60 psi through a wand fitted with two T-Jet 8002 hollow-cone nozzles spaced 12 in. apart. A non-treated control was not sprayed with fungicides. Fruit were harvested from 30 Nov 20 to 25 Jan 21 (15 harvests) to determine marketable yield and fruit disease incidence. Marketable fruit were counted and weighed to determine yield, and other cull fruit were enumerated to calculate disease incidence as the percentage of total harvested fruit with visible powdery mildew growth on more than 25% of the achenes compared to total number of marketable and non-marketable fruit. Foliar disease severity was assessed twice during the trial, and the percentage of leaf area covered by *P. aphanis* mycelial colonization was estimated based on visual assessment. In the first evaluation, one leaf per plant per plot was tagged during early petiole elongation on 16 Dec (one day before the third set of treatments was applied) and collected on 29 Dec 20. In the second evaluation, one leaf (first fully expanded leaf) per plant per plot was collected on 21 Jan 21. Data were analyzed by fitting a generalized linear mixed model using the GLIMMIX procedure in SAS and means were separated by Fisher's Protected LSD test ( $\alpha = 0.05$ ).

Typical powdery mildew symptoms and signs, characterized by curled leaves showing mycelial growth on the abaxial surface, were first observed within approximately six weeks of planting (end-Nov). Thereafter, foliar symptoms increased rapidly and were followed by disease development on the fruit. Over the 8-wk harvest period, fruit disease incidence averaged 76.6% in the non-treated control and was greatly reduced (more than 50%) by Gatten + Induce applied weekly and at 2-wk intervals, Luna Tranquility + Induce alternated with Torino and Exp14 at both rates, Quintec alternated with Torino and Mettle, Magister SC + Dyne-Amic, Apta + Induce, and Exp 14 at 10.72 oz alternated with Torino. Quintec and Exp 14 at 7.14 oz alternated with Torino, Provysol, Quintec, and Ninja applied at 2-wk intervals, and NAI-9055 + Induce, TRIL-4-9 and TRIL-3-35 applied weekly moderately reduced fruit disease incidence to 40.3 to 59.5%, whereas all the remaining treatments did not reduce disease compared to the non-treated control. Yield was closely correlated with powdery mildew control on the fruit. Except for TRIL-3-35 weekly applied and Ninja applied at 2-wk intervals, all the treatments that reduced fruit disease incidence increased marketable yield over the non-treated control. Except for the TRIL-4-17 treatment, foliar disease severity data collected at the end of the trial (21 Jan) also was correlated with fruit disease incidence and ranged from 0.8 to 15.7%. Although differences among treatments were observed, foliar disease severity data on 29 Dec had a low correlation with data collected on 21 Jan and with fruit disease incidence. Nevertheless, the most effective treatments in increasing yield and reducing fruit disease incidence were also the most effective in reducing disease severity on leaves, regardless of the evaluation date.

Treatment (products and amount/A)	Application timing <sup>z</sup>	Yield (lb/A) <sup>y</sup>	Fruit disease incidence (%) <sup>x</sup>		Leaf disease severity (%) <sup>w</sup>			
					29 Dec 20		21 Jan 21	
Gatten 8 fl oz + Induce 1 pt	weekly	3339.4 a	10.1	n	2.8	f	1.1	fg <sup>v</sup>
Luna Tranquility 500SC 20 fl oz + Induce 1 pt	1, 5	3010.6 abc	13.8	mn	4.3	f	2.4	efg
Torino 3.4 fl oz	3, 7, 9							
Gatten 8 fl oz + Induce 1 pt	1, 3, 5, 7, 9	3045.6 ab	19.8	lmn	4.1	f	1.6	efg
Luna Tranquility 500SC 20 fl oz + Induce 1 pt	1, 5, 9	2735.9 abcde	21.2	lm	2.5	f	1.0	fg
Exp 14 10.72 oz	3, 7							
Quintec 6 fl oz	1, 7, 9	3258.6 a	23.5	lm	5.1	ef	2.8	efg
Torino 3.4 fl oz	3							
Mettle 5 fl oz	5							
Luna Tranquility 500SC 20 fl oz + Induce 1 pt	1, 5, 9	3283.5 a	24.3	klm	7.9	ef	0.8	g
Exp 14 7.14 oz	3, 7							
Magister SC 36 fl oz + Dyne-Amic 2 pt	1, 3, 5, 7, 9	2848.1 abcd	27.0	jklm	11.6	def	4.2	cdefg
Apta 27 fl oz + Induce 1 pt	weekly	3118.6 ab	31.0	ijkl	8.6	ef	3.9	cdefg
Exp 14 10.72 oz	1, 5, 9	2226.3 bcdefg	33.1	hijkl	19.4	abcde	2.5	efg
Torino 3.4 fl oz	3, 7							
Quintec 6 fl oz	1, 5	2206.2 bcdefg	40.3	ghijk	30.2	a	8.8	bcd
Torino 3.4 fl oz	3, 7, 9							
ProvySol (BAS 750) 5 oz	1, 3, 5, 7, 9	2492.0 abcdef	41.4	fghij	14.2	bcdefg	5.2	cdefg
Exp 14 7.14 oz	1, 5, 9	2269.6 bcdefg	44.3	efghi	25.3	abcd	3.5	defg
Torino 3.4 fl oz	3, 7							
Quintec 6 fl oz	1, 3, 5, 7, 9	2053.5 defgh	44.4	efghi	25.2	abcd	6.7	cdef
NAI-9055 1.9 oz + Induce 1 pt	weekly	2059.9 cdefgh	49.1	defgh	27.2	abcd	6.2	cdefg
TRIL-4-9 (64 fl oz), 7-day	weekly	1787.1 efghi	53.1	cdefg	13.7	cdefgh	7.2	cde
TRIL-3-35 (64 fl oz), 7-day	weekly	1448.6 ghij	56.7	cdefg	32.2	ab	6.7	cdef
Ninja (SP2700) 11 oz	1, 3, 5, 7, 9	1703.8 fghij	59.5	bcdef	13.1	defgh	6.3	cdefg
PREV-AM (OR-009-A) 3.2 pt	1, 3, 5, 7, 9	1460.5 hij	60.4	abcde	32.6	ab	9.3	bc
TRIL-TXPC (64 fl oz), 7-day	weekly	1182.0 hij	65.8	abcd	33.6	a	9.5	bc
Exp 14 10.72 oz	weekly	1334.3 ghij	68.8	abc	28.8	abc	13.7	ab
TRIL-4-17 (64 fl oz), 7-day	weekly	960.7 ij	68.8	abc	27.7	abcd	5.9	cdefg
Exp 14 7.14 oz	weekly	935.5 ij	74.6	ab	27.4	abcd	13.3	ab
Control		819.5 j	76.6	a	31.7	ab	15.7	a
Probability of a greater F value		<0.0001	<0.0001		<0.0001		<0.0001	

<sup>z</sup> Week of application over 9 weeks from 20 Nov 20 to 15 Jan 21.

<sup>y</sup> Yield based on harvest data from 30 Nov 20 to 25 Jan 21 (15 harvests total).

<sup>x</sup> Fruit disease incidence in percent of total harvested fruit with conspicuous powdery mildew (PM) growth on more than 25% of the achenes.

<sup>w</sup> Percent of leaf area covered with powdery mildew based on visual assessment

<sup>v</sup> Values in a column followed by the same letter are not significantly different by Fisher's Protected LSD test ( $\alpha = 0.05$ ).