

Evaluation of fungicides for strawberry powdery mildew management under greenhouse conditions, summer 2021.

The experiment was conducted in a greenhouse at the Cal Poly Crops unit in San Luis Obispo, CA. Bareroot 'Monterey' transplants were planted in a plastic-covered high tunnel on 14 Jun 2021 in 1 gal trade pots (Greenhouse Megastore, Sacramento, CA) containing a soilless mixture called CB 1294 (Sun Gro Horticulture, Nipomo, CA), with 10 g of Osmocote Plus (Scotts, Marysville, OH) added to the surface of each pot 2 wk after planting (28 Jun). Treatments were replicated four times with each replicate consisting of 4 plants (1 plant/pot) in a 3 ft × 3 ft area, arranged in a randomized complete block design on greenhouse benches. Plants were irrigated automatically for 2 min, 4 times per day using an arrow dripper (1 L/hr) (Netafim USA, Fresno, CA). The greenhouse temperature control system was set to heat at 45°F and cool at 75°F. Plants were inoculated on 29 Jun (2 weeks after planting) by moving them from the plastic tunnel 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 of transfer to the greenhouse. Fungicide applications were made at weekly intervals starting on 8 Jul and ending on 4 Aug for a total of 5 applications. Weekly leaf counts, disease incidence, and severity evaluations were made one day prior to each fungicide application and two weeks after the final application, except for the first evaluation and fungicide application which was made on the same day (7 Jul to 18 Aug). Disease severity was based on the percent of the upper and lower leaf surfaces colonized 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. Treatments were applied using a compressed CO₂ handheld backpack sprayer at 35 psi with a single flat fan nozzle (DG8002VS yellow) (TeeJet Technologies, Clovis, CA) angled down at 90-degrees and calibrated to deliver 100 gal/A. No yield data was collected due to very low fruit production during the trial. Stolons (runners), and fully ripe fruit were removed from plants once per week. Data were subjected to analysis of variance (ANOVA) and Fisher's LSD mean separation was calculated using ARM version 2021.2.

Disease in the non-treated plants developed very rapidly and visual symptoms were detected as very faint mycelium just starting to develop 8 days after exposing plants to the disease in the greenhouse. The first fungicide application was made on the day first visual symptoms were observed. Disease in non-treated plants developed very rapidly with 45.6% incidence on 14 Jul, 2 weeks after inoculation. The grower standard for conventional treatments was Luna Sensation and the organic standard was Microthiol Disperss. Based on the disease evaluation made 1 week after the final application (11 Aug), all treatments separated statistically from the non-treated control for disease incidence and disease severity. There were no significant differences among treatments with regards to the number of leaves per plant, disease incidence, and disease severity prior to the first application (data not shown). There were no significant differences among leaves per plant at any evaluation date except for the evaluation on 27 Jul. The non-treated control had significantly more leaves than all other treatments apart from Microthiol Disperss (data not shown). Phytotoxicity was observed in the All Phase treatment where necrotic spots developed on the upper side of leaves.

Powdery mildew (%)

Treatment (amount/A)	Application sequence ^z	11 Aug ^y				AUDPC ^w			
		Incidence ^x		Severity		Incidence		Severity	
Non-treated	-----	95.4	a	32.4	a	3148.3	a	878.7	a
<i>CONVENTIONAL</i>									
Luna Sensation SC (7.6 fl oz)	ABCDE	0.0	d	0.0	d	49.1	e	2.5	d
Esendo WP (2.8 lb)	ABCDE	15.5	d	1.0	d	562.3	d	48.9	d
<i>BIOLOGICALS</i>									
All Phase WP+WG (5 lb)	ABCDE								
Hi Wett (2.5 pt)	ABCDE	0.8	d	0.0	d	45.1	e	2.3	d
Microthiol Disperss WP (5 lb)	ABCDE	34.0	c	2.8	cd	1080.4	c	86.9	d
Howler WP (5 lb)	ABCDE	52.4	b	7.1	bc	1698.2	b	198.8	c
Theia WP (3 lb)	ABCDE	56.8	b	8.8	b	1997.9	b	310.2	b
F13 SC (1.3 qt)	ABCDE	66.8	b	10.5	b	1735.8	b	215.7	bc
LSD		18.3		4.4		457.9		103.9	

^z Application Timings: A=7 Jul, B=14 Jul, C=21 Jul, D=28 Jul, E=4 Aug.

^y This disease assessment was made 7 days after the final application.

^x Treatments that do not share a letter are significantly different according to Fisher's LSD mean separation test ($\alpha=0.05$) calculated using ARM version 2021.2 (Gylling Data Management, Brookings, SD).

^w Area Under the Disease Progress Curve was calculated for disease incidence at 7 weekly ratings using ARM version 2021.2.