



Growth and Flower Quality Influenced by Foliar Application of Potassium Nitrate and Sujala of Hybrid Tea Rose Cultivar Mohana

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

An experiment was conducted from September 2019 to March 2020 to examine the effect of different combination of foliar applicable fertilizers on Hybrid tea rose cultivar Mohana. The study was performed with 9 treatments (T₁-RDF, T₂- KNO₃ 2.5g/l, T₃- KNO₃ 5.0g/l, T₄- Soluble fertilizer (Sujala) 1g/l, T₅- Soluble fertilizer (Sujala) 2 g/l, T₆- KNO₃ 1g/L+ Soluble fertilizer (Sujala) 1g/l, T₇- KNO₃ 1 g/l + Soluble fertilizer (Sujala) 1.5g/l, T₈- KNO₃ 1g/L + Soluble fertilizer (Sujala) 2g/l, T₉- KNO₃ 1g/l+ Soluble fertilizer (Sujala) 2.5g/l) and 3 replications. From this study T₈ (KNO₃ 1g/L + Soluble fertilizer (Sujala) 2g/l) gave best in case of vegetative and flower quality parameters and minimum days from FBE to cup shape and flower. While in case of cup shape to full bloom minimum days was taken in T₁(RDF).

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1. INTRODUCTION

Rose, universally known as the Queen of Flowers is the most beautiful and popular flower in the world flower trade. The genus *Rosa* belong to the family Rosaceae & has species endemic to North temperate region to tropical mountain. Besides occupying portion of significance as cut flower in the trade. The roses also have a position in perfumery & cosmetics industries, rose hips are a source of Vitamin C and used in herbal medicine. In India, roses are cultivated in Maharashtra, Tamil Nadu, Karnataka and West Bengal. Among the different types of rose, Hybrid Teas are dominant in the cut flower trade, preferred for its large, well framed and symmetrical flower on long, strong stalks. Foliar application of nutrients is gaining importance for two reasons, besides providing positive results in terms of overall growth parameters and yield, it also helps in reduce the hazardous effect of soil application on soil health and ground water. West Bengal occupies a place of prominence in flower cultivation. The study was taken up with an objective to investigate the performance of Hybrid Tea rose cultivar Mohana in response to foliar application of Potassium Nitrate and Sujala (19:19:19) and also to make a foliar application nutritional dose in manner to reduce soil degradation and nutrient loss through leaching.

2. MATERIALS AND METHODS

2.1 Site Description

The experiment was conducted at Horticulture Research Station, Mandouri, Faculty of Horticulture, Bidhan Chandra Krishi Viswavidyalaya, Nadia, West Bengal. The site of experiment is located at 23N latitude and 89E longitude at an elevation of 9.75 meters from mean sea level. The soil of the proposed investigation site is sandy loam in texture, well drained with pH level of 6.7, organic matter is 0.74%, total nitrogen 0.07%, Phosphorus 28.50 kg/hectare and K₂O 78 kg/hectare.

2.2 Experimental Details

2.2.1 Tested material

Sujala (19:19:19) is a foliar grade complete fertilizer containing 3 forms of nitrogen, Amide Nitrogen (NH₂, N-10.5%), Nitrate Nitrogen (NO₃, N- 4.0%) and Ammonium Nitrogen (NH₄, N-4.5%) including water soluble Phosphorus and

Potassium each containing 19 percent. Potassium Nitrate (32:0:45) is also a water soluble fertilizer containing 32% of Nitrate Nitrogen and 45% K₂O.

The cultivar selected for the study was Mohana, belong to Hybrid Tea rose, with RHS 6A, developed by Hans Jurgen Evers, the flower had a light blush on the petal edges. The experiment was taken up in two years old plants, planted in September 2017. The budded plants were purchased from Pusphanjali Rose Nursery, Jakpur, West Bengal.

Recommended dose of fertilizer for rose is 75:150:50 (N:P:K) g/plant/year (TNAU Agritech Portal) .

2.2.2 Experimental design and crop management

Experiment was arranged in a randomize block design with 9 treatments and 3 replications. The plants were planted in raised bed (1.5X1.0 m²) at a spacing of 50X30 cm 10 plants per bed. The crop was raised as per the recommended cultural practices. Each bed received cow dung manure @ 4 kg/m².

3. RESULTS

3.1 Vegetative Parameters

The traits plant height, plant spread, number of branches per plant and individual leaf area were significant by the application of Recommended dose of fertilizer, Potassium Nitrate and Sujala. Among the treatments T₉ (KNO₃ 1g/L +Soluble fertilizer (Sujala) 2.5g/l) proved it superior for all the traits. Among the treatments T₁ and T₉ was statistically significant for the traits plant height and number of branches per plant, but failed to show levels of significance for the traits plant spread and individual leaf area.

3.2 Flowering Parameters

The treatments positively influence the flowering parameters (days to flower bud emergence from last spray, days to cup shape and days to full bloom). Early flower bud appearance was recorded in the plants receiving the treatment T₈ & T₉ (KNO₃ 1g/L +Soluble fertilizer (Sujala) 2g/l & KNO₃ 1g/L +Soluble fertilizer (Sujala) 2.5g/l), 35.07 and 35.60 respectively.

Chart 1. Treatment details

Treatments	Details
T ₁	RDF (Recommended dose of fertilizer)
T ₂	KNO ₃ 2.5g/l
T ₃	KNO ₃ 5.0g/l
T ₄	Soluble fertilizer 1g/l (Sujala)
T ₅	Soluble fertilizer 2 g/l (Sujala)
T ₆	KNO ₃ 1g/L+ Soluble fertilizer 1g/l
T ₇	KNO ₃ 1 g/l + Soluble fertilizer 1.5g/l
T ₈	KNO ₃ 1g/L +Soluble fertilizer 2g/l
T ₉	KNO ₃ 1g/l+ Soluble fertilizer 2.5g/l

Application of Sujala (19:19:19) singly at 2 g/l, 4 g/l or in combination with Potassium nitrate at 2 g/l & 2.5 g/l produced early flower as compare to T₁ (RDF), T₂ (KNO₃ 2.5g/l), T₃ (KNO₃ 5g/l) & T₆ & T₇ (KNO₃ 1g/L+ Soluble fertilizer 1g/l & KNO₃ 1g/L+ Soluble fertilizer 1.5g/l). The treatment T₁ & T₈ and T₁ & T₉ produced significant variation among the day's taken to flower bud emergence. The treatments also influenced the days taken to attain cup shape stage after Flower bud appearance following the same as flower bud emergence after last spray.

3.3 Flower Quality Parameters

From the Table 3. It is evident that all the parameters studied to assess the bloom quality attained level of significance under the influence of the treatments.

4. DISCUSSION

Because of foliar application induce the nutrient uptake in plant and similar effect of foliar application was recorded by Samia et al., in Gladiolus and Ali and Mowafy [1] studied on

peanut and found that potassium fertilizer significantly increased leaf area and number of branches per plant. Similar effect of potassium as foliar application on flowering parameters was reported by Mukesh *et al.* [2] in Gladiolus, Also, Butt, [3] mentioned that K significantly influenced number of days to spike emergence and first floret opening in gladiolus [3]. The improvement in the studied flowering parameters as a result of foliar potassium application could be attributed to positive role of K in floret development [4]. The role of K in the greatly improved biometric characteristics such as photosynthetic activity, N metabolism and protein synthesis besides, the increase in leaf area and leaves number per plant, which in turn supplied more photosynthates [5]. The stimulatory effects of foliar application of K might have resulted in better accumulation of assimilates thereby resulting in taller, stronger and sturdier stems of cut flowers [6]. Foliar application of potassium has a potential effect on the nutrient uptake and on the stimulation of growth parameters and flowering characteristics [7,8]. Foliar fertilization increases micronutrient uptake and physiological and biochemical indexes [9-11].

Table 1. Effect of KNO₃ & Sujala (19:19:19) on vegetative parameters of Hybrid Tea rose cultivar Mohana

Treatments	Plant height (cm)	Plant spread (cm)	No of branches/plant	Individual leaf area (cm ²)
T1	64.87	54.33	12.33	59.27
T2	45.73	44.67	9.00	42.27
T3	45.00	46.73	10.13	42.80
T4	52.00	51.40	11.07	42.73
T5	53.60	51.27	11.00	49.13
T6	58.27	52.07	12.60	49.00
T7	61.80	52.13	12.00	52.33
T8	65.27	52.00	12.20	59.13
T9	69.60	54.93	14.67	61.47
S.Em. ±	0.57	0.97	0.42	0.84
C.D. at 5 %	1.71	2.92	1.26	2.51

Table 2. Effect of KNO₃ & Sujala (19:19:19) on flowering parameters Hybrid Tea rose cultivar Mohana

Treatments	Days to FBE from last spray	Days to cup shape from FBE	Cup shape to full bloom
T1	45.93	22.07	2.27
T2	44.20	18.87	2.20
T3	41.13	19.40	2.80
T4	39.07	15.07	3.00
T5	37.00	15.20	3.00
T6	40.93	13.00	3.60
T7	41.60	14.07	3.13
T8	35.07	14.20	2.87
T9	35.60	12.00	3.00
S.Em. ±	0.48	0.14	0.16
C.D. at 5 %	1.42	0.41	0.49

Table 3. Effect of KNO₃ & Sujala (19:19:19) on flowering characteristics of Hybrid tea rose cultivar Mohana

Treatments	Flower bud diameter (cm)	Pedicle diameter (cm)	Flower shoot length (cm)	Stalk length (cm)	Stalk diameter (cm)	Pedicle length (cm)	Pedicle diameter (cm)	Number of flowers/plant
T1	1.57	3.47	43.47	39.07	0.65	6.07	0.69	13.80
T2	1.53	2.67	33.27	29.07	0.41	5.00	0.51	11.73
T3	1.60	2.93	37.33	32.13	0.41	5.20	0.53	12.07
T4	1.77	3.00	41.13	38.07	0.46	5.07	0.53	12.20
T5	1.80	3.73	43.20	38.07	0.50	5.27	0.54	12.13
T6	1.60	3.27	44.60	39.87	0.52	5.27	0.53	12.87
T7	1.60	3.40	44.80	39.27	0.56	3.47	0.55	13.07
T8	1.87	3.93	45.00	40.00	0.59	5.53	0.59	13.13
T9	1.90	4.00	45.93	39.73	0.62	5.87	0.61	14.13
S.Em. ±	0.06	0.19	0.21	0.30	0.01	0.30	0.01	0.19
C.D. at 5 %	0.17	0.58	0.63	0.90	0.03	0.90	0.03	0.58

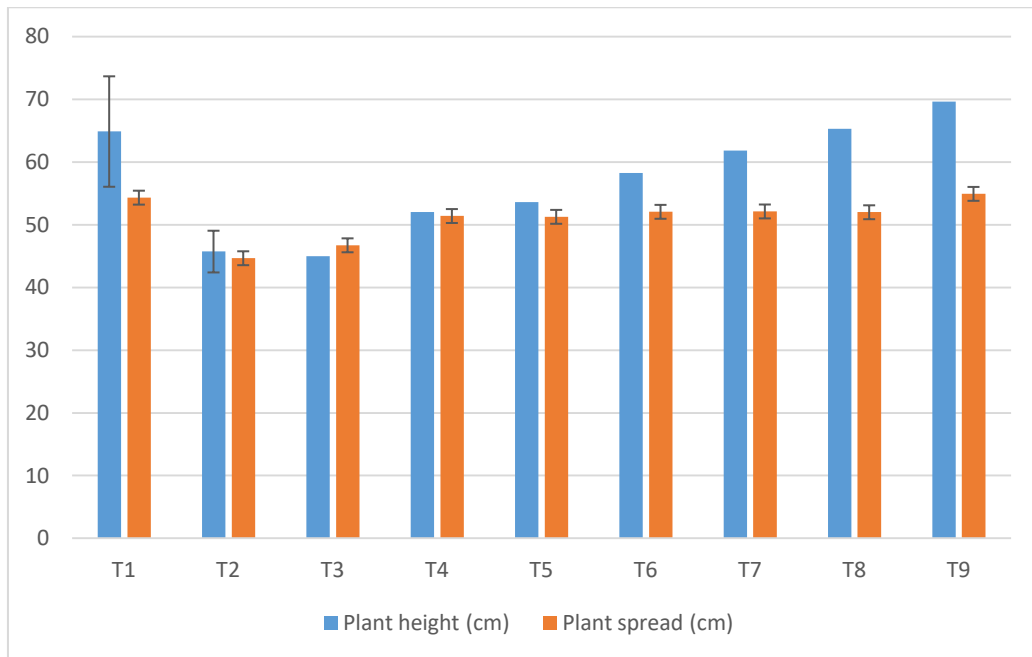


Fig. 1. Effect of KNO₃ & Sujala (19:19:19) on vegetative parameters of Hybrid Tea rose cultivar Mohana

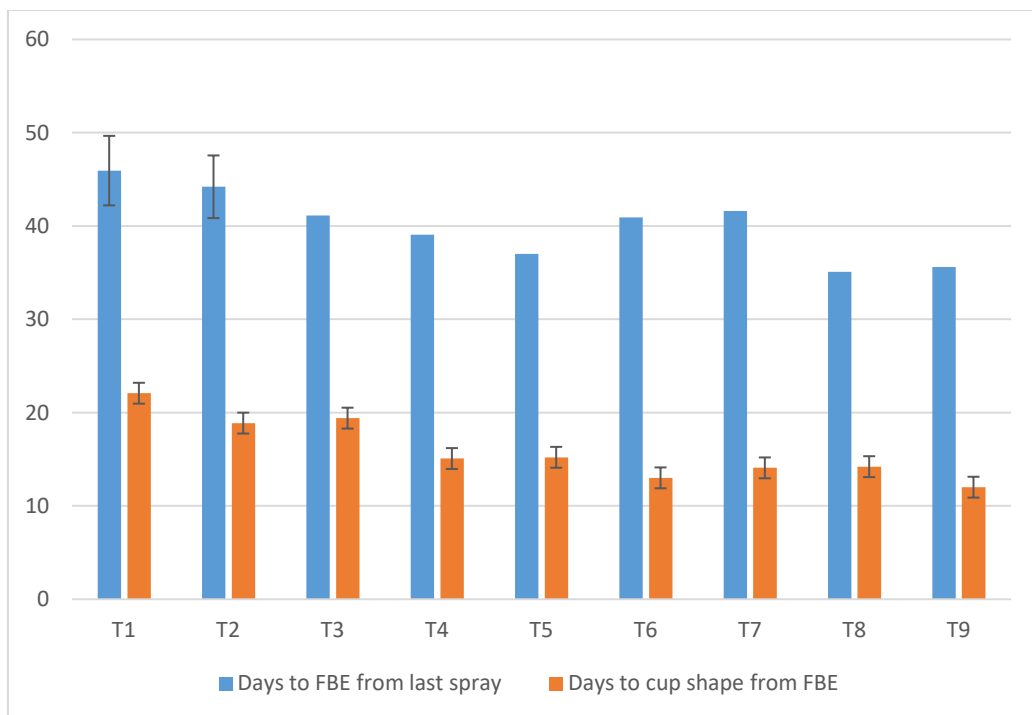


Fig. 2. Effect of KNO₃ & Sujala (19:19:19) on flowering parameters Hybrid Tea rose cultivar Mohana

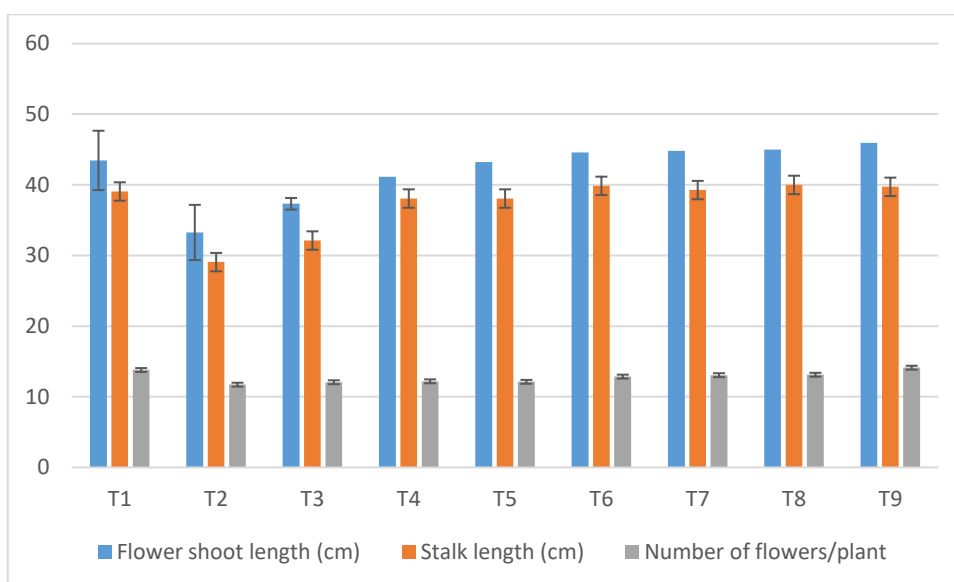


Fig. 3. Effect of KNO₃ & Sujala (19:19:19) on Flowering characteristics and of Hybrid Tea rose cultivar Mohana

5. CONCLUSION

It is concluded that the performance of Hybrid Tea rose cultivar Mohana in response to foliar application of Potassium Nitrate and Sujala and also made a foliar application nutritional dose in manner to reduce soil degradation and nutrient loss through leaching. From this study T8 (KNO₃ 1g/L + Soluble fertilizer (Sujala) 2g/l) gave best in case of vegetative and flower quality parameters and minimum days from FBE to cup shape and flower.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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