Evaluation of fungicides for strawberry powdery mildew management under greenhouse conditions

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The trial was conducted in a greenhouse at the Cal Poly Crops Unit in San Luis Obispo, CA. Bareroot 'Monterey' transplants were planted outdoors on raised nursery benches on 20 Mar 2025 in plastic nursery 1 gal trade pots containing a soilless mixture called CB 1294 (Sun Gro Horticulture, Nipomo, CA). Plants were inoculated on 21 Apr (31 days after planting) by moving them from the outdoor nursery benches and placing them in the greenhouse where powdery mildew-infected strawberry plants were present with high levels of sporulation. No symptoms of the disease were detected on plants on the day they were transferred to the greenhouse. Treatments were replicated four times with each replicate consisting of 4 plants (1 plant/pot), arranged in a randomized complete block design. Two standards were included in the trial: Luna Sensation (conventional standard) and Microthiol Disperss (organic standard). One water-treated control was also included. Disease severity was based on the percent of the upper and lower leaf surfaces covered by visible mycelial growth of each fully emerged trifoliate leaf. Disease incidence was assessed as the percent of trifoliate leaves with at least one powdery mildew lesion. The disease index was calculated by multiplying disease incidence by disease severity for each replicate. Stolons (runners), and flowers were removed from plants once per week.

The first visual symptoms of infection were detected on 26 Apr, 5 days after planting transplants in the greenhouse. There were no significant differences among treatments for powdery mildew incidence or severity before the first fungicide application (data not shown). Powdery mildew incidence and severity on 21 May (30 days after inoculation) offered the most treatment separation. Overall, powdery mildew pressure was high as demonstrated by the non-treated water control (Table 1). Typically, the powdery mildew efficacy trials conducted at the Cal Poly Strawberry Center receive 5 weekly fungicide applications. Due to a mechanical failure of automated irrigation, all treatments in this trial received only 3 fungicide applications. Despite the early conclusion of the experiment, significant differences among treatments were still observed at the conclusion of this trial.

Table 1. Treatments sorted in ascending order by powdery mildew disease index.

			Powdery mildew (%) on 21 May	
Treatment (amount/A)	**Application sequence** [z]	**Disease index** [w]	**Severity**	**Incidence** [x]
Non-treated water control (100 gal)	ABC	2.16 ab	4.39 a	49.49 a
Luna Sensation (7.6 fl oz)	ABC	0.13 g	1.15 f	9.69 g
Luna Sensation (7.6 fl oz)	AC	0.16 g	1.25 ef	13.19 fg
Regev (8.5 fl oz)	B			
Luna Sensation (7.6 fl oz)	AC	0.39 fg	1.76 def	19.12 efg
Timorex Act (21 fl oz) *	B			
Merivon (7 fl oz)	ABC	0.40 fg	1.79 def	19.64 efg
Flint Extra (3 oz)	ABC	0.85 efg	2.74 bcd	28.36 de
Miravis Prime (13.4 fl oz)	ABC	0.88 efg	2.50 cde	26.26 def
Microthiol Disperss (5 lb) *	ABC	1.14 def	2.85 bcd	39.74 bcd
OR-dSl-120 (4.9 L) *	ABC	1.25 cde	3.45 abc	34.89 cd
Amara (2 qt) *	ABC	1.28 cde	3.41 abc	37.09 bcd
Cevya (5 fl oz)	ABC	1.36 b-e	3.39 abc	36.70 bcd
Serenade ASO (4 qt) *	ABC	1.95 a-d	3.99 ab	44.88 abc
LalSTOP G46 (1.8 oz) *	ABC	2.04 abc	4.41 a	45.26 abc
LalStim OSMO (4.3 oz) *	ABC			
Zorda (2.5 lb) *	ABC	2.41 a	4.16 a	57.30 a
EXP2501 (40 fl oz) *	ABC	2.42 a	4.58 a	51.14 ab
Crop4Life (3 fl oz) *	ABC	2.66 a	4.60 a	49.49 ab
LSD $P = 0.05$		0.84	1.31	14.46

[z] Application sequence: A=30 Apr, B=8 May, C=16 May.
[w] Disease index calculated by multiplying disease incidence by disease severity for each plot.
[x] Cultivars that do not share a letter are significantly different according to Fisher's LSD mean separation test (α=0.05) calculated using ARM version 2024.2 (Gylling Data Management, Brookings, SD).
*Indicates bactericides, plant extracts, or natural products.

Evaluation of strawberry host plant resistance to powdery mildew in 21 genotypes under greenhouse conditions

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The trial was conducted in a greenhouse at the Cal Poly Crops Unit in San Luis Obispo, CA. Bareroot transplants were planted directly in a greenhouse on 10 Dec 2024 where powdery mildew-infected strawberry plants were present with high levels of sporulation. Transplants were planted in 1-gal plastic nursery pots containing a soilless potting mix with 10 g of Osmocote Plus added to the surface of each pot 28 days after planting (7 Jan). Treatments were replicated four times with each replicate consisting of 3 plants (1 plant/pot), arranged in a randomized complete block design. Disease severity was based on the percent of the upper and lower leaf surfaces covered by visible mycelial growth of each fully emerged trifoliate leaf. Disease incidence was assessed as the percent of trifoliate leaves with at least one powdery mildew lesion. The disease index was calculated by multiplying disease incidence and disease severity for each replicate. Stolons (runners), and flowers were removed from plants once per week.

The first visual symptoms of infection were detected on 24 Dec, 14 days after planting transplants in the greenhouse. Overall, powdery mildew pressure was high, reaching 79.6% incidence and 23.2% severity in 'Golden Gate, the most suspectable cultivar in the trial (Table 1). '088W02' was the most resistant cultivar in the trial with 5.0% disease incidence and 0.3% disease severity. These results show the dramatic difference in susceptibility to powdery mildew among strawberry genotypes.

Table 1. Cultivars sorted in ascending order by powdery mildew disease index.

			Powdery mildew (%) on 23 Jan [y]	
Cultivar	**Breeding program**	**Disease index [z]**	**Severity**	**Incidence [x]**
088W02	Good Farms	0.03 f	0.3 g	5.0 g
24-414R	Planasa	0.11 f	0.6 g	8.3 g
24-410R	Planasa	0.28 ef	1.2 fg	14.9 fg
24-407R	Planasa	0.51 ef	1.6 fg	23.9 efg
HW026.029	Driscoll's	0.69 ef	1.8 efg	27.3 d-g
PE-16.4092.013	Plant Sciences, Inc.	0.74 ef	2.8 efg	25.6 d-g
SB_13_164-030	Plant Sciences, Inc.	0.75 ef	2.5 efg	27.8 d-g
24-415R	Planasa	0.81 ef	2.4 efg	26.5 d-g
PEP-15.1890.010	Plant Sciences, Inc.	1.37 def	3.4 d-g	36.3 c-f
Angelina	Driscoll's	1.95 c-f	4.7 c-g	40.5 cde
152X15	Good Farms	3.26 c-f	6.3 c-f	58.3 abc
152X18	Good Farms	3.62 c-f	5.4 c-g	47.4 b-e
PS-13.467.089	Plant Sciences, Inc.	4.13 c-f	6.6 b-f	46.0 b-e
Monterey	University of California, Davis	4.51 c-f	7.4 b-e	47.6 bcd
24-413R	Planasa	4.56 c-f	6.6 b-f	38.0 c-f
122X08	Good Farms	4.87 c-f	7.2 b-f	44.7 b-e
UCD_Royal Royce	University of California, Davis	5.21 cde	8.8 bcd	55.8 bc
060z12	Good Farms	6.27 bcd	9.4 bc	58.6 abc
SB_14_028-025	Plant Sciences, Inc.	6.55 bc	7.5 b-e	54.8 bc
Cuyama	Driscoll's	8.26 bc	11.9 b	67.9 ab
UCD_Golden Gate	University of California, Davis	18.71 a	23.2 a	79.6 a
LSD $P = 0.05$		5.08	5.6	23.7

[y] This disease assessment was made 44 days after planting.
[z] Disease index calculated by multiplying disease incidence by disease severity for each plot.
[x] Cultivars that do not share a letter are significantly different according to Fisher's LSD mean separation test (α=0.05) calculated using ARM version 2024.2 (Gylling Data Management, Brookings, SD).