











Evaluation of conventional, biological, and natural products for control of Botrytis fruit rot, early season 2025

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Planting date	31 October 2024
Number of rainfall events; total rain	5 rainfall events; 2.2 inches total rainfall
Backpack sprayer specs	8 hollow cone nozzles calibrated to deliver 150 gal at 60 psi
Application dates; (spray interval days)	10, 18, 28 Mar, 4, 10 Apr ; (8, 10, 7, 6)
Trial design	Randomized complete block; replicated 4 times; 60 plants/plot
Location	Cal Poly field 35b
Cultivar	Fronteras

									
Start	App A		App B		App C			App D	App E
9	10	12-14	17	18	26	28	30-31	2	4
March								April	
								10	11
								Harvest	

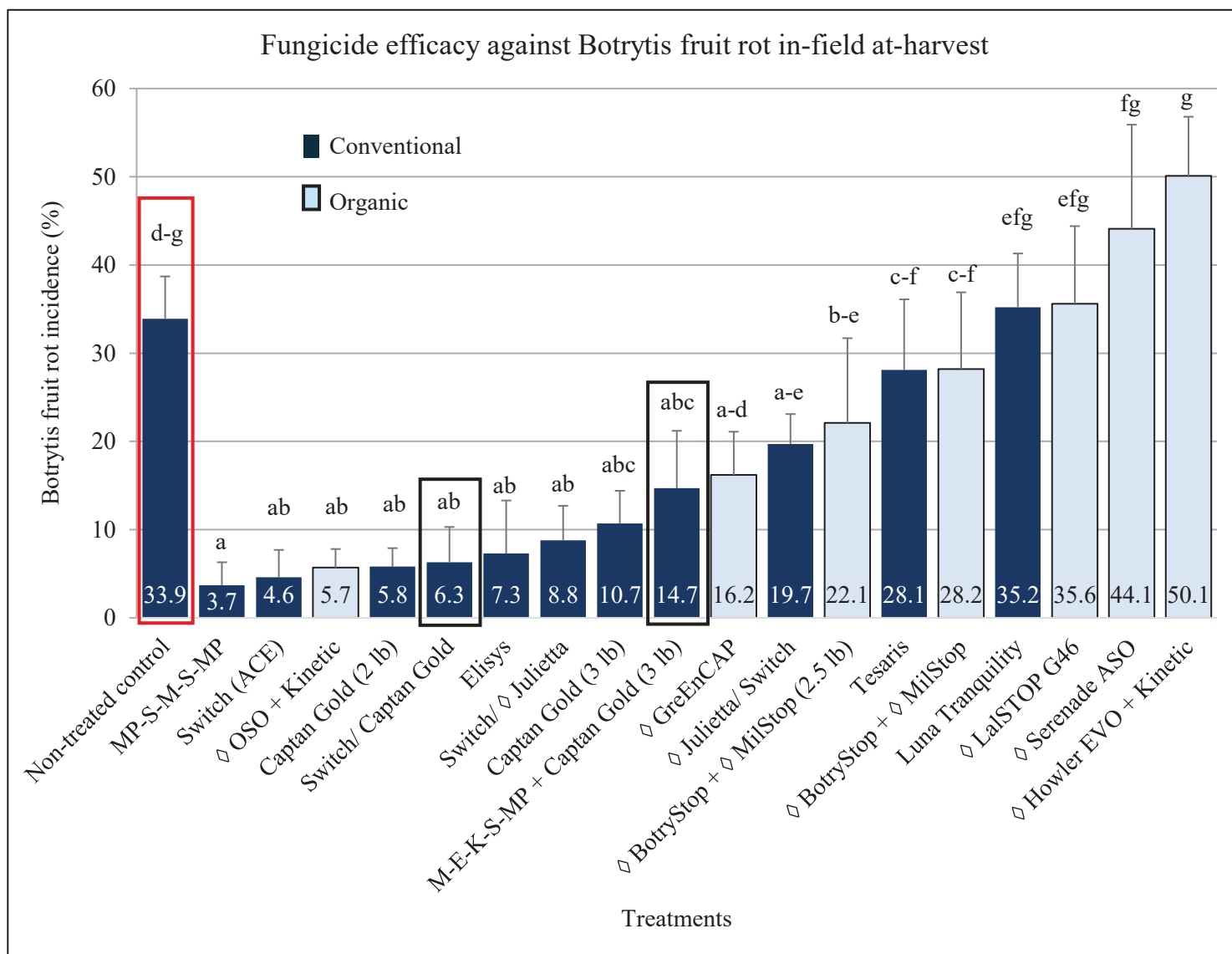


Figure 1. = Non-treated control, = Strawberry Center standards, / =Weekly rotation; + =Tank mix; MP=Miravis Prime S=Switch M=Merivon E=Elevate, K=Ken a ◇= biological or natural product. Kinetic was applied at 4 fl oz/A and all other products were applied at max label rate unless otherwise stated. Sorted by level of Botrytis fruit rot incidence. Data was subject to ANOVA and Fishers LSD mean separation. Error bars represent standard error of the mean. Means that do not share the same letter are significantly different ($\alpha=0.05$).



STRAWBERRY: FUNGICIDE EFFICACY - CONVENTIONAL

Fungicide ¹	Resistance risk (FRAC) ²	Gray mold	Powdery mildew	Anthrax - nose	Rhizopus/ Mucor rot	Phytophthora diseases ³	Common leaf spot	Angular leaf spot
Miravis Prime	medium (7/12)	5	5	3	NL (4)	NL	NL	NL
Merivon	medium (7/11)	5 ^R	5 ^R	ND	NL (4)	NL	0	NL
Kenja	high (7)	5	3	ND	NL (2)	NL	ND	NL
Pristine	medium (7/11)	5 ^R	4 ^R	ND	NL	NL	0	NL
Switch ⁵	medium (9/12)	5 ^R	2	4	4	NL	NL	NL
Cannonball ⁵	high (12)	5 ^R	NL	4	4	NL	NL	NL
Elevate	high (17)	5 ^{RR}	NL (0)	NL (0)	NL	NL	NL (0)	NL
Inspire Super	medium (3/9)	5 ^R	5	4	5	NL	ND	NL
Protocol	medium (1/3)	4 ^R	4 ^R	3	NL	NL	4	NL
Captevat ^{**}	medium (M4/17)	4 ^R	NL	4	NL	NL	NL	NL
Rovral, Iprodione, Nevado, etc. ⁷	high (2)	4 ^R	NL (0)	0	NL	NL	0	NL
Thiram	low (M3)	4	NL (0)	3	NL	NL	0	NL
Captan	low (M4)	4	NL (0)	NL (2)	NL (2)	NL	NL (0)	NL
PH-D, Oso	high (19)	3	4	3	NL	NL	NL	NL
Regev	medium (3/BM 01)	3	5	4	5	NL	ND	NL
Scala	high (9)	3	NL (2)	NL	NL	NL	NL	NL
Fontelis	high (7)	2 ^R	4 ^R	NL	NL	NL	NL	NL
Luna Sensation	medium (7/11)	1 ^R	5	3 ^R	2	NL	ND	NL
Luna Privilege ^{**} (foliar)/ Velum One (soil) ⁴	high (7)	1/NL	5/3	NL	ND	ND	ND	NL
Luna Tranquility	medium (7/9)	1	5	NL	1	NL	ND	NL
Tesaris	high (7)	1	ND	NL	NL	NL	NL	NL
Topsin-M, T-Methyl, Incognito, etc. ⁶	high (1)	1 ^{RR}	4	0	NL	NL	NL (3)	NL
Intuity	high (11)	1 ^{RR}	2 ^R	NL	NL	NL	NL (0)	NL
Quadris, Abound, Acadia LFC, Arius, etc.	high (11)	1 ^{RR}	3 ^R	4 ^R	NL (2)	NL	NL	NL
Evito [*]	high (11)	1 ^{RR}	3 ^R	2 ^R	NL	NL	NL	NL
Flint Extra	high (11)	1 ^{RR}	4 ^R	2 ^R	NL	NL	NL	NL
Cabrio	high (11)	1 ^{RR}	2 ^R	3 ^R	NL (2)	NL	0	NL
Quilt Xcel, Avaris 2XS, etc.	medium (3/11)	NL (3) ^R	5 ^R	0 ^R	NL (0)	NL	NL	NL
Quintec	high (13)	NL (3)	5 ^R	NL (4 ^R)	NL (0)	NL	NL (0)	NL
Quadris Top, Acadia ESQ ^{*,8} , etc.	medium (3/11)	NL (2) ^R	5 ^R	4 ^R	NL	NL	3	NL
Bumper, Tilt, etc.	high (3)	NL (0)	5 ^R	NL (3)	NL (0)	NL	4	NL
Mettle, Perissim, etc.	high (3)	NL	5 ^R	NL	NL	NL	ND	NL
Procure	high (3)	NL	5 ^R	NL (2)	NL	NL	NL (0)	NL
Rally	high (3)	NL (0)	5 ^R	NL (3)	NL	NL	4	NL
Rhyme ⁹	high (3)	NL (0)	5 ^R	NL	NL	NL	NL	NL
Torino	high (U6)	NL	5 ^R	NL	NL	NL	NL	NL
Gatten [*]	high (U13)	NL	5	NL	NL	NL	NL	NL
Sulfur	low (M2)	NL	4	NL	NL	NL	NL	NL
Cevya	high (3)	NL	3 ^R	NL	NL	NL	NL	NL
Zivion S ⁵	low (48)	NL (0)	NL	4	NL	NL	NL	NL
Fungi-Phite, K-Phite, ProPhyt, etc.	high (P07,33)	NL	0	0	NL	4	NL	NL (2)
Orondis Gold	high (4/49)	NL	NL	NL	NL	4	NL	NL
Aliette ^{3,9} , Legion ^{**}	high (P07,33)	NL	NL	NL	NL	4	NL	NL
Ridomil Gold SL, Ultra Flourish, etc. ⁹	high (4)	NL	NL	NL	NL	4	NL	NL
Copper, etc. ¹⁰	low (M1)	0	0	0	0	0	0	4 ¹⁰
Actigard	high (P01)	NL	NL	NL	NL	NL	NL	3

Rating: 5 = excellent and consistent, 4 = good and reliable, 3 = moderate and variable, 2 = limited and/or erratic, 1 = minimal and often ineffective, 0 = ineffective, NL = not on label, ND = no data. ^R=Resistance in this pathogen has been documented but performance is not fully compromised. ^{RR}=High level of resistance documented in this pathogen and performance is significantly compromised.

Footnotes continued on next page...



* Registration pending in California.

** Not registered, label withdrawn or inactive in California.

¹ To reduce the risk of resistance development, start fungicide treatment with a multi-site mode of action; rotate or mix fungicides with different mode of action FRAC numbers for subsequent applications, use labeled rates (preferably the upper range), and limit the total number of applications per season.⁹

² Code numbers are assigned by the Fungicide Resistance Action Committee (FRAC) according to different modes of actions (for more information, see <http://www.frac.info/>). To minimize resistance, make no more than one application of a fungicide with a “high” or “medium” resistance risk of the same FRAC code before rotating to a fungicide with a different FRAC code. Resistance risk determined based on single-site = high risk; premix = medium risk; multi-site = low risk.

³ Efficacy rating for soil applied control of Phytophthora crown rot and leather rot of fruit.

⁴ Velum One is a fluopyram formulation for chemigation. Soil applications are designed for nematode management but may also suppress powdery mildew.

⁵ Apply as a transplant dip after digging/harvesting and prior to cold storage (nursery use) or prior to planting (field use).

⁶ Generic products may not be all listed and “etc.” indicates that other products may be available that have the same active ingredient.

⁷ Apply as preplant dip or foliar spray; do not apply after first fruiting flower.

⁸ Not for use in nurseries, on nursery transplants, or greenhouses (check label for details).

⁹ Foliar applications provide systemic treatment.

¹⁰ Apply at low rates since phytotoxicity (reddening of older leaves, slow growth and yield reduction) has been documented with repeated sprays.

STRAWBERRY - FUNGICIDE EFFICACY - BIOCONTROLS AND NATURAL PRODUCTS

Fungicide trade names	Active ingredient	Resistance risk (FRAC) ¹	Gray mold	Powdery mildew	Anthrac - nose	Rhizopus/ Mucor rot	Phytophthora diseases ²	Common leaf spot	Angular leaf spot
Oso	Polyoxin D zinc salt	medium (19)	3	4	3	NL	NL	ND	NL
Microthiol Disperss, etc. ³	sulfur	low/ (M2)	NL	4	NL	NL	NL	NL	NL
All Phase	<i>potassium sorbate; sodium lauryl sulfate</i>	low (NC)	ND	4	ND	NL	NL	ND	ND
Serenade ASO, etc. ³	<i>Bacillus subtilis</i> QST 713	low (BM 02)	0	3	0	NL (0)	NL (0)	NL (0)	NL
Sonata	<i>Bacillus pumilis</i> QST 2808	low (BM 02)	NL (0)	3	0	NL	NL	NL	NL
Timorex Act	tea tree oil	low (BM 01)	0	3	ND	0	ND	NL	ND
ProBlad Verde, Fracture ³	<i>Banda de Lupinus albus</i> doce	low/(NC)	0	3	ND	ND	NL	ND	NL
Aviv, BACIX, etc.	<i>Bacillus subtilis</i> IAB/BS03	low (BM 02)	0	3	ND	NL	ND	ND	NL
Kaligreen, MilStop, etc.	potassium bicarbonate	low (/NC)	0	3	NL	NL	NL	NL	NL
M-Pede, Des-X, etc. ³	potassium salts of fatty acids	medium (28)	NL	2	NL	NL	NL	NL	NL
Double Nickel	<i>Bacillus amylo-liquefaciens</i> D747	low (BM 02)	0	2	0	NL	0	NL	1
Actinovate	<i>Streptomyces lydicus</i> WYEC 108	low (BM 02)	0	2	NL	NL	0	NL	1
Serifel	<i>Bacillus amylo-liquefaciens</i> MBI 600	low (BM 02)	0	2	0	NL	0	ND	2
Taegro	<i>Bacillus amylo-liquefaciens</i> FZB24	low (BM 02)	0	2	0	NL	ND	NL	NL (2)
Theia	<i>Bacillus subtilis</i> AFS032321	low (BM 02)	0	2	0	NL	0	NL	ND
Regalia	<i>Reynoutria sachalinensis</i> extract	low (P5)	0	2	ND	NL	ND	NL	NL

Table continued on next page...



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Stargus	<i>Bacillus amylo-liquefaciens</i> F727	low (BM 02)	0	1	ND	NL	NL (1)	NL (1)	NL (1)
Copper, etc. ⁴	Copper	low (M 01)	0	0	0	0	0	0	4 ⁵
Cinnerate	cinnamon oil	low (BM 01)	0	ND	NL	ND	NL	NL	NL
Lalstop G46	<i>Clonostachys rosea</i> J1446	low (BM 02)	0	0	NL	NL	ND	ND	ND
Oxidate, Jet-Ag, etc.	Hydrogen peroxide; peroxyacetic acid	low (NC)	0	0	NL	NL	NL	NL	2
Julietta	<i>Saccharomyces cerevisiae</i> LAS02	low (BM 02)	0	NL	NL	NL	NL	NL	NL
Procidic, etc.	citric acid	low (NC)	0	NL	NL	NL	0	NL	NL
Rango	cold pressed neem oil	low (NC)	2	ND	ND	NL	0	0	NL
BotryStop	<i>Ulocladium oudemansii</i> U3	low (BM 02)	0	NL	NL	NL	NL	NL	NL
Botector	<i>Aureobasidium pullulans</i> DSM 14940; DSM 14941	low (BM 02)	0	NL	ND	NL (1)	NL	NL	NL
Howler	<i>Pseudomonas chlororaphis</i> AFS009	low (BM 02)	0	NL (2)	NL	NL	ND	ND	0
Veg'Lys	garlic oil	Unknown/ (NC)	0	NL	0	NL	0	0	ND

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