

COMMON MALLOW (*Malva sylvestris* ‘Zebrina’)
Hollyhock rust; *Puccinia malvacearum*

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Evaluation of fungicides for control of *Puccinia malvacearum* on common mallow, 2023.

This trial was conducted in a growth chamber located at Michigan State University in East Lansing, MI. Seeds of *Malva sylvestris* ‘Zebrina’ were sown into SureMix soilless medium (Michigan Grower Products, Inc., Galesburg, MI) 14 Nov 2022 and grown in a growth chamber with a 16-hour light and 8-hour dark period at 20C. Seedlings were transplanted into 6-in pots containing SureMix soilless medium on 16 Dec 22 and were grown in the same growth chamber until inoculation. Inoculation with *Puccinia malvacearum* began 6 Feb 2023. A 15-ml falcon tube was filled with distilled water and placed into the soilless medium near each plant’s base. A stem and leaf from a previously rust-infected hollyhock plant was inserted through a hole on the top of the tube and into the water, stem-first. Each plant was placed inside a plastic bag, tied off, and placed in a growth chamber set with a 16-hour light and 8-hour dark period at 20C and 50% relative humidity. Four replicates for each of the five treatments were arranged close together in a completely randomized design within the growth chamber. Bags were removed on 22 Feb 2023. Two additional infected mallow plants were placed among the plants in the trial to try and maintain inoculum. The foliage and pots were drenched twice daily with water. Initial measurements of rust pustule count and disease severity (%) were taken prior to the first application of fungicides on 22 Feb 2023. Fungicide treatments then occurred at 14-day intervals, with subsequent applications on 8 Mar 2023 and 22 Mar 2023. Rust pustule counts, disease severity (%) and phytotoxicity ratings (0-5) were taken before fungicide application on 8 Mar 2023 and 22 Mar 2023, and a final rating of pustule count, disease severity, and phytotoxicity was performed 5 Apr 2023. Disease severity was visually assessed on a scale from 0-100%, where 0% = healthy plant, no pustules on the foliage and 100% = foliage and stems completely covered in pustules or plant death. Fungicides were applied using a Solo 148 hand pressurized sprayer (Solo Inc. Newport News, VA) until run-off. Data were analyzed using analysis of variance (ANOVA) followed by mean separation with Fisher’s LSD t-test in R (v.4.1.2).

Phytotoxicity was not observed in any fungicide treatment. Disease severity in the untreated control ranged from 67.5% (8 Mar) to 68.75% (5 Apr). On 8 Mar, Encartis SC and Eagle 20EW did not differ significantly in disease severity than the untreated control while Pillar SC and Avelyo SC were effective. On 22 Mar and 5 Apr, all treatments had a lower disease severity than the untreated control with the exception of Encartis SC. On 8 Mar, only Avelyo differed in the average number of rust pustules compared to the untreated control. On 22 Mar and 5 Apr, all treatments had significantly fewer pustules compared to the untreated control; Pillar SC and Avelyo SC were more effective than Encartis SC. Overall, fungicides were identified that are effective to control hollyhock rust.

Treatment and rate/100 gal, applied at 14-day intervals	Disease Severity (%)**		
	8 Mar	22 Mar	5 Apr
Untreated control	67.50 a*	75.00 a	68.75 a
Encartis SC 22 fl oz	52.50 ab	52.50 ab	48.25 a
Eagle 20EW 8 fl oz	31.25 ab	18.75 bc	7.75 b
Pillar SC 12 fl oz	18.75 b	4.25 c	12.75 b
Avelyo SC 5 fl oz	17.75 b	2.75 c	2.00 b
<i>P-value</i>	<0.001	<0.001	0.0002

**Based on visual estimation of foliage covered in pustules, on a scale from 0 - 100%.

*Column means with a letter in common are not statistically different (LSD t-test; $P=0.05$).

Treatment and rate/100 gal, applied at 14-day intervals	Avg. # of rust pustules per plant		
	8 Mar	22 Mar	5 Apr
Untreated control	753.00 a*	911.50 a	760.75 a
Encartis SC 22 fl oz	720.75 a	446.75 b	309.75 b
Eagle 20EW 8 fl oz	471.75 ab	125.25 bc	59.75 bc
Pillar SC 12 fl oz	310.75 ab	24.75 c	17.25 c
Avelyo SC 5 fl oz	259.25 b	19.00 c	12.00 c
<i>P-value</i>	0.0004	<0.0001	<0.0001

*Column means with a letter in common are not statistically different (LSD t-test; $P=0.05$).