Original Research Article

Growth and flower quality influenced by foliar application of Potassium Nitrate and Sujala of Hybrid Tea rose cultivar Mohana

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 8 treatments (T_1-RDF, T_2- KNO3 2.5g/l, T_3- KNO3 5.0g/l, T_4- Soluble fertilizer 1g/l, T_5- Soluble fertilizer 2 g/l, T_6- KNO3 1g/L+ Soluble fertilizer 1g/l, T_7- KNO3 1 g/l + Soluble fertilizer 1.5g/l, T_8- KNO3 1g/L +Soluble fertilizer 2g/l, T_9- KNO3 1g/l+ Soluble fertilizer 2.5g/l) and 3 replications. From this study T_8 (KNO3 1g/L +Soluble fertilizer 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 T_1(RDF).

Key Words- Hybrid tea rose, water soluble fertilizer, foliar application, cut flower, rose

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

Comment [ZBM1]: Please re-check
1. problem statement
2. research findings / research findings

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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.

Materials and Methods

Comment [ZBM3]: Good

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.

Experimental Details: -

Tested material

Sujala (19:19:19) is a foliar grade complete fertilizer containing 3 forms of nitrogen, Amide Nitrogen (NH_2, N-10.5%), Nitrate Nitrogen (NO_3, N- 4.0%) and Ammonium Nitrogen (NH_4, 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.

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
T_5	Soluble fertilizer 2 g/l
T_6	KNO_3 1g/L+ Soluble fertilizer 1g/l
T_7	KNO_3 1 g/l + Soluble fertilizer 1.5g/l

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T_8	KNO_3 1g/L +Soluble fertilizer 2g/l
T_9	KNO_3 1g/l+ Soluble fertilizer 2.5g/l

Recommended dose of fertilizer for rose is 600:200:200 (N:P:K) kg per hectare

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 m^2) 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/m^2.

Result

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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 (KNO_3 1g/L +Soluble fertilizer 2.5g/l) proved it superior for all the traits. Among the treatments T_1 and T_9 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. Potassium nitrate

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 T_8 & T_9 (KNO_3 1g/L +Soluble fertilizer 2g/l & KNO_3 1g/L +Soluble fertilizer 2.5g/l), 35.07 and 35.60 respectively.

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 T_1 (RDF), T_2 (KNO_3 2.5g/l), T_3 (KNO3 5g/l) & T_6 &T_7 (KNO_3 1g/L+ Soluble fertilizer 1g/l & KNO_3 1g/L+ Soluble fertilizer 1.5g/l). The treatment T_1 & T_8 and T_1 & T_9 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.

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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.

Discussion

Comment [ZBM5]: Please discuss the analysis of the study in more depth referring to the data obtained.

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 (2003) 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*., (2001) in Gladiolus, Also, Butt, (2005) mentioned that K significantly influenced number of days to spike emergence and first floret opening in gladiolus (Butt, 2005). 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 (Zubair, 2011). 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. (El-Tohamy *et al*., 2011). 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 (Arvinder *et al*., 2015). Foliar application of potassium has a potential effect on the nutrient uptake and on the stimulation of growth parameters and flowering characteristics (Sathyanarayana *et al*., 2017; El-Naggar and El-Nasharty 2016). Foliar fertilization increases micronutrient uptake and physiological and biochemical indexes (Bistgani *et al*., 2018; Oliveira *et al*., 2020).

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Comment [ZBM6]: Latest ref < 5 year

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

Treatments	Plant height	Plant spread	No of	Individual

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	(cm)	(cm)	branches/plant	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

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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)	Pedicel diameter (cm)	Flower shoot length (cm)	Stalk length (cm)	Stalk diameter (cm)	Pedicel length (cm)	Pedicel 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

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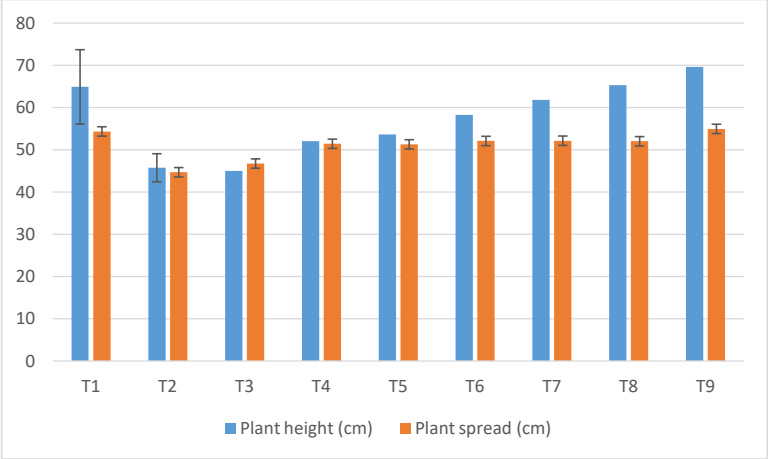


Fig: 1. Effect of KNO3 & Sujala (19:19:19) on vegetative parameters of Hybrid Tea rose cultivar Mohana.

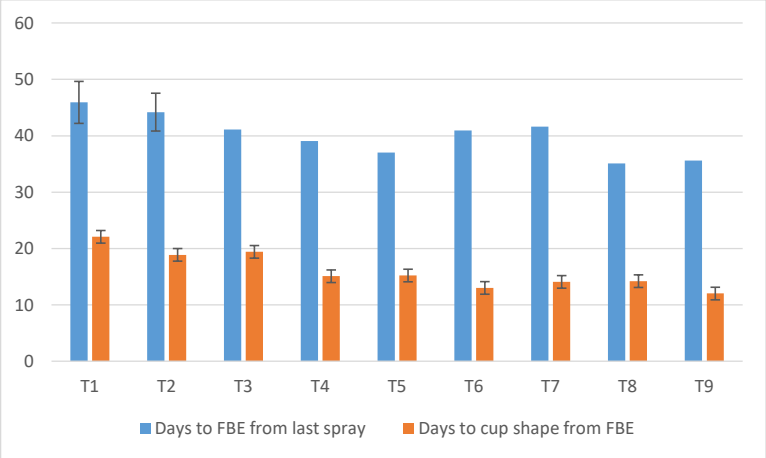
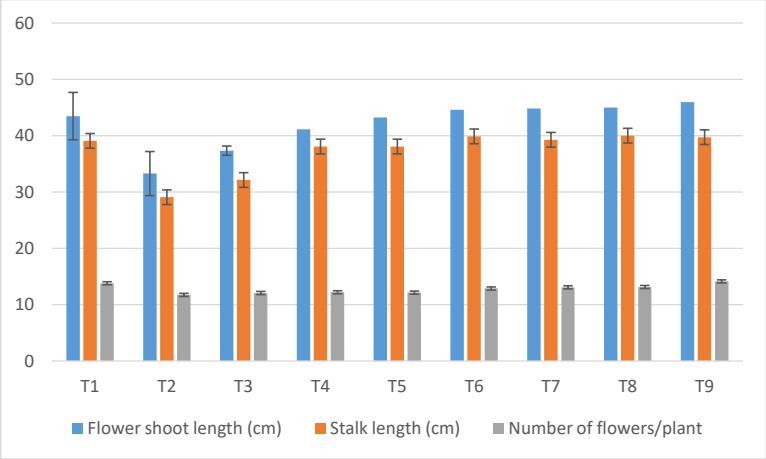


Fig: 2. Effect of KNO3 & Sujala (19:19:19) on flowering parameters Hybrid Tea rose cultivar Mohana.



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