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Influence of chemicals on the vase life of flower buds and flowers of *Petunia cv. Mix*

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Abstract

The studies conducted on extending the vase life of flowers of *Petunia cv. mix* as means of dual purpose seed production technique to use the flowers for interior decoration revealed that flower buds and flowers dipped either in GA₃ at 200 and 500 ppm or coconut water at 50 and 100 per cent maintained the freshness of flower upto 5 and 3 days, respectively.

Keywords: Vase life, GA₃, coconut water, preservation

Introduction

Flowers are highly meant for their aesthetic value because of which they are highly recommended in interior decoration which becomes a venture in cultured societies. Persistence of prettyness for longer duration is made this venture economic one which necessitates the research on prolonging the withering of beauty which was intended to be due to the use of different chemicals of varying concentration. Significant progress has been made for in this area of flower preservation using simple or complex chemicals. In addition to the chemicals, the quality of cut flowers which used before, after or during handling and storage also said to decide the success of flower life (Rudnicki *et al.*, 1986)^[8].

The vase life of flower mostly depended on its water relation (Vanmeeteren and Van Gelder, 1980)^[9], reserved food materials and retarded rate of senescence (Borochoy and Woodson, 1989)^[2], and these can be manipulated by using wide range of chemicals based on their specific actions (Mayak and Halevy, 1980)^[5] on preservation of freshness in flowers. Halevy and Mayak (1974)^[4] were of the opinion that flower might withstand better if treated with appropriate chemical solutions. Since then significant progress has been made for proper usage of preservative solutions. Maintaining optimal water equilibrium is a prerequisite in post harvest handling of flowers. Hence an attempt was made with *Petunia* flower to extend the longevity of flower bud and flower using the preservative solutions of chemical and non chemical base in different concentrations and analysed for retention of freshness both with flower buds and flowers.

Materials and Methods

Uniform and straight normal flower buds and flowers were harvested with sharp knife during morning hours and brought to the laboratory. There after the stalks were removed and given a sharp cut leaving 2 cm so as to have a uniform stalk length before placing them into the 100 ml beaker containing chemical solutions at varying concentration as detailed below in three replicates.

1. KMNO₄ - 1, 2, 4 and 5%
2. 8HQS - 0.5, 1 and 2%
3. AgNO₃ - 0.5, 1 and 2%
4. AISO₄ - 0.1, 0.5 and 1%
5. BAP - 0.2%
6. Boric acid - 1, 2 and 5%
7. CuSO₄ - 0.1, 0.5 and 1%
8. Salicylic acid - 0.1, 0.5 and 1%

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9. Sodium thio sulphate - 1, 2 and 5%
10. IAA - 100, 200 and 500 ppm.
11. GA₃ - 100, 200 and 500 ppm
12. Sucrose - 1, 2 and 5%
13. Coconut water - 25, 50, 100%
14. 1% AgNO₃ + 0.5% 8HQS+ 5% sucrose
15. 0.5% AgNO₃ + 2% sucrose
16. 0.5% AlSO₄ + 2% sucrose dissolved in glycerol
17. Salicylic acid 100 ppm + 2% sucrose
18. 0.5% AgNO₃ + 0.5% Na₂ EDTA
19. Water

The treatment set up was maintained upto five days to observe the preservation period by taking daily counts and the vase life was indicates as days with respect to different chemical vase solution.

Results

The variation in duration of preservation was evident both with the chemicals and their concentration. The variation exist even with the material taken for preservation either as flower bud or flower.

Flower bud

Among the preservative solutions coconut water @ 25, 50 and 100 per cent, GA₃ 500 ppm and sucrose 5 per cent preserved the flower bud similar to fresh flower for 5 days. Whereas AlSO₄@ 0.1, 0.5 per cent, AgNO₃ @ 0.5, 1.0 and 2 per cent, sucrose @ 1 and 2 per cent and GA₃ 100 and 200 ppm preserved the flower bud for 4 days. 8 HQS solution @ 0.5, 1.0, 2 per cent, IAA @ 100, 200 and 500 ppm and boric acid @ 1.2 and 5 per cent preserved the flower bud for three days. While the water and BAP 0.2 per cent preserved the flower bud for 2 days. The combinational treatment also preserved the flower bud only for 1or 2 days. Dipping the flower buds in CuSO₄ @ 0.1, 0.5 and 1.0 per cent preserved the freshness of a flower only for a day (Table 1).

Flower

The flowers of *Petunia* placed in coconut water @ 50 and 100 per cent, sucrose @ 1,2 and 5 per cent, GA₃ @ 100, 200 and 500 ppm preserved the flowers for 3 days. Whereas water, IAA @ 100, 200 and 500 ppm, boric acid @ 1 and 2 per cent preserved the flowers only for 2 days. While KMnO₄ @ 1, 2, 4 and 5 per cent, 8 HQS @ 0.5, 1.0 and 2 per cent, AgNO₃ @ 0.5, 1.0 and 2 per cent, AlSO₄ @ 0.1 0.5 and 1 per cent BAP 0.2 per cent, CuSO₄ @ 0.1, 0.5 and 1.0 per cent, and the

combinational treatments preserved the flowers only for a day (Table 1).

Discussion

The results revealed that flower buds placed in the coconut water @ 25,50 and 100 per cent, sucrose 1, 2 and 5 per cent and GA₃ 500 ppm retained their freshness for 5 days without shrivelling and decaying. The increase in vase life of flower bud in coconut water might be due to the presence of chlorine, copper and sulphur present in thisbio solution which act as germicides and prevented stem plugging by inhibiting microbial growth thereby prolonging the vase life of cut flowers (Nair *et al.*,1999)^[7].

The cytokinin present in coconut water might have also delayed the senescence by retarding the loss of weight, enhancing the uptake of water and maintaining cell integrity thereby prolonging the vase life (Nair *et al.*, 2000) ^[7]. The prolonged vase life in sucrose might be due to the maintenance of carbohydrate supply that aids in turgidity of tissue (Halevy, 1976) ^[3]. GA₃ increased vaselife period as it acted as a growth promoting substances thereby lead to storage of flower buds for a period of 5 days. In general most of the preservatives contains carbohydrates, germicides, ethylene inhibitors, growth regulators and certain mineral compound and thereby maintained the vase life of cut flowers (Bhattacharjee, 1997)^[1].

On the other hand, decrease in vase life by these chemicals might be due to higher concentration of chemical solutions that resulted in the cellular integration of floret tissues through osmotic injury (Halevy and Mayak, 1974) ^[4] that resulted in wilting of flowers because of which the tender *Petunia* flowers were very sensitive to wilting / decaying with these chemicals.

The study carried out with fully opened *Petunia* flowers for preserving them in different solutions as that of the flower buds revealed that, coconut water @ 50 and 100 per cent, sucrose 1,2 and 5 per cent, GA₃ @ 100, 200 and 500 ppm preserved the flowers upto 3 days without loss in weight and shrivelling due to the reasons discussed elsewhere whereas IAA 100, 200 and 500 ppm and water preserved the vase life for 2 days while the other chemicals and their combinations preserved the vase life only for a day. Thus the study indicated that

- Flower buds could retain the vaselife better than flowers.
- Coconut water (50 and 100 per cent) and GA₃ (200 and 500 ppm) could preserve the vaselife upto 3 and 5 days for flowers and flower buds, respectively.

Table 1: Influence of chemicals on vase life of flower buds and flowers

Treatments	Flower buds					Flowers		
	Preservation period in days							
	1	2	3	4	5	1	2	3
KMNO ₄ 1.0%	+	+	-	-	-	+	-	-
2.0%	+	+	-	-	-	+	-	-
4.0%	+	+	-	-	-	+	-	-
5.0%	+	+	-	-	-	+	-	-
8 HQS 0.5%	+	+	+	-	-	+	-	-
1.0%	+	+	+	-	-	+	-	-
2.0%	+	+	+	-	-	+	-	-
AgNO ₃ 0.5%	+	+	+	+	-	+	-	-
1.0%	+	+	+	+	-	+	-	-
2.0%	+	+	+	+	-	+	-	-
AlSO ₄ 0.1%	+	+	+	+	-	+	-	-
0.5%	+	+	+	+	-	+	-	-
1.0%	+	+	+	+	-	+	-	-
BAP0.2%	+	+	-	-	-	+	-	-

Boric acid 1.0%	+	+	+	-	-	+	+	-
2.0%	+	+	+	-	-	+	+	-
5.0%	+	+	+	-	-	+	-	-
CuSO ₄ 0.1%	+	-	-	-	-	+	-	-
0.5%	+	-	-	-	-	+	-	-
1.0%	+	-	-	-	-	+	-	-
Salicylic acid 0.1%	+	+	+	-	-	+	+	-
0.5%	+	+	+	-	-	+	+	-
1.0%	+	+	+	-	-	+	+	-

Table 1 Contd...

Treatments	Flower buds					Flower		
	Preservation period in days							
	1	2	3	4	5	1	2	3
Sodium thio 1.0%	+	+	+	-	-	+	+	-
sulphate 2.0%	+	+	+	-	-	+	+	-
5.0%	+	+	+	-	-	+	+	-
IAA 100 ppm	+	+	+	-	-	+	+	-
200 ppm	+	+	+	-	-	+	+	-
500 ppm	+	+	+	-	-	+	+	-
GA ₃ 100 ppm	+	+	+	+	-	+	+	+
200 ppm	+	+	+	+	-	+	+	+
500 ppm	+	+	+	+	+	+	+	+
Sucrose 1.0%	+	+	+	+	-	+	+	+
2.0%	+	+	+	+	-	+	+	+
5.0%	+	+	+	+	+	+	+	+
Coconut water 25%	+	+	+	+	+	+	+	+
50%	+	+	+	+	+	+	+	+
100%	+	+	+	+	+	+	+	+
1% AgNO ₃ + 0.5% 8HQS + 5% sucrose	+	-	-	-	-	+	-	-
0.5% AgNO ₃ + 2% sucrose	+	-	+	+	-	+	-	-
0.5% AlSO ₄ + 2% sucrose dissolved in 100 ml glycerol	+	+	+	-	-	+	-	-
Salicylic acid 100 ppm + 2% sucrose	+	+	-	-	-	+	-	-
0.5% AgNO ₃ + 0.5% Na ₂ EDTA	+	+	-	-	-	+	+	-
Water	+	+	-	-	-	+	+	-

+ denotes flowers and flower buds remained fresh,

- denotes flowers and flower buds lost the life

Conclusion

The study demonstrated that flower buds preserved in coconut water (25%, 50%, 100%), sucrose (1%, 2%, 5%), and GA₃ (500 ppm) maintained freshness for five days without shriveling or decaying, primarily due to the presence of germicidal elements and growth-regulating substances. Coconut water's cytokinins delayed senescence, while sucrose provided carbohydrates to retain tissue turgidity. GA₃ promoted growth, extending the vase life of flower buds. Conversely, higher concentrations of some chemicals led to osmotic injury, causing wilting. Fully opened *Petunia* flowers, preserved in similar solutions, lasted up to three days, with coconut water and GA₃ proving most effective in extending their freshness.

Ethics and conflict of interest

The research is carried out as per research ethics and no conflict of interest is involved.

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