

Extending Post-Storage Life of different loose-flowers through 24 hours temperature pull-down under Ecofrost Cold Room

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Abstract:

Uniform and healthy loose flowers of Marigold cv. “Calcutta Jambo”, Tuberoses cv. “Local” and Chrysanthemum “White” and “Yellow” colored were used for the study in October 2018. The aim of this study was to determine the effectiveness through 24 hours pull down temperatures and storage at cold room conditions (4°C + 95% RH) on the post-storage life of loose flowers. The post-storage life of different loose flowers was tested by holding flowers at room temperature, after taking out from the cold room of Ecofrost at the end of the day – 1, 2, 3, 4 and 5. The results showed that keeping loose flowers at cold room conditions recorded the maximum storage-life (days) as compared to the flowers kept at room temperature.

Keywords- Marigold, Tuberoses, Chrysanthemum, Loose flower, Ecofrost, Cold Room, etc.

Introduction:

In the recent years, floriculture has emerged as a profitable agribusiness in India and worldwide, as improved standards of living and growing consciousness among the citizens across the globe to live in the environment-friendly atmosphere has led to an increase in the demand of floriculture products in the developed as well as developing countries worldwide. The Government of India has identified floriculture as a sunrise business. The steady increase in demand for flowers, floriculture has become one of the important commercial trades in Agriculture (Vahoniya *et al.*, 2018).

In India, the demand for flowers is quickly increasing during festival, Valentine day, Puja, Wedding seasons and Christmas. Due to inadequate supply chain and cold storage facilities, the seller can't fulfill market demand, and during this period, flowers prices are at peak.

Floriculture is an old farming activity in India having immense potential for generating gainful self-employment among small and marginal farmers'. Southern India controls the major production of flowers and Tamilnadu is number one in loose flowers production (Bahirat and Jadhav, 2011).

Flowers are the most beautiful creation of the earth. Flowers symbolize beauty, purity, peace, love, affection, and honesty. In India, major flower growers refer to those which produces high-value loose flowers like Jasmine, Crossandra, Marigold, China Aster, Chrysanthemum, Tuberoses, and Gaillardia. Loose flowers are critical for handling after harvesting from the field. There are some reports, which suggest that improper post-harvest handling accounts for 20 to 30% of flowers' loss during marketing (Jadhav *et al.*, 2014).

Rapid cooling and maintaining proper temperature are key requirements for managing the vitality of loose flowers. The storage systems play a pivotal role in the preservation of freshness of the produce along with quality. Refrigerated storages provide growers with the capability of extending the storage-life of loose flowers and, therefore, widen the marketing potential of the product. Temperature is considered the most important factor affecting the quality and longevity of flowers (Cevallos and Reid, 2001; Leonard *et al.*, 2001; Gul and Sultan, 2007; Shahri *et al.*, 2009; and Shahri and Tahir, 2011). At lower temperatures, flowers have a lower respiration rate and consume stored energy slowly (Van Doorn and De Witte, 1991, Cevallos and Reid, 2001; Shahri *et al.*, 2009; Jadhav *et al.*, 2018).

Materials and Methods

The present investigation was carried out in the Agricultural Research Laboratory of Ecofrost Technologies Pvt. Ltd. Jeevan Nagar, Tathawade, Pune (MH), India during October 2018. Marigold cv. 'Calcutta Jambo'; Tuberose cv. 'Local'; and Chrysanthemum 'White and Yellow' colored loose flowers were harvested in early morning at 7.00 to 9.00 am. Marigold, Chrysanthemum and Tuberose loose flowers were harvested at the fully opened stage but not over mature lower petals, and at fully developed bud stage (Plate 1); respectively and then transported within 2.30 hours by AC cab to the Agricultural Research Laboratory of Ecofrost Technologies Pvt. Ltd., Jeevan Nagar, Tathawade, Pune and then immediately prepared for tests.

All sorted flowers were placed at the Ecofrost cold room. In the 24 hours pull down process, temperature of loose flowers was reduced by 1°C per hour from 28 to 4°C. 10 kg flowers of each crop were put inside the cold room. Every day, different flower sets were checked for every kind of infection. Post-storage life of different flowers was recorded at room temperature after taking out from the cold room at the end the day – 1, 2, 3, 4 and 5. Shelf life of different loose flowers was recorded at room temperature.

Observations recorded

The observations regarding the shelf life and post-storage life at room temperature were recorded for Marigold cv. 'Calcutta Jambo'; Tuberose cv. 'Local'; and Chrysanthemum 'White and Yellow' colored flowers and cumulative data was subjected to statistical analysis.

Results & Discussion

Observations regarding the shelf life and post-storage life were noted in Table 1 and Table 2; respectively.

Table 1. The shelf life (days) of different loose flowers at room temperature.

Sr. No.	Loose-flowers	Shelf-life at room temperature
1	Marigold cv. 'Calcutta Jambo'	2.5 Days
2	Tuberose cv. 'Local'	1.5 Days
3	Chrysanthemum 'White' color	2.5 Days
4	Chrysanthemum 'Yellow' color	2.5 Days

Plate 1. Fresh different loose flowers samples.

Marigold cv. "Calcutta Jambo"



Tuberose cv. "Local"



Chrysanthemum- Yellow colored flowers



Chrysanthemum- White colored flowers

Table 2. Post-storage life (days) of different loose flowers at room temperature, after taken out from the cold room (4°C and 95% Relative Humidity).

Sr. No.	Loose-flowers	Loose flowers taken out from the cold room after the end of				
		1 day	2 days	3 days	4 days	5 days
Post-storage life of loose flowers at room temperature						
1	Marigold cv. 'Calcutta Jambo'	2.5 Days	2.0 Days	2.0 Days	1.5 Days	1.5 Days
2	Tuberose cv. 'Local'	1.5 Days	1.5 Days	1.5 Days	1.5 Days	1.0 Days
3	Chrysanthemum 'White' color	2.5 Days	2.5 Days	2.5 Days	2.5 Days	2.0 Days
4	Chrysanthemum 'Yellow' color	2.5 Days	2.5 Days	2.5 Days	2.5 Days	2.5 Days

Post-storage life of different loose flowers at room temperature was recorded after taking out from the cold room at the end of the day -1, 2, 3, 4 and 5 (Table 2). The low temperature was effective in delaying senescence process. The post-storage life of loose flowers at room temperature was influenced by reduction of 1°C temperature per hour from 28°C to 4°C and storage conditions (4°C and 95% RH).

Pull down temperature helped to reduce field heat and respiration, prevent moisture loss from condensing on the flowers and reduce the risk of infection (Jadhav and Gurav, 2018).

Storage of loose flowers under low temperature helped to increase the storage life inside the cold room and post-storage life at room temperature. The rate of respiration and other enzymatic activities were reduced, thereby delaying the senescence process in the florets (Shil *et al.*, 2017).

In the present investigation, the beneficial effect of the combination of reduction of 1°C per hour from 28°C to 4°C in the first day immediately after harvesting and low-temperature storage resulted in maintaining better-quality of flowers.

Conclusion

In conclusion, by reduction of 1°C per hour from 28°C to 4°C in the first day immediately after harvesting loose flowers and low-temperature storage can extend the shelf life of Marigold (Calcutta Jambo), Chrysanthemum (Yellow and White colored) and Tuberose (Local) loose-flowers.

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