Research Article

Effect of Chemical Preservatives on the Shelf Life and Quality of the 'Veni' Prepared from *Tabernaemontana divaricata* 'Flore Pleno' Flowers

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Abstract

The present investigation was carried out in the laboratory of the Department of Horticulture, Assam Agricultural University, Jorhat to study the effect of different doses of chemical preservatives on the shelf life and quality of the 'Veni' prepared from loose flowers of *Tabernaemontana divaricata* 'Flore Pleno', a common garden shrub distributed throughout India with double white flowers. Among the 9 treatments taken, including the different doses of chemical preservatives such as boric acid, sucrose, ascorbic acid and the control, 'Veni' treated with 4% boric acid solution for 5 seconds resulted in minimum physiological loss in weight (10.90%), with minimum flower spoilage percentage (6.67%), and the longest shelf life (33.17 hr) after 12 hours of storage, and also recorded the highest consumer acceptability score (8.33 out of 9.0).

Keywords: chemical preservatives, shelf life, *Tabernaemontana divaricata*, veni

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Introduction

Tabernaemontana divaricata "Flore pleno', in the family Apocynaceae is a flowering shrub growing up to 1.5 to 1.8 m height with woody spreading branches and shiny dark green leaves. It is found distributed throughout the Asia, Australia, mangrove forest of China, Japan and India [1], where it is grown as a garden plant for its large, mildly fragrant, attractive, creamy-white petaled flowers with double rows of crimped, wavy corollas. Although it is mostly spring-blooming, flowers appear sporadically round the year.

In recent years, as a result of the influence of social media, the trend of using floral ornaments during different ceremonies has become fashionable.

The commonly garden shrub *Tabernaemontana divaricata*, known as Pinwheel flower has single pinwheel-like white flowers; these are made into hair adornments known as venis, either singly or in combination with crossandra etc, and are popular among women in South India.

Prolonging of the relatively short shelf life of this flower through the use of chemical preservatives like boric acid, sucrose, ascorbic acid as in case of garlands of jasmine, tuberose etc will be very beneficial for long distance transport and long-term storage of veni in the near future. Therefore, keeping all these factors in mind, this postharvest experiment was taken up in the Department of Horticulture, Assam Agricultural University, Jorhat to identify the most suitable chemical preservative for enhancing the shelf life and quality of the 'Veni' prepared from *Tabernaemontana divaricata* 'Flore pleno' flowers.

Materials and Methods

The present investigation was conducted in the Laboratory of the Department of Horticulture, Assam Agricultural University, Jorhat, Assam during the month of June, 2022 *Tabernamontana* 'Flore Pleno' freshly opened flowers were plucked from the shrubs in the campus early in the early morning hours (at 7 am), packed in polyethylene bags and brought immediately to the laboratory where 'veni' were immediately made by stringing 20 flowers each on to a thread with a needle (**Figure 1**). Initial fresh weights of the veni were recorded and then they were completely dipped into the preservative treatments for 5 seconds and then allowed to air dry, after which they were immediately packed into LDPE zip lock bags (**Figure 3**). The bags were then put in a thermocol box containing gel ice pads (**Figure 2**) and stored for 12 hrs. After this, the venis were removed from the ziplock bags and kept in ambient condition in the laboratory.

Figure 1: *Tabernamontana divaricata* 'Flore pleno' veni

Figure 2: *Tabernamontana divaricata* veni packed inside the thermocole box containing ice gel pads

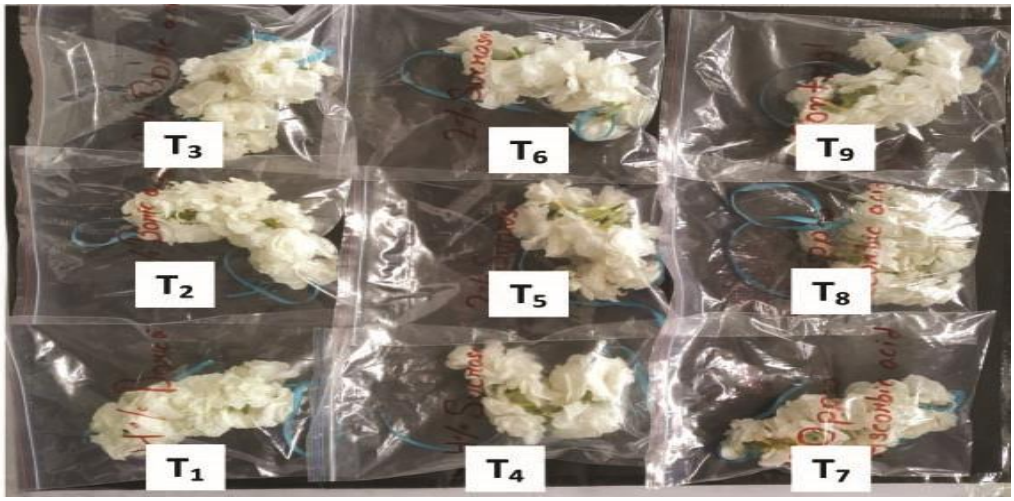

Figure 3 *Tabernamontana divaricata* veni inside the pp bags after different chemical treatments

Observations such as Physiological loss in weight (%), Flower spoilage (%), Shelf life and Consumer Acceptability Score were recorded at 12, 24 and 36 hrs after storage.

$$\text{Physiological Loss in Weight (PLW) (\%)} = \frac{\text{Initial fresh weight-fresh weight on the day of observation}}{\text{Initial fresh weight}} \text{ X } 100$$

$$\text{Flower spoilage (\%)} = \frac{\text{Number of spoiled flowers}}{\text{Total number of flowers}} \text{ X } 100$$

Consumer Acceptability Score

Consumer acceptability score of the flower venis were recorded based on a Hedonic scale rating from 1-9 by the panellists based on the freshness and colour at an interval of 12hr after storage.

Shelf life

Completion of the shelf life was calculated when the consumer acceptability score for the flowers went below 5 which is commercially unacceptable.

Results and Discussion

Physiological loss in weight (%)

Significant difference in terms of physiological loss in weight was observed in individual *Tabernaemontana divaricata* 'Flore pleno' venis (**Table 1**) as influenced by different treatments with chemical preservatives. Increase in PLW % could be observed with increase in time in all the treatments.

Flowers in the venis treated with 4% Boric acid showed the minimum physiological loss in weight (10.90 %, 30.26 % and 44.21 %) at 12hr, 24hr and 36hr after storage respectively followed by the flowers treated with 3% Boric acid. However, the maximum physiological loss in weight was recorded in control i.e., 23.15 %, 37.18 % and 58.20 % at 12hr, 24hr and 36hr after storage respectively.

Table 1 Effect of different chemical preservatives on the physiological loss in weight (%) and spoilage (%) of Tabenamontana *divaricata* 'Flore pleno' veni.

Treatment	Physiological Loss in Weight (%)			Spoilage (%)		
	12 hr after storage	24 hr after storage	36 hr after storage	12 hr after storage	24 hr after storage	36 hr after storage
T_1: BA 4%	10.90	30.26	44.21	6.67	16.67	56.67
T_2: BA 3%	11.89	32.17	47.93	8.33	25.00	66.67
T_3: BA 2%	15.82	35.11	48.11	11.67	26.67	71.67
T_4: Sucrose 4%	15.71	32.00	50.37	11.67	21.67	56.67
T_5: Sucrose 3%	18.11	33.06	50.42	13.33	26.67	71.67
T_6: Sucrose 2%	22.35	34.30	53.14	16.67	33.33	81.67
T_7: Ascorbic acid 100 ppm	13.36	34.11	48.13	13.33	28.33	73.33
T_8: Ascorbic acid 200 ppm	13.23	33.06	54.04	11.67	26.67	71.67
T_9: Control	23.15	37.18	58.20	21.67	38.33	91.67
S. Ed	0.32	0.24	0.24	3.04	3.51	2.36
CD (5%)	0.67	0.50	0.51	6.44	7.44	5.00

Flower Spoilage (%)

Table 1 showed the significant effect of different treatments on the flower spoilage. Minimum flowers spoilage was recorded in treatment treated with 4% Boric acid i.e., 6.67 %, 16.67% and 56.67% at 12hr, 24hr and 36hr after storage respectively. Maximum flowers spoilage was recorded in control i.e., 21.67 %, 38.33% and 91.67% at 12hr, 24hr and 36hr after storage respectively.

Consumer Acceptability of the flower venis

Significant differences were observed among the treatments in the acceptability score (**Table 2**) at 12hr and 24 hr after storage. Flowers treated with 4% Boric acid recorded the highest acceptability score i.e., 8.33 and 6.67 at 12hr and 24hr after storage respectively. Lowest score was observed in the control treatment.

Shelf life of flowers (hr)

After 12 hours after storage, the longest shelf life of 33.17 hr. was recorded in the flowers treated with 4% Boric acid (**Table 2**). This was followed by the flowers treated with 3% Boric acid; the minimum shelf life (14.35 hr) was recorded in the control treatment.

Boric acid being used as a mineral salt could increase the osmotic concentration as well as the pressure potential of the cells and thereby maintains the water balance in the petals as well as increase its longevity [2]. Besides this, boric acid also possesses some anti-ethylene activity which delays the senescence of the petals [3]. Similar observations were also reported by Chawla *et al.,* 2020 [4] where the postharvest life of the tuberose florets was improved by the boric acid treatment. Similarly, extension of shelf life of loose flowers of jasmine were reported by Jawaharlal *et al.,* 2012 [5] and Manimaram *et al.,* 2018 [6].

In addition, packing the flowers in LDPE zip lock bags resulting in the lower PLW and lower rate of spoilage might be due to higher relative humidity inside the films leading to reduced rate of respiration and lower moisture loss. Similar opinion was expressed by Mahajan *et al.,* 2016 [7] working on packaging of Bell pepper.

Storage of venis in thermocol box with gel ice pad might have modified the atmosphere inside the box and lowered the temperature around the flowers resulting in delayed respiration and senescence, thereby retaining their freshness for longer period. Our results are concomitant with the findings of Yathindra *et al.,* 2018 [8] in Jasmine.

Table 2 Effect of different chemical preservatives on the acceptability score (1-9) and shelf life (hr) of Tabenamontana *divaricata* 'Flore pleno' veni.

Treatment	**Acceptability score (1-9)**			**Shelf life (hr)**
	12 hr after storage	**24 hr after storage**	**36 hr after storage**	
T_1: BA 4%	8.33	6.67	3.33	33.17
T_2: BA 3%	8.20	5.67	2.67	25.37
T_3: BA 2%	7.44	4.17	2.27	20.17
T_4: Sucrose 4%	7.78	4.40	2.67	22.20
T_5: Sucrose 3%	7.67	3.67	2.67	19.38
T_6: Sucrose 2%	6.51	3.50	2.17	16.07
T_7: Ascorbic acid 100 ppm	6.80	3.83	2.33	17.13
T_8: Ascorbic acid 200 ppm	7.11	4.10	2.67	17.43
T_9: Control	5.13	3.10	1.33	14.35
S. Ed	0.40	0.50	0.90	4.27
CD (5%)	0.85	1.06	NS	9.03

Conclusion

From the experiment, it can be concluded that the fresh flower veni of *Tabernaemontana divaricata* 'Flore pleno' treated with 4% Boric acid for 5 seconds and followed by air drying before packing in polyethylene bags resulted in lower PLW and delayed flower spoilage, resulting in significantly longer shelf life.

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