

Effect of organic manures and biofertilizers on growth and flowering of *Rosa cv. Madgod*

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The cultivation of rose is highly remunerative enterprise. Rose is nutrient loving plant. Rose requires feeding of nutrients through organic, inorganic manures and biofertilizers for proper growth and development. Chemical fertilizers applied in to the field have adverse effect on soil health and environment. Now attention is being shifted towards alternate sources *i.e.*, organic manure and biofertilizers. Use of organic manures as a source of nutrients was well documented by (Mishra and Kapoor, 1992). Application of decomposable organic matter like oil cake to soil is recognized as most efficient method of maintaining a good soil structure and rhizosphere environment. Oil cakes are good source of organic nitrogen and excellent for rose crop (Yadav *et al.*, 1989). Pandey and Singh, (1990) reported that neem cake is superior for increasing population of *Azotobacter* sp. and maximum soil fungal colonies than compost, mustard cake, linseed cake. Gopal *et al.* (2005) recorded increased population of *Azotobacter* with neem cake treatment. Inadequate plant nutrition causes serious disorders in rose and may eventually lead to decline of plants. Keeping in view that organic manure and biofertilizers have been utilized in order to determining their effects on growth and flowering of *Rosa cv. Madgod* under West Bengal conditions.

The experiment was conducted at Mondouri Horticultural Research Farm, Bidhan Chandra Krishi Viswavidyalaya, Nadia, West Bengal during 2009 and 2010 to study the effect of organic manure and biofertilizers on growth and flowering of *Rosa cv. Madgod*. The experimental site is situated at 23.5° N latitude and 89° E longitude at an elevation of 9.75 m above mean sea level. At the time of experimental period minimum and maximum monthly mean temperature, mean relative humidity, average rainfall were 31.20°C, 19.41°C, 75.81 % and 1.96 mm respectively. The soil is clayey loam, well drained with medium fertility status; pH 6.6-6.7 and contained 0.245% total nitrogen, 14.0 kg ha⁻¹ available phosphorus, 42.0 kg ha⁻¹ available K₂O and 0.63% organic carbon. Plants were pruned on 14th October. The experiment was laid out in Randomized Block

Design with two replications and ten treatments (T₁= Control, T₂= Mustard cake 400 g m⁻², T₃ = Mustard cake 400 g + PSB 1 g + *Azotobacter* 1 g m⁻², T₄ = Neem cake 400 g m⁻², T₅ = Neem cake 400 g + PSB 1 g + *Azotobacter* 1 g m⁻², T₆ = Linseed cake 400 g m⁻², T₇ = Linseed cake 400 g m⁻² + PSB 1 g + *Azotobacter* 1 g m⁻², T₈ = Mustard cake 200 g + Linseed cake 200 g + PSB 1 g + *Azotobacter* 1 g m⁻², T₉ = Neem cake 200 g + Linseed cake 200 g + PSB 1 g + *Azotobacter* 1 g m⁻² and T₁₀ = Neem cake 200 g + Mustard cake 200 g + PSB 1 g + *Azotobacter* 1 g m⁻²). The schedules of manuring have been maintained as per the treatment. At the time of bed preparation and pruning well rotten FYM was incorporated @ 2 kg m⁻² as basal dose. After pruning Nitrogen was applied @ 200 kg ha⁻¹ as Neem cake, mustard cake, linseed cake and biofertilizer *viz.*, *Azotobacter* + PSB were applied @ 1 g m⁻². Biofertilizers was applied 4 times. Data on different growth and yield parameters were recorded and analysed statistically.

Results revealed (Table 1) that application of different levels of organic manures and biofertilizers singly and in combination failed to show any significant variation on plant height. The plant height ranges from 53.11 to 66.30 cm. The maximum plant height (66.30 cm) was recorded by application of neem cake 400 g + PSB 1 g + *Azotobacter* 1 g m⁻² followed by the application of mustard cake 400 g + PSB 1 g + *Azotobacter* 1 g m⁻². Minimum plant height recorded with control (53.11 cm). The plant height may be increased due to secretion of cytokinins (growth promoting substance) by the application of *Azotobacter*, a similar finding was noted by Waithaka and Dana (1978). Application of different levels of organic manures and biofertilizer singly or in combination failed to show any significant variation on days required to flower bud appearance after pruning. Plants treated with neem cake 400 g + PSB 1g + *Azotobacter* 1 g m⁻² recorded maximum stalk length (21.86 cm) followed by mustard cake 400 g + PSB 1g + *Azotobacter* 1 g m⁻² (21.73cm). Application of linseed cake (400 g m⁻²) recorded maximum stalk diameter (0.40 cm).

Table 1: Effect of organic manures and biofertilizer on growth and yield attributes of *Rosa cv. Madgod*

Treatment	Plant height (cm)	Days to 1 st flower bud appearance	Stalk length (cm)	Stalk diameter (cm)	Pedicle length (cm)	Flower bud length (cm)	Flower diameter (cm)	Number of flower plant ⁻¹	Flower yield m ⁻²	Vase life in water (days)
T ₁	53.11	25.00	19.27	0.37	5.92	2.66	2.18	11.02	121.23	4.67
T ₂	54.59	21.00	20.57	0.36	5.98	2.69	2.44	11.04	121.41	4.84
T ₃	63.81	19.00	21.73	0.36	6.15	2.99	2.45	15.17	166.88	5.34
T ₄	56.67	20.00	17.65	0.33	5.40	2.71	2.22	13.65	150.12	5.00
T ₅	66.30	22.00	21.86	0.35	5.90	3.03	2.50	18.28	201.03	6.00
T ₆	56.14	21.00	21.15	0.40	5.93	2.76	2.41	11.36	125.01	4.83
T ₇	60.86	21.50	21.67	0.36	5.56	2.94	2.46	13.71	150.84	5.50
T ₈	56.67	20.00	18.54	0.37	6.29	2.81	2.24	11.93	131.19	5.17
T ₉	59.81	21.50	19.76	0.38	6.83	2.89	2.33	12.48	137.27	5.34
T ₁₀	60.11	23.50	19.54	0.38	6.09	2.93	2.38	13.07	143.78	5.33
SEm(±)	5.24	0.80	1.67	0.23	0.23	0.06	0.08	1.15	12.69	5.20
LSD(0.05)	NS	NS	NS	NS	NS	0.19	NS	3.45	37.97	NS

More length of flower bud (3.03 cm) was obtained when plant treated with neem Cake 400 g + PSB 1 g + *Azotobacter* 1 g m⁻² and minimum under control (2.66cm). Among the treatments maximum flower diameter (2.50 cm) was observed with neem Cake 400 g + PSB 1 g + *Azotobacter* 1 g m⁻² followed by linseed cake 400 g m⁻² + PSB 1 g + *Azotobacter* 1 g m⁻² (2.46 cm). Data in table 2 revealed that the treatments of organic manures and biofertilizer showed significant influence on flower yield. Plants treated with neem cake 400 g + PSB 1 g + *Azotobacter* 1 g m⁻² recorded maximum (201.03) number of flowers followed by mustard cake 400 g + PSB 1g + *Azotobacter* 1 g m⁻² (166.88). Yadav *et al.* (1989) reported that oil cakes are good source of organic nitrogen and are excellent for rose crop. Sinha *et al.* (1981) reported that proper decomposition of oil cakes and mineralization, the oil cakes supplied available nutrients directly to the plants. Vase life (6.0 days) of flowers was maximum under neem cake 400 g + PSB 1 g + *Azotobacter* 1 g m⁻².

From the above discussion it may be concluded that the yield of flowers can be improved by application of neem cake along with PSB and *Azotobacter*.

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