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Improvement in Quality and Vase Life of Iris Flower by Salicylic Acid

Safia Ramzan[1], Imran Hassan[1] and Salman Mushtaq[1*]

[1]PMAS - Arid Agriculture University, Rawalpindi, Pakistan.

Authors' contributions

This work was carried out in collaboration between all authors. Author SR envisioned the project and conducted the experiment. Author IM provided guideline and supervised the project. Author SM helped in conduction of the experiment and managed the literature search.

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Short Communication

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ABSTRACT

Iris is very beautiful flower with a wide range of colors but with short vase life. The role of growth regulators have been significant in improving cut flowers vase life. Salicylic acid is one of the important growth regulator that may increase the shelf life of cut flowers. Present study was performed in the experimental area of Department of Horticulture, PMAS-Arid University, Rawalpindi to explore the effect of different concentrations of salicylic acid [0.5, 1.0, 3.0 and 5.0 SA mM] along with control on vase life of three cultivars. The collected data was analyzed statistically by using MSTAT-C and the means were compared for significance. Results indicated that Wedge Wood cultivar showed maximum flower size at SA @1 mM/L, while minimum flower size was observed with the same cultivar in control plots. Cultivar Pride of Holland showed maximum vase life at SA @1 mM/L while, minimum vase life was observed with Wedge Wood cultivar in control plots. SA@1mM/L is best for Iris flower vase life and quality.

Keywords: Cut flower; vase life; salicylic acid; flower quality.

**Corresponding author: Email: smushtaq006@gmail.com;*

1. INTRODUCTION

Cut flowers stand among the valuable products of horticulture. To cash that worth, importance of postharvest longevity of flowers cannot be ignored. Flower's tendency to maintain their physiological functions consistently even after harvest shortens their shelf life [1,2]. Ethylene production during physiological processes, and blockage of vascular tissues by air and microorganisms, are among the main reasons of flower short vase life [2,3]. A lot of work have been executed to increase the vase life of flowers by addition of different preservatives to the vase water. Generally floral preservative contains growth regulators, germicides, some mineral compounds, ethylene synthesis inhibitors and carbohydrates that are necessary to lengthen the vase life of cut flowers [4].

Iris [*Iris hollandica*] is an important cut flower belongs to family Iridaceae. Its beautiful petals have made its worth in cut flower industry [5]. Although, it's short vase life is challenging like others cut flowers [6]. The use of plant hormones can help in increasing flower's vase life.

SA, a plant hormone has diverse role in physiological and biological processes of plants [7,8]. During stress conditions, it saves plants from diseases and pathogen attack by modulating plant responses to stresses [9]. It suppresses ACC oxidase and ACC synthase activities and interferes with biosynthesis of ethylene, cytokinins and abscisic acid in plants [8]. SA and sucrose addition in vase solution of roses has significantly reduced the respiration rate, alleviated the moisture stress and improved the vase life [10]. Besides, SA treatment has improved vase life of several cut flowers [8]. By keeping in view, the importance of Iris, this study was performed to increase the quality and shelf life of Iris flower by the application of different concentrations of Salicylic acid.

2. MATERIALS AND METHODS

An experiment was conducted at post-harvest laboratory Department of Horticulture, PMAS-Arid Agriculture University Rawalpindi. Iris spikes were harvested from Horticulture research area and were brought to the postharvest Laboratory Department of Horticulture for studies. Experiment was laid down with two factor factorial Complete Randomized Design [CRD]. Three Dutch iris cultivars [Wedge Wood, Prof. Blaauw and Pride of Holland] were used. In order to study the effect of salicylic acid on vase life of iris cut flower cultivars, flowers stage were harvested at tight bud early in the morning and brought to the laboratory. The lower ends of the spikes were washed under running tap water. After this lower ends of spikes were cut slantingly and then placed in the jars of distilled water. Different concentrations of salicylic acid [T_1] 0.5, [T_2] 1.0, [T_3] 3.0 and [T_4] 5.0 SA [mM/L] along with [T_0] control were used to keep the spikes of iris cut flower cultivars under normal laboratory condition to evaluate the harvest longevity of iris cut flowers. Data on size of flower [cm] and vase life [number of days] was recorded during the course of study. Two flower spikes were selected randomly per treatment with 3 replications. The collected data was analyzed statistically by using MSTAT-C and the means were compared for significance [11].

3. RESULTS AND DISCUSSION

Cultivars and different concentrations of SA in vase solution showed significant differences for quality of Iris cut flower [Table 1]. Maximum flower size of 34 cm was observed in cultivar Wedge Wood, while minimum was observed in cultivar Prof. Blaauw. SA treatments showed significant differences in quality and vase life of Iris flower. Maximum flower size of 33.28 cm was observed in T_2 [SA @1 mM/L]. Minimum flower diameter of 24.31 cm was recorded in T_0 [control]. Interactive effect of cultivars and SA treatments showed maximum flower diameter of 36.65 cm in cultivar Wedge Wood with T_2 [SA @1 mM/L], while minimum flower diameter [20.49 cm] was observed with Prof. Blaauw cultivar in T_0 [control]. It was observed that lower concentrations of salicylic acid [0.5 and 1.0 mM/L] showed maximum flower diameter, while with the increase in concentration levels of SA, flower diameter started to reduce. Control plot also showed reduced flower diameter. Similar results were observed by Ezhilmathi [12] and Hajizadeh and Aliloo [13] on gladiolus and tuberose, respectively. Studies have shown positive effect of salicylic acid, ascorbic acid and citric acid on quality of several cut flowers [14]. Improved cut flower quality with salicylic acid might be due to the role of SA in plants physiological and biological processes [8], as it suppresses the ACC synthesis and reduces the oxidation process [4]. The other reason might be the cultivar effect as different germplasm performed differently in the same environmental conditions [15].

Table 1. Effect of SA concentrations on flower size [cm] of iris cut flower cultivars

Varieties	Treatments					Mean
	T_0 [control]	T_1 [0.5 SA mM/L]	T_2 [1.0 SA mM/L]	T_3 [3.0 SA mM/L]	T_4 [5.0 SA mM/L]	
V_1 [Wedge Wood]	27.6 ± 0.26 i	36.0 ± 0.03 b	36.6 ± 0.11 a	35.4 ± 0.08 c	34.4 ± 0.21 d	34.0 ± 0.89 A
V_2 [Prof. Blaauw]	20.5 ± 0.14 l	29.5 ± 0.08 h	30.5 ± 0.22 g	27.2 ± 0.09 i	24.3 ± 0.11 k	26.4 ± 0.98 C
V_3 [Pride of Holland]	24.9 ± 0.12 j	31.1 ± 0.08 f	32.7 ± 0.10 e	30.1 ± 0.07 g	29.4 ± 0.21 h	29.6 ± 0.70 B
Mean	24.3 ± 1.03 E	32.2 ± 0.97 B	33.3 ± 0.90 A	30.9 ± 1.20 C	29.4 ± 1.45 D	

Means not sharing a common letter differ significantly at 5% level of probability, ± = Standard Error.

Table 2. Effect of SA concentrations on vase life [days] of iris cut flower cultivars

Varieties	Treatments					Mean
	T_0 [Control]	T_1 [0.5 SA mM/L]	T_2 [1.0 SA mM/L]	T_3 [3.0 SA mM/L]	T_4 [5.0 SA mM/L]	
V_1 [Wedge Wood]	7.33 ± 0.15 f	8.47 ± 0.09 cd	8.93 ± 0.06 bc	7.46 ± 0.09ef	7.05 ± 0.06 h	8.29 ± 0.15 B
V_2 [Prof. Blaauw]	6.55 ± 0.05 i	7.83 ± 0.20 e	7.89 ± 0.11 de	7.16 ± 0.09 g	6.74 ± 0.09 i	7.12 ± 0.21 C
V_3 [Pride of Holland]	8.33 ± 0.09 d	9.17 ± 0.17 b	9.78 ± 0.15 a	8.66 ± 0.09 c	8.05 ± 0.05de	9.10 ± 0.17 A
Mean	7.12 ± 0.34 D	8.57 ± 0.23 B	8.94 ± 0.25 A	7.83 ± 0.30 C	7.44 ± 0.28 D	

Means not sharing a common letter differ significantly at 5% level of probability, ± = Standard Error.

Cultivars and different concentrations of SA in vase solution showed significant differences for vase life of Iris cut flower [Table 2]. Cultivar effects have showed that cultivar Pride of Holland performed best for vase life, while cultivar Prof. Blaauw shown minimum flower vase life. SA treatments showed that maximum vase life of 8.94 days was observed in T_2 [SA @1 mM/L], while minimum vase life of 7.12 days was recorded in T_0 [control]. Interactive effect of cultivars and SA treatments showed maximum vase life [9.78 days] in cultivar Pride of Holland with T_2 [SA @1 mM/L]. While, minimum vase life [6.55 days] was observed with Prof. Blaauw cultivar in T_0 [control] and T_4 [SA @ 5.0 mM/L]. Our results are in alike of Gerailoo and Ghasemnezhad [4] and Mehdikhah [16] in rose and gerbera flowers, respectively. Kazemi *et al*. [14] noted that treatment of carnation flower with 1.5 mM/L of SA solution increased the flower vase life. In another experiment, Amin [17] checked the effect of SA on chrysanthemum flower and noticed increased vase life from lower concentrations of SA. It might be the cause of Salicylic acid inhibitory effects on ethylene production [8].The other reason might be the Salicylic Acid regulatory role in plant growth and development and its positive role during stress conditions [18]. Moreover, 2.4 pH of SA might help in the preservation of cut flowers from pathogen attack by helping in stress conditions [19]. Among other reasons, germplasm might be the cause of altered vase life [17].

4. CONCLUSION

On the basis of present study it can be concluded that vase solution of salicylic acid @ 1.0 mM/L is best for vase life in cultivar Pride of Holland.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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