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Response of Selected Old Garden Roses to Seven Isolates of *Marssonina rosae* in Mississippi[1]

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Abstract

Seven isolates of *Marssonina rosae* (imperfect stage of *Diplocarpon rosae*) elicited different blackspot disease expression among 39 Old Garden Roses in laboratory tests. 'Felicite Parmentier' (Alba), 'Mme. Hardy' (Damask), 'The Bishop' (Centifolia) and 'Rosa Mundi' (Gallica) showed no symptoms. 'Cardinal de Richelieu' (Gallica), 'Hermosa' (China) and 'Leda' (Damask) were the most susceptible showing a cultivar ratings mean of 2.86 or more. The Wayne variant was the least virulent, causing susceptible reactions on only 46.1% of the roses. The Hinds variant was the most virulent and caused symptoms of 89.7% of the rose plants tested. The remaining five variants caused disease on 69.1% to 79.5% of the plants.

Index words: Blackspot, *Marssonina rosae*, old garden roses

Significance to the Nursery Industry

Old Garden Roses (Heritage Roses) have gained popularity among rose fanciers in recent years, resulting in more producers of a greater number of varieties. This research on the reactions of 39 heritage roses to seven isolates of rose blackspot [*Marssonina rosae* (Lib.) Lind], in a state with high rainfall and humidity, may assist producers in the cultivars offered to states with similar weather conditions. It may also help rose fanciers to more efficiently select those varieties that have an apparent higher resistance to blackspot.

Introduction

Blackspot, caused by *Marssonina rosae* (Lib.) Lind (imperfect stage of *Diplocarpon rosae* Wolf), is generally regarded as the most important fungus disease of roses worldwide. Differential pathogenicity of isolates and susceptibility of rose selections has been firmly established (2, 3, 8, 10).

Blackspot is particularly destructive in Mississippi because of the large number of fungus variants (Spencer, data not shown) and highly favorable weather during the growing season. A modern rose cultivar may show resistance to blackspot in one location in the state (Personal observation) but be highly susceptible at another due to fungus variant and local weather conditions.

Old Garden Roses received a great deal of interest and recognition in the garden or landscape during the 1980's (1, 4, 5, 6, 11, 13) with Old Garden Rose Seminars held at several locations in the United States. Some Alba roses were reported to show blackspot resistance whereas Gallica was reportedly susceptible (4).

There is limited commercial production of Old Garden Roses in Mississippi and a planting of Old Roses was made in an Arboretum within the state by Rosarians. Because of the widespread interest in this group of roses, research was initiated with the encouragement of University patrons. Objectives of this research were to: 1) determine the response of selected Old Garden Roses to seven variants of *M. rosae* occurring in Mississippi, and 2) provide such information to rose fanciers for possible use in selecting for landscape plantings, and 3) assist producers in selecting cultivars with blackspot spot resistance.

Materials and Methods

Isolation and growth. Fungal isolates were obtained from infected leaflets from seven Mississippi counties (Marion, Oktibbeha, Chickasaw, Hinds, Wayne, Sharkey and Quitman) that represented spatially dispersed geographical rose growing areas. Diseased leaflets were washed in running water for 5 min, submerged in 75% ethyl alcohol (ETOH) for 3 min and then in 1% sodium hypochlorite for 3 min. Pieces of diseased leaflets were placed on yeast-malt extract agar (YMEA). The YMEA medium contained thiamine, inositol, pyridoxine and biotin (12) and minor elements iron, manganese and zinc (7). The agar plates were maintained at room temperature [26°C (79°F)] and usually produced pure cultures of *M. rosae*.

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Inoculum. Fungus growth from plated tissue was blended in sterile water in a micro-blender. Bits of mycelium and spore suspension aliquots [1.5 ml (0.051 oz.)] were transferred to YMEA in culture plates and the plates were rotated so inoculum would spread over the agar surface. Conidia of 7-day-old cultures were scraped from the agar and blended in water for 30 sec in a micro-blender. The suspension was diluted to 2.5×10^4 conidia/ml (7.4×10^6 conidia/oz.) in sufficient water to inoculate the individual test. Cultures were recycled through susceptible plants every 2–3 months to maintain virulence and diseased leaflets of individual isolates were frozen for preservation.

Pathogenicity tests. Each test was replicated twice. Each test was made on 39 rose cultivars that included Alba, Bourbon, Centifolia, China, Damask, Gallica, Hybrid Perpetual, Moss and Portland classes. All rose cultivars were arranged randomly on the bench for each test. Leaflets were placed on sterile, moistened (2% sucrose), cotton discs (9 cm, absorbent) in culture plates (3, 10). Leaflets were sprayed until wet, under a transfer hood, with minute droplets of spore suspension from a model 15 DeVilbiss atomizer. Five non-inoculated control leaflets in a single culture plate were sprayed with sterile water. Leaflets in plates were incubated on a laboratory bench at room temperature [22–24°C (72–75°F)]. The light source was 40 watt Gro-lux lamps 62.5 cm (25 in.) above the plate surface. Lights were on 8 hr and off 16 hr per day. Symptoms were read 16 days post-inoculation. Ratings and percents were: 0 = no blackspot symptoms, 1 = 1–10%, 2 = 11–25%, 3 = 26–40%, 4 = over 40% of the leaflet surface covered with blackspot symptoms. Symptoms for an individual rose cultivar were

Table 1. Ratings on the effect of seven isolates of *Marssonina rosae* on old garden roses.

Common name	Class[y]	Isolate[z] MAR	OKT	CHI	HIN	WAY	SHA	QUI	Cultivar ratings[x] means
Felicite Parmentier	A	0[w]	0	0	0	0	0	0	0.00
Mme. Hardy	D	0	0	0	0	0	0	0	0.00
The Bishop	C	0	0	0	0	0	0	0	0.00
Rosa Mundi	G	0	0	0	0	0	0	0	0.00
Comtesse du Cayla	CH	0	0	0	1	0	0	0	0.14
Old Blush	CH	0	1	0	3	0	0	1	0.71
York and Lancaster	D	0	1	1	2	0	0	2	0.86
Rose de Meaux	C	1	1	0	2	0	2	0	0.86
Boule de Neige	B	0	1	3	1	0	0	1	0.86
Charles de Mills	G	0	1	0	3	0	1	1	0.86
Belle de Crecy	G	0	0	2	4	1	0	0	1.00
Baron Girod de l'Ain	HP	1	0	0	3	0	2	1	1.00
Mme. Isaac Periere	B	1	0	0	4	0	2	2	1.29
Paul Neyron	HP	1	1	1	4	1	1	1	1.43
Tuscany	G	2	2	2	2	0	0	2	1.43
Ispahan	D	1	0	2	2	2	2	2	1.57
Belle Isis	G	2	3	0	3	0	3	0	1.57
Gloire des Mousseuses	M	1	0	2	4	1	1	2	1.57
Tour de Malakoff	C	2	3	0	1	0	4	1	1.57
Kazanlik	D	2	1	2	4	0	2	1	1.71
General Kleber	M	2	2	2	2	0	2	2	1.71
Baronne Prevost	HP	2	1	1	4	1	1	3	1.86
Fantin Latour	C	2	2	2	4	0	1	2	1.86
William Lobb	M	3	1	2	3	0	1	3	1.86
Comtesse du Murinais	M	0	2	2	3	0	4	3	2.00
Rose de Rescht	D	3	1	1	4	1	1	3	2.00
Konigen von Danemark	A	2	2	2	2	2	2	2	2.00
General Jacqueminot	HP	3	2	2	3	0	1	3	2.00
La Reine Victoria	B	3	1	3	4	1	1	2	2.14
Juno	C	2	2	1	4	2	2	3	2.29
Alfred de Dalmas	M	3	2	2	4	1	2	3	2.43
Reine de Violettes	HP	2	2	2	4	2	3	2	2.43
Crested Moss	M	2	3	2	4	2	2	2	2.43
Rose du Roi	P	2	2	3	4	2	2	2	2.43
Autumn Damask	D	1	4	1	4	2	3	3	2.57
Marie Louise	D	3	2	2	4	2	4	2	2.71
Cardinal de Richelieu	G	3	1	3	4	2	4	3	2.86
Hermosa	CH	3	1	3	4	1	4	4	2.86
Leda	D	3	4	3	4	2	2	4	3.14
Overall isolate virulence		58	52	54	112	28	62	68	

[z]Isolates are abbreviated county names of isolate source: MAR = Marion, OKT = Oktibbeha, CHI = Chickasaw, HIN = Hinds, WAY = Wayne, SHA = Sharkey, QUI = Quitman.

[y]Class of rose is indicated by letter: A = Alba, B = Bourbon, C = Centifolia; CH = China, D = Damask, G = Gallica, HP = Hybrid Perpetual, M = Moss, P = Portland.

[x]Data represents means of ratings for all variants on a given cultivar.

[w]0, 1, 2, 3, 4 indicates no symptom, 1–10%, 11–25%, 26–40%, over 40% of leaf surface with blackspot symptoms, respectively.

visually averaged in each test because of the similarity of disease expression on the leaflets. Control leaflets were symptomless.

Results and Discussion

'Felicite Parmentier' (Alba), 'Mme. Hardy' (Damask), 'The Bishop' (Centifolia) and 'Rosa mundi' (Gallica) showed no blackspot symptoms (Table 1). 'Cardinal de Richelieu' (Gallica), 'Hermosa' (China) and 'Leda' (Damask) were the most susceptible roses and showed a ratings mean of 2.86 or more. The Wayne county isolate was the least pathogenic, producing symptoms on 46.1% of the cultivars. The Hinds county isolate was the most highly pathogenic, producing symptoms on 89.7% of the cultivars. The five remaining isolates caused disease on 69.1 to 79.5% of the cultivars.

Apparently, a great many variants of *M. rosae* exist in the rose world as evidenced by those mentioned in earlier research reports (3, 9). The four rose cultivars that showed resistance to all seven fungus isolates in our study may be susceptible to fungus variants from other rose growing areas. Changing internal plant chemistry, with seasonal growth, should not have affected responses obtained as all roses were inoculated at one time to a specific fungal isolate.

New isolates of the fungus may be shipped into any state on roses having blackspot stem lesions, and other isolates may develop over time due to genetic changes of the pathogen in an area. The virulence of variant(s) present, favorable weather conditions, and efficiency of regularly applied chemical controls may be the major determining factors in the degree of disease development in any planting.

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