

Different Level of Fertigation Influences Rose Flowering and Production

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Abstract

Use of irrigation water becomes scarce in the whole world. It is more desirable to get plenty of benefit from already present reservoirs. Method of fertilizer application to crop, especially to ornamental plant is a key issue to get the optimum potential of the crop. Different fertilizer incorporation methods have its own drawback and advantages. Therefore, under these circumstances, the present study was conducted to find out influences of different fertigation level with application of compound fertilizer on vegetative growth, flowering characteristic and chemical constituent of two rose hybrids Amelia and Anjleeq. An experiment was conducted at experimental Landscaping and Ornamental research substation, Multan during year 2011. Fertigation treatment was applied 100,200,300,400 and 500 ml to treatment, but not to control treatment. Compound fertilizer having a ratio (17:17:17) was applied at rate 2 gL⁻¹ to all treatment. Our experimental result shows that all of different fertigation level influences rose production, flowering and chemical constituent. Maximum rose production, flowering and chemical constituent occurred due to 400 ml fertigation treatment followed by 300 ml. Therefore, it is proved from our experiment that fertigation technique with different level has potential to enhance and significantly affected all parameters of two rose hybrids Amelia and Anjleeq.

Keywords: Fertilizer level, Fertigation, Rose, Amelia and Anjleeq

INTRODUCTION

Many aspects were emerging contributor to agricultural field in which one of the main factors is the cultivation of ornamental roses which have very high market demand in world wide. Flower arrangements have its unique place from very early civilization in global level. In Pakistan now a day, cut flower got superb attention due to especial aroma and beauty, every one want to buy it with reasonable price (Yusuf and Dennis, 1999). In Pakistan not extensive research had been done on the production of cut flower; although in Pakistan have the potential to grow cut flowers for large area. Some macroclimate in Pakistan is most suitable for cultivation of cut flower. Cut flower required less management practices and give a valuable price as compared with other ornamental plants. Therefore very large research is needed to conduct on cut flower production technology, which covers all aspects of cut flower production such as section and breeding of potential varieties, pruning, management of crops and crop harvest technology. Scores of millions of roses are sold every year and the demand for this cut flower has recently been increased tremendously in Pakistan. However, production potential is not fully exploited. There is a need to establish this enterprise on modern lines and conduct extensive research on all aspects of rose production technology, which may include section and breeding of potential varieties, pest and disease control, pruning practices, crop management and post harvest technology. Fertilizer inputs induce yield by increases size and flower of the plant. Application of fertilizer with different modes have different drawback, for supposing some fertilizer may be lost directly or some may be not reach to root of crops. All the method of fertilizer application, fertigation technique determined the timing of fertilizer, quantity of fertilizer and most important component water distribution. It is suggested that, to properly understand the effect of fertigation frequency on growth, flower production and quality of rose plants, its need optimum fertigation timing. It is possible to get maximum growth and plant yield with nitrogen fertilization management and irrigation interval (Yousaf et al., 2014). Optimum plant nutrition is very essential in plant growth, if it is not in sufficient amount, it reduced vigor of plant and affect yield of crops. The addition of NPK fertilizer level increases flower production (Young et al., 1976; Umma and Gowda, 1986). Two important factors play very good role in the production of plant such is water and nutrients. Fertigation make these two key factors for water and nutrients for better quality and yield. Fertigation is the low cost and improved rates of seasonal fertilizer application over traditional fertilizer application (Jaynes et al., 1992). Nevertheless, in fact rose are constantly harvested and have a large fluctuation transpiring area as compared with other crops, therefore care must be taken when scheduling fertigation. Great emphasis have been focusing on to get maximum fertilizer utilization, higher yield and uniform irrigation water, all these we can achieve through fertigation frequency and suitable fertilizer application with optimum quantity of irrigation water. The main benefit from fertigation is to get a reduced rate of fertilizer and interval between fertilizer applications. Providing a balanced nutrient dose and

water will improve water use efficiency, limited stress condition and production (Raviv & Blom, 2001). Therefore aim of this study was to do proper fertigation management for two different hybrids rose and also to investigate the effect on rose flowering and production.

MATERIALS AND METHODS

The experiment was conducted at Landscaping and Floriculture Research Substation, Multan during the year May 16, 2011. The main objective of this study was to explore different levels of fertigation on two hybrid tea rose varieties Amelia and Anjleeq.

The experiment has six treatments and three replications laid out with Randomized complete Block Design (RCBD). Fertigation was applied at the rate of 100, 200, 300, 400 and 500 ml per plant to all treatment but control without fertigation application. Compound fertilizer NPK having a ratio of (17:17:17) was applied at a rate of 2 g/L with irrigation water. All plants were getting pruning and treatments were applied after pruning and sprouting. Plants were left for growing and following data were recorded during the growing season.

- I. Vegetative growth: this included Plant Height (cm), Number Of Branches Per Plant, Number of leaves per plant
- II. Flowering characteristic: Days for the emergence of first flower, Number of flowers per plant, Number of petals per flower
- III. Chemical Analysis: Total Nitrogen was determined by micro kjeldhal apparatus (Black, 1965). Phosphorus and potassium was determined by the method adopted by (Yousaf et al. 2014).

Statistical Analysis:

Data were analyzed statistically by using the method described by (Steel et al., 1980). All mean were done with Least Significant Difference having LSD (0.005).

RESULTS AND DISCUSSION

Vegetative growth of rose:

Result recorded from data showed that plant height was significantly affected by different level of fertigation. Maximum plant height was noted in the treatment of 500 ml water per plant in both hybrid roses Amelia and Anjleeq 64.4 and 64.5 (cm) respectively. All treatment has a higher plant height compared with control which has a low plant height.

Another researcher also explained the effect of fertigation on plant height and production when fertigation was applied at a rate of 120,100 and 80 PPM (Krishna et al., 1999). Number of branches per plant is also significantly affected by the different fertigation level in both hybrids of rose. Number of branches were counted in the treatment of 400 ml than followed by 300 ml in both roses (6.5 and 8.0). While a very limited number of branches were in control treatment which is without fertigation level. Variety means were significant in both hybrid Amelia and Anjleeq (Table.1). (Veeranna et al, 2001) noted increment of 8.5 branches per plant in carnation with the application of 150 ppm, recommended K fertilizer through fertigation. Table.1 showed that Number of leaves per plant were significantly affected by the addition of compound fertilizer with different fertigation level. Comparatively similar number of plants were in treatment of control and 100 ml of fertigation in both hybrid roses. Significant differences were recorded in all fertigation level; number of leaves were in treatment of 400 ml that was 207 and 217 in Amelia and Anjleeq respectively. Variety means were also significantly affected in both hybrid roses. Anjleeq have more variety mean than Amelia. Just like our experimental result another scientist reported that number of leaves have positively increased by addition of fertigation with different level (Ashok and Rengasamy, 2000).

Table.1: Comparison of Vegetative Growth

Treatments	Plant Height (cm)		Number of branches per plant		Number of leaves per plant	
	Amelia	Anjleeq	Amelia	Anjleeq	Amelia	Anjleeq
Control	60.260 d	61.560 bc	3.5333 d	5.0333 f	201.33 b	213.33 c
100 ml	61.560 cd	61.440 c	3.6667 d	5.8667 e	203.00 ab	214.33 bc
200 ml	62.400 c	62.330 bc	4.5733 bc	6.3467 d	204.00 ab	214.67 bc
300 ml	63.067 bc	63.427 ab	5.3500 b	6.8333 c	203.33 ab	215.00 bc
400 ml	65.230 a	65.067 a	6.6733 a	8.0733 a	207.00 a	219.00 a
500 ml	64.424 ab	64.541 a	4.5026 c	7.3326 b	202.71 b	217.32 ab
Varieties Mean	61.777 b	64.343 a	4.7333 b	6.5850 a	203.56 b	215.44 a
LSD Value treatment	1.8927	1.9584	0.8024	0.4712	4.0919	2.9080
LSD Value of varieties	2.3240		1.5620		2.3389	

Means sharing the same letter in the columns do not differ significantly

Flowering stage:

Data from Table.2 revealed days to emergence of first flower was significantly induced by different level of fertigation in different level with compound fertilizer in both hybrids. Significantly more days to emergence was in the control treatment (77) compared with other treatment. In case of other treatment maximum days to emerge in treatment 100 ml followed by 200 ml (75 and 73). Variety has also showed significant differences in (70 and 69.44) flower was produced early when fertigation was applied with fertilizer (Palai *et al.* 2002). Numbers of flower per plant highly significantly increases by the addition of different fertigation level with compound fertilizer.

More number per plant was in treatment 400 ml such is 8, 33 in Amelia and Anjleeq respectively. Control and 100 ml fertigation have comparatively same result (4 and 5) and (4.7 and 5.8). Variety mean is also affected by the fertigation level in hybrid rose. Amelia has a low variety mean than Anjleeq. (Palai *et al.*, 2002) studied the response of rose cv. Montezuma at two different levels of NPK fertigation and observed a significant increase in the number of flowers per plant in response to NPK @ 300 ppm, 300 ppm and 200 ppm, respectively. Significantly more petals per plants were observed in treatment 400 ml 33.00 and 24.0 in both roses Amelia and Anjleeq respectively. While the minimum number of petals per plant was in control which have no fertigation treatment. It was also noted that fertigation under natural ventilated poly house increases flower per plant (Gurav *et al.*, 2002).

Table.2: Flowering stage influences by different level of fertigation

Treatments	Days to emergence of first flower		Number of flowers per plant		Number of petals per plant	
	Amelia	Anjleeq	Amelia	Anjleeq	Amelia	Anjleeq
(Control)	74 a	77 a	4.500 b	5.00 c	28.00 d	20.00 d
100 ml	72 ab	75 ab	4.700 b	5.83 bc	29.00 cd	21.00 cd
200 ml	71.33 ab	73 bc	5.000 b	6.033 bc	30.22 bcd	22.00 bc
300 ml	72 ab	75 ab	5.183 b	7.00 ab	31.00 abc	22.00 bc
400 ml	69.443 b	70 d	6.736 a	8.00 a	33.00 a	24.00 a
500 ml	72 ab	72.148 cd	6.444 a	7.361 ab	31.939 ab	22.787 ab
Varieties Mean	71.683 b	73.722 a	5.3900 a	6.5317 a	30.537 a	21.925 b
LSD Value treatment	2.7788	2.0178	0.8858	1.6966	2.7572	1.6547
LSD Value of varieties	2.1419		1.3532		2.1473	

Means sharing the same letter in the columns do not differ significantly

Chemical Constituent:

Maximum Nitrogen percentage (3.55%) was measured during treatment (400 ml fertigation) and (500 ml fertigation) in both hybrid roses (Table.3). Fertigation treatment 400 ml and 500 ml comparatively similar value, thus both these treatments 400 ml and 500 ml were statistically similar. Variety mean is also enhanced in both Amelia and Anjleeq by the addition of fertigation level. A similar result was also obtained by another researcher through the addition of compound fertilizer to Tuberoses (Amerjeet *et al.*, 2000).

Phosphorus Percentage in leaf (Table.3) significantly influences by the addition of different fertigation level in both roses. The higher Phosphorus percentage was observed in the treatment of 400 ml (0.31%) and both roses have a same phosphorus percentage. Low phosphorus percentage was found in control treatment which has no fertigation level. Variety mean significantly affected by fertigation level. Amelia has a higher Variety mean (2.9) than Anjleeq (2.7).

Table.3: Leaf constituent influences by different level of fertigation

Treatments	Leaf Nitrogen %		Leaf Phosphorus %		Leaf Potassium %	
	Amelia	Anjleeq	Amelia	Anjleeq	Amelia	Anjleeq
(Control)	2.38 f	2.38 f	0.27 c	0.24 c	2.28 c	2.28 c
100 ml	2.55 e	2.42 e	0.28 bc	0.25 c	2.28 c	2.28 c
200 ml	2.62 d	2.51 d	0.29 abc	0.26 bc	2.29 bc	2.29 bc
300 ml	3.31 c	3.31 c	0.29abc	0.29 ab	2.31 ab	2.32 ab
400 ml	3.51 a	3.55 a	0.31 a	0.31 a	2.35 a	2.35 a
500 ml	3.45 b	3.45 b	0.29 ab	0.30 a	2.33 a	2.34 a
Varieties Mean	2.9700 a	2.9367 a	0.2900 a	0.2750 a	2.3083 a	2.3100 a
LSD Value treatment	0.399	0.0345	0.0259	0.0313	0.0357	0.0364
LSD Value of varieties	0.7809		0.0318		0.0436	

Means sharing the same letter in the columns do not differ significantly

Comparison between individual treatment showed that there was a significantly higher leaf potassium percentage (2.35%) in the treatment (400 ml Fertigation). It was also noticed that control and 100 ml fertigation were at par statistically similar and showed minimum leaf potassium percentage (2.28%). Variety means indicate that there were differences between both roses. Another scientist also reported similar result by applying a different fertigation level with compound fertilizer altering content of Nitrogen, Phosphorus and Potassium in *Salvia Splendius* Plant (khattab *et al.*, 2002).

CONCLUSION

It is concluded from the present study, different level of fertigation has significantly affected rose production, flowering and chemical constituents. It is also proved from this experimental result that fertigation 400 ml and 500 ml with the addition of compound fertilizer is highly responsible in altering production flowering and chemical constituent.

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