



## VARIETAL REACTION OF ROSE AGAINST BLACK SPOT CAUSED BY *Diplocarpon rosae* Wolf. IN ARUNACHAL PRADESH

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**ABSTRACT:** Varietal reaction trial was conducted at Instructional farm, Department of Floriculture, College of Horticulture and Forestry, Central Agricultural University, Pasighat, Arunachal Pradesh during April 2011 to March 2012. Out of the thirty seven rose varieties evaluated under open condition none were found highly resistant or resistant. Three varieties namely Paradise, Shabnam and Pixie were moderately resistant. Eleven varieties namely Angelica Rinae, Atago, Folklore, Granada, Hot Cocoa, Mardigras, Midas Touch, Mrinalini, Revival, Tipus flame and Victor hugo were recorded moderately susceptible. Twelve varieties viz., Baccardi, Claudia Ribond, Charies Mallerier, Crimson Lace, Dr. Pal, Impatient, Madam Dulbourde, Marcopolo, Melody, Rainbow End, Sonia and Sugandha gave susceptible reaction. Eleven varieties viz., Angelique, Christiandior, Gemini, Gladiator, Golden Jubilee, Priyadarsini, Sand, Centaury, R. R. M. Roy, Sweet Promise, Unforgotten and Vale of Cloyd were recorded highly susceptible reaction against black spot of rose incited by *Diplocarpon rosae* Wolf.

**Keywords:** Black spot, *Diplocarpon rosae*, open condition, rose, screening, varieties.

Black spot (*Diplocarpon rosae* Wolf.) disease is economically the most important and devastating disease in ornamental roses (Horst and Cloyd, 7), especially in hot and humid climates. Disease outbreaks at the beginning of the growing season are initiated by rain-splashed pathogen spores overwintered on fallen leaves. Infected leaves develop characteristic dark spots, chlorosis, and drop prematurely. When left untreated, the disease can lead to reduced plant vigour, fewer blossoms, compromised aesthetics, and eventual failure of the plant (Henn, 5). Previous reports (Lily and Barnett, 9, Palmer *et al.*, 11, and Svejda and Bolton, 13) firmly documented differential pathogenicity of *Marssonina rosae* (Lib.) Lind (Imperfect stage of *Diplocarpon rosae* Wolf) isolates to various species and cultivars of roses. Other workers (Jenkins, 8, Palmer and Semeniuk, 10 and Palmer *et al.*, 12) reported different plant response to a single isolate. In Arunachal Pradesh there is some commercial rose production and many rose fanciers face difficulties mainly due to black spot disease since it is apparently impossible to purchase modern plants with known resistance. No specific information was available on *M. rosae* performance. Therefore, present investigation was carried out to determine

the existence of *M. rosae* variants within the state with anticipation to identify source of resistance against black spot disease of rose.

### MATERIALS AND METHODS

Investigations on varietal evaluation of roses were carried out at Instructional farm, Department of Floriculture, College of Horticulture and Forestry, Central Agricultural University, Pasighat, Arunachal Pradesh during April 2011 to March 2012. Thirty seven varieties of rose were planted in raised beds with a spacing of 1 x 1 m under open condition. The plants were provided with all the inputs as per package and practices for rose cultivation. The experiment was laid out in randomized complete block design (RCBD) and replicated thrice with 9 plants for each replication. The black spot disease developed from the natural inoculums. Observations on disease appearance was recorded at weekly interval by randomly selecting 5 plants from each replication for disease assessment.

Disease severity was recorded on the upper and lower leaf surfaces from initial growth stage to maturity and rated on 1 to 6 scale (Standard disease

severity scale) where, 1 = 0.00 defoliation (highly resistant), 2 = 1-10% defoliation (resistant), 3 = 11-25% defoliation (moderately resistant), 4 = 26-50% defoliation (moderately susceptible), 5 = 51-75% defoliation (susceptible) and 6 = 76-100% (highly susceptible) reaction to black spot of rose (Holcomb, 5). Using the standard disease score chart, the per cent disease index (PDI) was worked out according to the FAO (4) formula and the data analyzed statistically.

$$\text{Per cent disease index (PDI)} = \frac{\text{Sum of total numerical rating}}{\text{Total number of observations} \times \text{Maximum grade}} \times 100$$

## RESULTS AND DISCUSSION

The use of resistant genotypes is considered to be the best method for disease management. Therefore, the present investigation was carried out to determine source of resistance against *Diplocarpon rosae* Wolf. Thirty seven rose varieties were evaluated under open conditions during April 2011 to March 2012 cropping season (Table 1). Out of the thirty seven rose varieties evaluated, none were found highly resistant and resistant. However, three varieties namely Paradise, Shabnam and Pixie were found moderately resistant. Eleven varieties namely Angelica Rinae, Atago, Folklore, Granada, Hot Cocoa, Mardigras, Midas Touch, Mrinalini, Revival, Tipus flame and

Victor hugo showed moderately susceptible reaction. Twelve varieties viz., Baccardi, Claudia Ribond, Charles Mallerier, Crimson Lace, Dr. Pal, Impatient, Madam Dulbourde, Marcopolo, Melody, Rainbow End, Sonia and Sugandha gave susceptible reaction. Eleven varieties viz., Angelique, Christiandior, Gemini, Gladiator, Golden Jubilee, Priyadarsini, Sand. Centaury, R. R. M. Roy, Sweet Promise, Unforgotten and Vale of Cloyd were recorded highly susceptible against black spot of rose incited by *Diplocarpon rosae* Wolf.

Among the different varieties screened data pertaining to disease severity (%), number of flowering shoots plant-1, flower diameter (cm), bud length (cm) and diameter of bud (mm) is presented in Table 2. Three varieties namely Paradise (15.00, 26.33, 10.68, 11.40 and 12.15), Pixie (20.33, 25.68, 8.80, 9.40 and 12.66) and Shabnam (21.67, 24.00, 11.40, 10.26 and 11.78) showed moderately resistant reaction ranging from 11-25% against black spot. Similarly, eleven varieties, viz. Angelica Renae (28.10, 8.30, 7.16, 4.06 and 1.80), Atago (31.27, 3.00, 10.50, 7.75 and 14.00), Folklore (38.10, 2.50, 13.00, 4.75 and 2.00), Granada (31.30, 4.68, 10.00, 6.25 and 2.15), Hot Cocoa (46.10, 4.00, 9.72, 3.40 and 2.00), Mardigras (43.10, 5.67, 10.73, 4.83 and 12.00), Midas Touch (42.67, 5.00, 10.50, 6.50 and 2.40), Mrinalini

**Table 1: Varietal reaction of rose against black spot caused by *Diplocarpon rosae*.**

Scale	Range of Defoliation (%)	Reaction	No. of varieties	Name of varieties
1	0.00	HR	Nil	Nil
2	1-10	R	Nil	Nil
3	11-25	MR	3	Paradise, Shabnam, Pixie
4	26-50	MS	11	Angelica Renae, Atago, Folklore, Granada, Hot Cocoa, Mardigras, Midas Touch, Mrinalini, Revival, Tipus flame, Victor Hugo
5	51-75	S	12	Baccardi, Claudia Ribond, Charles Mallerin, Crimson Lace, Dr. Pal, Impatient, Madam Dulbourde, Marcopolo, Melody, Rainbow End, Sonia, Sugandha
6	76-100	HS	11	Angelique, Sand. Centenary, Christian Dior, Gemini, Gladiator, Golden Jubilee, Priyadarsini, R.R.M.Roy, Sweet Promise, Unforgotten, Vale of Cloyd

HR = Highly resistant; R = Resistant; MR = Moderately resistant; MS = Moderately susceptible; S = Susceptible; HS = Highly susceptible. (As per disease rating scale given by Holcomb,2002).

Table 2: Varietal response of rose against black spot during April 2011 to March 2012.

Varieties	Disease Severity (%)	No. of flowering shoots plant-1	Flower diameter (cm)	Bud length (cm)	Diameter of bud (mm)
Angelica Renae	28.10	8.30	7.16	4.06	1.80
Angelique	82.00	6.50	5.50	4.25	2.60
Atago	31.27	3.00	10.50	7.75	14.00
Baccardii	63.67	2.67	8.50	3.83	2.30
Charles Mallerin	60.01	3.00	10.18	5.60	2.20
Christian Dior	79.00	4.00	11.32	10.58	6.00
Claudia Ribond	62.33	3.67	9.50	4.42	7.00
Crimson Lace	65.78	6.00	5.60	4.83	1.70
Dr. Pal	66.33	3.00	6.00	7.50	2.20
Folklore	38.10	2.50	13.00	4.75	2.00
Gemini	87.33	2.35	7.00	5.35	2.83
Gladiator	79.00	2.30	10.50	9.50	3.00
Golden Jubilee	87.33	4.00	5.50	3.40	2.00
Granada	31.30	4.68	10.00	6.25	2.15
Hot Cocoa	46.10	4.00	9.72	3.40	9.00
Impatient	61.67	4.00	10.00	9.00	2.00
Madam Delbourde	59.00	4.33	11.17	7.50	11.00
Marcopolo	65.67	4.00	6.50	10.25	1.95
Mardigras	43.10	5.67	10.73	4.83	12.00
Melody	70.00	3.00	7.00	6.00	2.20
Midastouch	42.67	5.00	10.50	6.50	2.40
Mrinalini	31.00	2.67	13.00	5.68	2.15
Paradise	15.00	26.33	10.68	11.40	12.15
Pixie	20.33	25.68	8.80	9.40	12.66
Priyadarsini	87.33	9.50	8.75	4.75	1.45
R.R.M.Roy	89.00	2.33	5.00	8.25	6.75
Rainbow End	64.78	15.00	5.16	4.30	11.00
Revival	42.33	2.66	4.80	5.00	1.98
Sand. Centenary	89.00	3.50	7.50	3.00	3.90
Shabnam	21.67	24.00	11.40	10.26	11.78
Sonia	65.33	3.67	7.50	6.00	2.25
Sugandha	60.00	3.00	3.80	7.75	2.60
Sweet Promise	85.00	3.50	8.00	7.00	6.50
Tipus Flame	43.67	3.00	7.00	5.20	8.50
Unforgotten	87.00	3.00	4.20	7.00	2.80
Vale of Cloyd	89.11	5.00	4.00	4.00	2.50
Victor Hugo	34.67	3.00	11.50	5.00	2.78

(31.00, 2.67, 13.00, 5.68 and 2.15), Revival (42.33, 2.66, 4.80, 5.60 and 1.98), Tipus flame (43.67, 3.00, 7.00, 5.20 and 8.50) and Victor Hugo (34.67, 3.00, 11.50, 5.00 and 2.78) showed moderately susceptible reaction ranging from (26-50 %). Likewise, twelve varieties viz., Baccardi (63.67, 2.67, 8.50, 3.83 and 2.30), Claudia Ribond (62.33, 3.67, 9.50, 4.42 and 7.00), Charles Mallerin (60.01,

3.00, 10.18, 5.60 and 2.20), Crimson Lace (65.78, 6.00, 5.60, 4.83 and 1.70), Dr. Pal (66.33, 3.00, 6.00, 7.50 and 2.20), Impatient (61.67, 4.00, 10.00, 9.00 and 2.00), Madam Dulbourde (59.00, 4.33, 11.17, 7.50 and 11.00), Marcopolo (65.67, 4.00, 6.50, 10.25 and 1.95), Melody (70.00, 3.00, 7.00, 6.00 and 2.20), Rainbow End (64.78, 15.00, 5.16, 4.30 and 11.00), Sonia (65.33, 3.67, 7.50, 6.00 and

2.25) and Sugandha (60.00, 3.00, 3.80, 7.75 and 2.60) developed black spot ranging from 51-75 %. However, eleven varieties *i.e.* Angelique (82.00, 6.50, 5.50, 4.25 and 2.60), Christian Dior (79.00, 4.00, 11.32, 10.58 and 6.00), Gemini (87.33, 2.35, 7.00, 5.35 and 2.83), Gladiator (79.00, 2.30, 10.50, 9.50 and 3.00), Golden Jubilee (87.33, 4.00, 5.50, 3.40 and 2.00), Priyadarsini (87.33, 9.5, 8.75, 4.75 and 1.45), R.R.M. Roy (89.00, 2.33, 5.00, 8.25 and 6.75), Sand. Centenary (89.00, 3.50, 7.50, 3.00 and 3.90), Sweet Promise (85.00, 3.50, 8.00, 7.00 and 6.5), Unforgotten (87.00, 3.00, 4.20, 7.00 and 2.80) and Vale of Cloyd (89.11, 5.00, 4.00, 4.00 and 2.50) showed highly susceptible reaction ranging from 76-100 % infection during the course of the investigation.

The results of present investigation were in close conformity with Baker & Kenneth, (1), Colbaugh *et al.* (2) and Drewes-Alvarez (3) who evaluated 107 roses cultivars reaction to naturally happening rose black spot disease. They used disease of the entire plant, with 0-no black spot, 1-slight defoliation, 2-minor defoliation, 3-moderate defoliation, 4-severe defoliation and 5-complete defoliation. The cultivars Sir Thomas Lipton, Knockout, Rec Cascade, Sea Foam, Caldwell Pink, The Fairy and New Dawn were found highly resistant to the disease, while Spice, Juane, Desprez and Perle d'Or were also resistant but with verified variations in disease reaction during the study. In the present investigation, black spot screening methodology for rose under open condition has been established and few moderately resistant varieties of rose against black spot have been identified. These varieties may be utilized for future breeding programme to evolve source of resistance against black spot of rose.

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