

Evaluation of Commonly Used Fungicides for Botrytis Fruit Rot Management on Strawberry in San Luis Obispo, CA, Early Season 2024

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Botrytis fruit rot, caused by *Botrytis cinerea*, is the most economically important strawberry fruit rot worldwide. Infection first appears as a small brown lesion, often under the calyx and following prolonged wetness (>13 h). Sporulation appears as a velvety gray mold, with susceptibility increasing with fruit ripeness. This report evaluates the efficacy of 16 different fungicides most commonly used in Santa Barbara County for the management of Botrytis fruit rot on strawberry cultivar 'Fronteras' in San Luis Obispo, CA, in 2024. Results from this study will help inform strawberry growers in developing effective management programs for this disease.

The trial was conducted in field 35b at the Cal Poly State University campus in San Luis Obispo, CA (35°18'20" N, 120°40'22" W). Bare root strawberry transplants, 'Fronteras', were transplanted into raised beds on 1 November 2023. The experimental area consisted of eight beds that were 160 ft. long. Industry standard beds were used, which had 64-in. spacing between bed centers; four lines of plants with 12-in. spacing between plant lines; and 15.5-in. spacing between plants within a line. Beds were covered with black non-totally impermeable film (TIF) polyethylene mulch (1.5 ml) (Ginegar, Santa Maria, CA, U.S.A.). Plots were 20 ft. long (62 plants per plot), replicated four times, and arranged in a randomized complete block design. A 23-in. planted buffer (four plants) was used on both ends of each plot. Plants were irrigated and fertilized via three lines of Aqua-Traxx drip tape (EAXxx0867) (Toro, Bloomington, MN, U.S.A.) per bed. Treatments were applied using a backpack sprayer equipped with a custom 48-in. handheld boom (R&D Sprayers, Opelousas, LA, U.S.A.). The boom consisted of

eight nozzles (ALBUZ ATR 80 blue hollow cone; Kisco Sales, Santa Maria, CA, U.S.A.) that were spaced 12-in. apart and were calibrated to deliver 150 to 200 gal./acre using compressed CO₂ at 60 psi. The two outer nozzles were angled inward at 45 degrees, and the six inner nozzles facing forward and backward were arranged in pairs, with each nozzle at opposing 45-degree angles. A weekly rotation of Elevate + Captan, Kenja + Thiram, Switch + Captan, Merivon + Thiram, and Switch + Captan was added as a positive control. MilStop (potassium bicarbonate) was the only Organic Materials Review Institute (OMRI)-listed treatment. The treatment consisting of a tank mix of Broadspred, Acadian, and MixWell was adjusted to a pH between 5.0 and 5.5 and was applied at 200 gal. of carrier volume/acre to align with commercial practices. All other treatments were applied at 150 gal. of carrier volume/acre. On 8 March 2024, 4 days prior to the first application, all fruit were removed from the plants, leaving only blooms and flower buds. The first treatment application was made on 12 March and continued for five applications at approximately 7-day intervals: 12 March, 19 March, 26 March, 2 April, and 9 April. Botrytis fruit rot (BFR) incidence was evaluated in the field on 10 April, 1 day after the final application. This was done by harvesting all ripe fruit from each plot and categorizing each fruit as diseased or sound. The data were subjected to analysis of variance (ANOVA), and Fisher's mean separation was calculated using ARM version 2024.3.

The season consisted of above average annual rainfall of 22.5 in. versus the 36-year average of 19.0 in. Rainfall during the trial (12 March to 10 April) was 2.9 in., with an average maximum air temperature of 66.7°F versus the 36-year average of 67.0°F. The trial was conducted under very conducive weather, with three timely rain events on 23 March, 28 March, and 4 April. Most BFR lesions were observed sporulating under the calyx. BFR incidence at-harvest in the nontreated control was extremely high at 38.1%, and 10 treatments statistically separated. Treatment "Broadspred, Acadian, and MixWell", commonly used for the control of two-spotted spider mites rather than BFR, had the highest BFR incidence at 55.2%. We speculate that the acidic solution damaged the cuticle of the fruit, leading to significantly higher BFR incidence than the nontreated control. No other phytotoxicity was observed in any treatment (Supplementary Table S1).

Keywords: Acadian, Broadspred, Captan, Captan Gold, Elevate, Fontelis, Kenja, Luna Sensation, Merivon, MilStop, Miravis Prime, MixWell, Ph-D, Regev, Scala Brand, Switch, Thiram, Topsin

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e-Xtra: Supplementary material is available online.

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Supplementary Table S1. Evaluation of fungicides, biologicals, and natural products for Botrytis fruit rot (BFR) management on strawberries.

Treatment (amount/acre)	Application sequence ^y	In-field BFR incidence (%)	
		10 April ^z	
Nontreated control	–	38.1	bcd
Miravis Prime 34.2 SC (13.4 fl. oz.)	ABCDE	6.7	i
Miravis Prime 34.2 SC (13.4 fl. oz.)	AE		
Switch 62.5 WG (14 oz.)	BD		
Merivon 42.4 SC (11 fl. oz.)	C	7.0	i
Elevate 50 WDG (1.5 lbs.)	A		
Kenja 400 SC (15.5 fl. oz.)	B		
Switch 62.5 WG (14 oz.)	CE		
Merivon 42.4 SC (11 fl. oz.)	D		
Captan 80 WDG (3 lbs.)	ACE		
Thiram 44 SC (2.5 qts.)	BD	9.3	hi
Thiram 44 SC (2.5 qts.)	ABCDE	15.4	ghi
Elevate 50 WDG (1.5 lbs.)	A		
Kenja 400 SC (15.5 fl. oz.)	B		
Switch 62.5 WG (14 oz.)	CE		
Merivon 42.4 SC (11 fl. oz.)	D	16.3	ghi
Switch 62.5 WG (14 oz.)	ABCDE	17.8	fgh
Kenja 400 SC (15.5 fl. oz.)	ABCDE	18.7	fgh
Captan Gold 80 WDG (3 lbs.)	ABCDE	21.4	fg
Captan 80 WDG (3 lbs.)	ABCDE	21.8	fg
Merivon 42.2 SC (11 fl. oz.)	ABCDE	27.1	ef
Elevate 50 WDG (1.5 lbs.)	ABCDE	34.3	de
Ph-D 11.3 WP (6.2 oz.)	ABCDE	34.4	cde
Scala Brand 54.6 SC (18 fl. oz.)	ABCDE	36.0	b–e
Fontelis 20.4 SC (24 fl. oz.)	ABCDE	36.7	b–e
MilStop 85 SP (5 lbs.)	ABCDE	41.6	bcd
Topsin 4.5 FL (20 fl. oz.)	ABCDE	42.9	bcd
Luna Sensation 42.8 SC (7.6 fl. oz.)	ABCDE	45.0	abc
Regev 60.9 EC (8.5 fl. oz.)	ABCDE	45.2	ab
Broadspred 99% (19.5 fl. oz.)	ABCDE		
MixWell 40% (18 fl. oz.)	ABCDE		
Acadian 5% (64 fl. oz.)	ABCDE	55.2	a
LSD		10.6	

^y Application timing sequence: A, 12 March; B, 19 March; C, 26 March; D, 2 April; E, 9 April.

^z Numbers within a column followed by the same letter are not significantly different ($\alpha = 0.05$) per Fisher's least significant difference (LSD) simultaneous comparison calculated using ARM version 2024.3 (Gylling Data Management, Brookings, SD, U.S.A.). Except for the nontreated control, treatments are in ascending order from least in-field BFR incidence.