

Evaluation of biorational products for control of Botrytis fruit rot on annual strawberry, 2018-19.

A trial was conducted at a commercial farm in Plant City, FL to evaluate biorational and conventional fungicide products for Botrytis fruit rot (BFR) management. On 8 Oct 2018, bare-root transplants from a nursery in California were transplanted into fumigated raised beds measuring 28 in. wide on 4-ft centers. Beds were pre-treated with Pic-Clor 60 (200 lb/A) and covered with black plastic mulch. Strawberry transplants were staggered in two rows per bed with 15 in. within and between rows. After plants were established using overhead irrigation for 10 days, water and fertilizers were applied through a central irrigation tape in each bed throughout the season. Nineteen biorational and conventional fungicide treatments and a non-treated control were arranged in a randomized complete block design with four replications in adjacent beds. Each plot measured 9.5-ft long and contained 12 plants. Treatments were applied with a CO₂ back-pack sprayer calibrated to deliver 100 gal/A at 60 psi through a boom mounted with two hollow-cone T-Jet 8002 nozzles. Weekly applications of treatments with biorational products were made 11 times at weekly intervals from 30 Nov 2018 to 11 Feb 2019. Treatments with the conventional fungicide Switch 62.5WG were applied during weeks with high risk for infection, following the risk assessment provided by the Strawberry Advisory System (StAS) (<http://agroclimate.org/tools/sas/>). In alternation with Switch 62.5WG, Captan 80WDG, Stargus, and Regalia were applied during weeks with low infection risk. In total, four StAS-based applications were made on 19 Dec 2018, and 6 Jan, 1 and 11 Feb 2019. Fruit were harvested twice weekly from 4 Dec 2018 to 19 Feb 2019 (22 harvests) to determine yield and BFR incidence. Yield was expressed in pounds of marketable fruit per acre, and BFR incidence as a percentage of diseased fruit relative to total number of harvested fruit. All data were analyzed by fitting a generalized linear mixed model using the statistical software SAS and means were separated according to Fisher's Protected LSD test ($\alpha = 0.05$).

During the trial, there were nine days in which the environmental conditions were highly conducive for *B. cinerea* infection according to the StAS. In addition, StAS indicated conducive conditions triggering moderate alerts for an additional eleven days during the season. BFR incidence was evaluated for early season (4 Dec 2018 to 15 Jan 2019), late season (18 Jan to 19 Feb 2019), and for the whole season with averages of 4.4, 33.4, and 28.5%, respectively. During early season, none of the treatments reduced BFR incidence compared to the non-treated control. However, significant reduction of disease incidence was observed during the late and whole season periods in treatments with Switch 62.5WG rotated with either Captan or Stargus, and AFS32321 WP + Nu Film P. These same treatments (except AFS32321 WP + Nu Film P), in addition to Switch 62.5WG alone or rotated with Regalia, AFS32321 WP (240 oz) + Nu Film P, and AFS32321 SC significantly increased yield compared to the non-treated control.

Treatment (products and rates/A)	Application timing ^z	Yield (lb/A) ^y	BFR incidence (%) ^x		
			Early Season	Late Season	Whole Season
Switch 62.5WG 14 oz	4, 6, 10, 11	19386 abc	3.7	12.6 g ^w	11.0 f
Captan Gold 80WDG 1.9 lb	1, 2, 3, 5, 7, 8, 9				
AFS32321 WP 160 oz + Nu Film P 8 fl oz	Weekly	16013 bcdefg	2.5	16.9 fg	14.3 ef
Switch 62.5WG 14 oz	4, 6, 10, 11	19487 ab	4.9	17.7 fg	15.6 ef
Stargus 2 qt	1, 2, 3, 5, 7, 8, 9				
Switch 62.5WG 14 oz	4, 6, 10, 11	18700 abcde	3.6	19.3 ef	16.9 de
AFS32321 WP 240 oz + Nu Film P 8 fl oz	Weekly	19949 a	2.7	20.1 def	17.1 de
Switch 62.5WG 14 oz	4, 6, 10, 11	19321 abcd	6.2	19.6 def	17.4 de
Regalia 2 qt	1, 2, 3, 5, 7, 8, 9				
AFS32321 SC (240 oz)	Weekly	15816 cdefg	3.0	21.8 cdef	18.5 cde
AFS32321 WP 80 oz + Nu Film P 8 fl oz	Weekly	15593 efg	2.4	24.8 bcde	21.4 bcd
Howler 80 oz	Weekly	15581 efg	5.4	28.1 abc	22.5 abcd
BotryStop 3 lb + Nu Film P 8 fl oz	Weekly	15740 defg	7.5	26.5 abcd	23.1 abcd
AFS32321 SC 160 oz	Weekly	15838 cdefg	2.8	28.1 abc	23.8 abc
SAU 53 20 oz	Weekly	13850 fg	6.0	28.2 abc	24.6 abc
Howler 80 oz	2, 4, 6, 8, 10	14922 fg	3.2	29.8 ab	24.6 abc
AFS32321 SC 80 oz	1, 3, 5, 7, 9, 11				
AFS32321 SC 80 oz	Weekly	14477 fg	3.9	29.4 ab	25.0 ab
Timorex ACT 18 fl oz	Weekly	14304 fg	4.0	31.8 ab	26.3 ab
Onix 7 fl oz + Nu Film P 8 fl oz	Weekly	15591 efg	6.4	31.4 ab	26.8 ab
Timorex ACT 28 fl oz	Weekly	15326 efg	6.7	31.0 ab	27.5 ab
Non-treated control	-	12946 g	4.4	33.4 a	28.5 ab
AFS32321 SC (40 oz)	Weekly	17067 abcdef	6.4	32.4 ab	28.7 a
SAU 53 (17 oz), weekly	Weekly	15746 defg	5.8	32.3 ab	29.0 a
Probability of a greater <i>F</i> value		0.0033	0.8195	<.0001	<.0001

^z Week of application over 11 weeks from 30 Nov 2018 to 11 Feb 2019.

^y Total yield in pounds per acre based on harvest data from 4 Dec 2018 to 19 Feb 2019 (22 harvests total).

^x Botrytis fruit rot (BFR) incidence during early season (4 Dec 2018 to 15 Jan 2019), late season (18 Jan to 19 Feb 2019), and whole season (4 Dec 2018 to 19 Feb 2019)

^w Values in a column followed by the same letter are not significantly different according to Fisher's Protected LSD test ($\alpha=0.05$).