

EVALUATION OF FUNGICIDES FOR THE CONTROL OF BLACK LEAF SPOT AND CERCOSPORA LEAF SPOT OF ROSE

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ABSTRACT

Black leaf spot, caused by the pathogen *Diplocarpon rosae* and Cercospora leaf spot, caused by *Cercospora rosicola*, are destructive fungal diseases of rose plants and leading cause of defoliation in susceptible rose cultivars. Fungicide application has proven to be effective for control of both diseases. A fungicide efficacy trial was conducted in a shade house with rose 'Miniature' plants with black leaf spot and Cercospora leaf spot developed from natural inoculum. Broadform 4 fl oz/100 gal, Mural and KleenGrow were sprayed at 14-day interval while Broadform 3 fl oz/100 gal was applied as a drench at 28-day interval. Disease severity, defoliation, phytotoxicity, area under disease progress curve and plant height were assessed. Both black leaf spot (19.0% mean disease severity) and Cercospora leaf spot (5% mean disease severity) disease pressure was low for non-treated control plants. There were no significant differences in the mean disease severity and progress in any of the treated versus non-treated control plants. Defoliation was low (<15%), with plants treated with the drench application of Broadform (3 fl oz) and the non-treated control plants experiencing the highest degree of defoliation at 12.0% and 9.0%, respectively. Treated and non-treated control plants were similar in plant height increase. Phytotoxicity was not observed in any of the treated rose plants. Application of these identified fungicides can be included in rotation for integrated management of black leaf spot and Cercospora leaf spot.

INTRODUCTION

Black leaf spot, caused by *Diplocarpon rosae* and Cercospora leaf spot, caused by *Cercospora rosicola*, are both primary fungal diseases of rose. Black leaf spot shows symptoms of leaf spotting and rapid defoliation and disease development is favored by high humidity and wet foliage (Fig. 1). Susceptible cultivars also show decreased quality and quantity of blooms. Cercospora leaf spot causes small spots (resembling black leaf spots) that enlarge and coalesce into irregularly-shaped purple to reddish brown areas (Fig. 2). Fungicides can be an effective control for both diseases.

MATERIALS AND METHODS

- ❑ Six single-plant replications of rose 'Miniature' plants per treatment were arranged in a completely randomized design in a shade house under 56% shade.
- ❑ Three treatments (**Broadform 4 fl oz/100 gal, Mural 6 oz/100 gal and KleenGrow 0.25 fl oz/gal**) were applied to run-off using a backpack CO₂-pressurized sprayer on a 14-day interval and one treatment (**Broadform 3 fl oz/100 gal**) was applied via drench (13.5 fl oz/plant) on a 28-day interval.
- ❑ Severity of **black leaf spot, Cercospora leaf spot, defoliation and phytotoxicity** were determined using a scale of 0-100% foliage area affected; increase in **plant height** was observed.
- ❑ The area under the disease progress curve (**AUDPC**) was calculated:
$$AUDPC = \sum[(x_i + x_{i-1})/2](t_i - t_{i-1})$$
where x_i is the rating at each evaluation time and $(t_i - t_{i-1})$ is the number of days between evaluations.
- ❑ **One-way analysis of variance** was performed using the general linear model's procedure with SAS v. 9.4 statistical software and means were separated using Fisher's LSD test.

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RESULTS AND CONCLUSION

Table 1. Efficacy of treatments for the management of black leaf spot and Cercospora leaf spot of rose

Treatment and rate/100 gal	Application dates*	Black Leaf Spot		Cercospora Leaf Spot		Defoliation (%)	Height increase (in.)
		% Mean severity	AUDPC	% Mean severity	AUDPC		
Broadform 3 fl oz	1, 3	20.0 a**	282.8 a	4.9 a	101.9 a	12.0 a	0.6 a
Broadform 4 fl oz	1, 2, 3	12.0 a	247.1 a	2.9 a	50.8 a	3.4 c	0.8 a
Mural 45WG 6 oz	1, 2, 3	10.0 a	152.6 a	3.7 a	32.6 a	3.2 c	1.7 a
KleenGrow 0.25 fl oz per gal	1, 2, 3	12.0 a	225.8 a	1.9 a	21.4 a	6.2 bc	1.3 a
Non-treated control	-	19.0 a	331.1 a	5.0 a	92.1 a	9.0 ab	0.4 a
P-value	-	0.1	0.08	0.4	0.2	0.01	0.4

* Application dates: 1=25 May; 2= 8 Jun; 3= 22 Jun

** Values are the means of six replications; treatments followed by the same letter within a column are not significantly different at $P \leq 0.05$.

- ❑ Black leaf spot and Cercospora leaf spot both developed from natural inoculum.
- ❑ Both black leaf spot (19.0% mean disease severity) and Cercospora leaf spot (5% mean disease severity) disease pressure was low for non-treated control plants.
- ❑ There were no significant differences in the mean disease severity and AUDPC of black leaf spot and Cercospora leaf spot in any of the treated versus non-treated control plants.
- ❑ Defoliation was low, with plants treated with the drench application of Broadform (3 fl oz) and the non-treated control plants experiencing the highest degree of defoliation at 12.0% and 9.0%, respectively.
- ❑ Treated and non-treated control plants were similar in plant height increase.
- ❑ Phytotoxicity was not observed in any of the treated rose plants.
- ❑ Application of these fungicides can be included in rotation for integrated management of black leaf spot and Cercospora leaf spot.



Figure 1. Black leaf spot



Figure 2. Cercospora leaf spot