STRAWBERRY (*Fragaria x ananassa* 'Florida Brilliance')
Botrytis fruit rot; *Botrytis cinerea*

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Evaluation of biorational products for control of Botrytis fruit rot on annual strawberry, 2019-20.

The effectiveness of biorational treatments were compared to an industry standard fungicide treatment for Botrytis fruit rot (BFR) management in a replicated experiment conducted at a commercial farm in Plant City, FL. Bare-root transplants from California were planted on raised beds covered with new black plastic mulch on 8 Oct 2019. Beds measured 28 in. wide on 4-ft centers and were previously treated with Pic-Clor 80 (200 lb/A). After planting, overhead irrigation was used for 10 consecutive days during the day to aid establishment and then drip irrigation was used to deliver water and fertilizer throughout the season. Nineteen treatments and a non-treated control were arranged in a randomized complete block design with four blocks in adjacent rows. Plots measured 9.5-ft long and consisted of 12 plants that were 15 in. apart within and between rows. Treatments were applied with a CO_2 back-pack sprayer calibrated to deliver 100 gal/A at 60 psi through two hollow-cone T-Jet 8002 nozzles spaced 12-in. apart on the wand. Treatments with biorational products were applied weekly (14 applications) from 26 Nov 2019 to 25 Feb 2020. Treatment programs including the conventional fungicide Switch 62.5WG were applied during weeks with high disease risk as determined by the Strawberry Advisory System (StAS) (http://agroclimate.org/tools/sas/). The products ADF-22, SA 065004, and Captan Gold 80WDG were applied in alternation with Switch 62.5WG during weeks with low disease risk. StAS-based applications were made on 3, 17, and 26 Dec 2019, and 4 and 25 Feb 2020 (5 applications). Twenty harvests were made from 20 Dec 2019 to 4 Mar 2020 to determine yield and BFR incidence. Marketable fruit were counted and weighted to determine yield, and BFR incidence was expressed as the percentage of diseased fruit compared to total number of marketable and unmarketable fruit. 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 our experiment, StAS identified 7 days that were highly conducive for disease development (temperatures of 17 to 25˚C and ≥ 12 h leaf wetness) during the 2019-20 strawberry season. In addition, six days were moderately favorable through early Feb. Thus, average BFR incidences in the non-treated control were similar (25.6, 34.6, and 33.7%) for early season (20 Dec 2019 to 14 Jan 2020), late season (17 Jan to 4 Mar 2020), and whole season (20 Dec 2019 to 4 Mar 2020) periods, respectively. During the early season, Switch 62.5WG rotated with ADF-22, SA 0650004 or Captan Gold 80WDG, and weekly applications of XF-17002 reduced BFR incidence compared to the non-treated control. These treatments, as well as ADF-22 + Kinetic and SA 065001 + Kinetic also reduce BFR during the late season and whole season overall. The most effective treatment was the program of Switch 62.5WG + ADF-22 + Kinetic alternated with ADF-22 + Kinetic, which reduced BFR more than 50% during the three evaluated periods. None of the treatments significantly increased yield over the non-treated control likely due to the incidence of mites and Pestalotiopsis leaf spot in some plots.

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 + ADF-22 11 fl oz + Kinetic 1 pt ADF-22 11 fl oz + Kinetic 1 pt	2, 4, 5, 11, 14 1, 3, 6, 7, 8, 9, 10, 12, 13	29746	3.6 f	17.1 f	15.4 f[w]
ADF-22 11 fl oz + Kinetic 1 pt	weekly	27884	18.3 abc	22.4 e	21.9 e
Switch 62.5WG 14 oz SA 0650004 28 fl oz	2, 4, 5, 11, 14 1, 3, 6, 7, 8, 9, 10, 12, 13	31339	9.3 de	24.7 cde	22.9 de
Switch 62.5WG 14 oz Captan Gold 80WDG 1.9 lb	2, 4, 5, 11, 14 1, 3, 6, 7, 8, 9, 10, 12, 13	32191	7.0 ef	26.3 bcde	24.2 cde
SA 0650001 55 fl oz + Kinetic 1 pt	weekly	26342	24.4 abc	24.4 de	24.4 cde
XF-17002 2.4 pt	weekly	28800	15.3 cd	26.2 bcde	24.9 bcde
SA 0650004 28 fl oz	weekly	29693	21.1 abc	27.8 abcde	27.0 abcde
SB 9503 0.9 lb	weekly	29432	21.6 abc	28.0 abcde	27.2 abcde
SA 0650004 42 fl oz	weekly	28537	17.4 bc	29.4 abcd	28.0 abcde
Dart 2.8 pt	weekly	24835	22.2 abc	29.0 abcde	28.2 abcde
AVIV 15 fl oz	weekly	27675	25.0 abc	29.5 abcd	29.2 abcd
Exp 14 10.72 oz	weekly	29513	22.3 abc	30.1 abcd	29.3 abcd
Exp 14 41.0 oz + Kinetic 1 pt	weekly	27131	20.7 abc	30.4 abcd	29.4 abcd
Thymox Control 2 qt	weekly	27283	22.2 abc	30.7 abcd	29.7 abcd
Exp 14 7.14 oz	weekly	27093	20.7 abc	30.9 abcd	29.9 abc
SB 9503 1.8 lb	weekly	26418	16.9 bcd	31.5 abc	30.0 abc
AVIV 30 fl oz	weekly	28377	26.4 ab	31.0 abcd	30.4 abc
SA 0650004 14 fl oz[v] + SA 0790001 2.85 oz	weekly	27931	28.6 a	31.5 abc	31.3 ab
Exp 14 3.57 oz	weekly	24287	19.0 abc	33.1 ab	31.3 ab
Non-treated control	-	26216	25.6 ab	34.6 a	33.7 a
Probability of a greater F value		0.0588	<0.0001	0.0009	0.0002

[z] Week of application over 14 weeks from 26 Nov 2019 to 25 Feb 2020.

[y] Yield based on harvest data from 20 Dec 2019 to 4 Mar 2020 (20 harvests total).

[x] Botrytis fruit rot (BFR) incidence during early season (20 Dec 2019 to 14 Jan 2019), late season (17 Jan to 4 Mar 2020), and whole season (20 Dec 2019 to 4 Mar 2020)

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

[v] SA 0650004 was applied at 14 fl oz from 26 Nov 2019 to 4 Feb 2020 and at 28 fl oz for the last three applications.