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Standardization of Eco-Friendly Retail Packages for Freshness Retention and Shelf Life Extension of Jasmine Flower

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A B S T R A C T

Jasmine is one among the important commercial flower crops popular for its pleasent fragrance in domestic as well as export market. Packaging material plays an important role in retention of freshness of jasmine flowers. At present jasmine flowers are packed in bulk in wet gunny bags and sold in whole sale market. For retail market, jasmine flowers are loosely packed in polyethylene cover of jasmine flowers which is not eco-friendly. Hence an attempt is made to standardise alternate eco-friendly packages for retail market which will retain freshness and extend the shelf life of jasmine flowers. Experiments were conducted by packaging loose jasmine flowers in arecanut sheath cup, banana sheath cup and peepil leaf cup. The samples were stored in both ambient (Temp 25-26°C, RH 52%) and low temperature (Temp 10^0 C, RH 86%). Periodical observations on colour index, freshness index and fragrance index were done using standard procedures. It was found from the studies that areca nut sheath cup was found suitable for retail packaging of jasmine with higher freshness (82.26%), colour (78.15%) and fragrance (71.21%) indices. The samples had shelf life up to 2 days in ambient storage condition when compared to those packed in banana sheath cup and peepil cup which had less freshness and fragrance index in similar storage condition. In low temperature storage also jasmine flower packed in areca nut sheath cup had freshness index (81.94%), colour index (59.98%) and fragrance index (58.52%) and less spoilage (7.08%), as compared to those packed in banana sheath cup and peepil leaf cup. The shelf life of the sample was 7 days in low temperature storage. This technology of retail packing of jasmine flower in areca nut sheath cup could be widely adopted in super market and e- marketing.

Introduction

Jasmine is one among the important commercial flower crops popular for its pleasent fragrance in domestic as well as export market. Packaging material plays an important role in retention of freshness of jasmine flowers. At present jasmine flowers are packed in bulk in wet gunny bags and sold in whole sale market. Jasmine loose flowers are packed in bamboo basket (around 10-15kg are packed in each basket) and the baskets covered with wet gunny bags or muslin cloth (Safeena *et al.*, 2015). They are transported to the nearby wholesale market for selling. For retail market, polyethylene covers are largely

used for packaging of jasmine flowers which is not eco-friendly. Roy Chowdhury *et al.*, 2011) observed the beneficial effect of banana sheath over polyethylene and polypropylene in the packaging experiment of jasmine. An attempt is made to standardise eco-friendly packages like areca nut sheath cup, banana sheath cup and peepil leaf cup which will retain freshness and extend the shelf life of jasmine flowers.

Materials and Methods

Experiments were conducted by packaging loose jasmine flowers in areca nut sheath cup, banana sheath cup and peepil leaf cup. The samples were stored in both ambient (Temp 25-26°C, RH 52%) and low temperature (Temp 10^0 C, RH 83%).

Periodical observations on PLW, colour index, freshness index and fragrance index were done. The PLW was computed by subtracting fresh weight of flowers on any day from its weight on the previous day and expressed as percentage.

Visual observations such as colour retention Index, freshness index, fragrance index and shelf life (days) were recorded as sensory evaluation scoring based on Madhu (1999).

All the experiments were conducted with four replications and statistically analyzed using Completely Randomised Design (CRD) with WASP 2.0 software (Bhuvaneswari *et al.*, 2015)

Results and Discussion

Freshness index

Among different packages studied, freshness index (%) of jasmine flower was higher in areca nut sheath cup (82.26), followed by banana sheath cup (78.38), peepil leaf cup (77.14) at ambient storage condition (Table 1). In low temperature storage, freshness index in the areca nut sheath cup is lesser than banana sheath cup and peepil leaf cup (Table 2). Packaging maintains higher humidity which slows down the process of moisture loss. Respiration loss also slows down due to proper balance of Co_2 and O_2 (Anzueto and Rizve, 1985).

Fragrance index

Similarly fragrance index which is the important quality character was higher in jasmine packed in areca nut sheath cup (71.21%), followed by banana sheath cup and peepil leaf cup (66.67%) both in ambient and low temperature storage (Table 1 and 2). This may be due to biological nature of areca nut sheath to retain the fragrance without any off flavour development.

These results are in accordance with the findings of Karuppaiah *et al.,* (2006). The fragrance retention of jasmine was higher in areca nut sheath cup kept in low temperature storage (73.33%) even after seven days of storage than in ambient condition.

Colour index

Colour index which is used to determine the retention of whiteness of jasmine flower during storage was also higher in the flowers packed in areca sheath cup both in ambient and low temperature storage when compared to other package. Low temperature storage of jasmine in areca sheath cup had good colour retention upto 7 days of storage as compared to those stored at ambient condition for 2 days (Fig. 2). These results are in agreement with extension of shelf life of jasmine flowers for 5 days in low temperature storage by Thamarai selvi *et al.*, (2010). Higher relative humidity and lower temperature might have favoured the colour retention of jasmine flower.

Experiment details

Observations recorded

Freshness index

$$FI = \frac{(7 \times X_1) + (6 \times X_2) + (5 \times X_3) + (4 \times X_4) + (3 \times X_5) + (2 \times X_6) + (1 \times X_7)}{(X_1 + X_2 + X_3 + X_4) \times 4} \times 100$$

Colour retention index

$$CRI = \frac{(9 \times X_1) + (8 \times X_2) + (7 \times X_3) + (6 \times X_4) + (5 \times X_5) + (4 \times X_6) + (3 \times X_7) + (2 \times X_8) + (1 \times X_9)}{(X_1 + X_2 + X_3 + X_4 + X_5 + X_6 + X_7 + X_8 + X_9) \times 9} \times 100$$

Fragrence Index

$$\frac{(1 \times X_1) + (2 \times X_2) + (3 \times X_3) + (4 \times X_4)}{(X_1 + X_2 + X_3 + X_4) \times 4} \times 100$$

Fragrance level	Ranking
Least and undesirable	1
Mild	2
Strong	3
Very strong	4

Condition of flowers	Score	Number of flower buds
Almost all buds	7	X_1
Partial to half open flowers	6	X_2
Half to full open flowers	5	X_3
Partial to half open flowers, slightly wilted	4	X_4
Half to full open flowers, slightly wilted	3	X_5
Partial to half open flowers, fully wilted	2	X_6
Half to full open flowers fully wilted	1	X_7

Flower colour	Score	Number of flower buds
Bright white	9	X_1
Dull white	8	X_2
Cream or yellowish	7	X_3
1 to 10% brown	6	X_4
11 to 15% brown	5	X_5
16 to 50% brown	4	X_6
51 to 75% brown	3	X_7
76 to 90% brown	2	X_8
All brown	1	X_9

Table.1 Jasmine in retail packages at ambient storage (Temp. 25-26°C, RH 52%) after 48h of storage

Treatments	Freshness Index	Colour retention Index	Fragrance Index	PLW (%)
Peepil Leaf cup	77.14	76.51	66.67	8.33
Arecanut shealth cup	82.26	78.15	71.21	10
Banana shealth cup	78.38	77.18	66.67	8.33
CD (1%)	2.38	1.42	1.36	1.52

Table.2 Jasmine in retail packages at low temperature storage (Temp 8^0 C, RH 85%) after 7 days of storage

Treatments	Freshness Index	Colour retention Index	Fragrance Index	PLW (%)	Spoilage (%)
Peepil Leaf cup	89.94	64.83	65.33	5.97	15.89
Arecanut sheath cup	81.94	61.98	58.52	7.6	7.08
Banana sheath cup	87.88	63.15	64.65	4.16	8.37
CD (1%)	1.955	1.948	2.275	1.394	2.060

Fig.1a, b, c Jasmine flower in different packages at ambient storage (Temp. 25-26°C, RH 52%)

Fig.1a Jasmine flower in areca nut sheath cup

Fig.1b Jasmine flower in peepil leaf cup

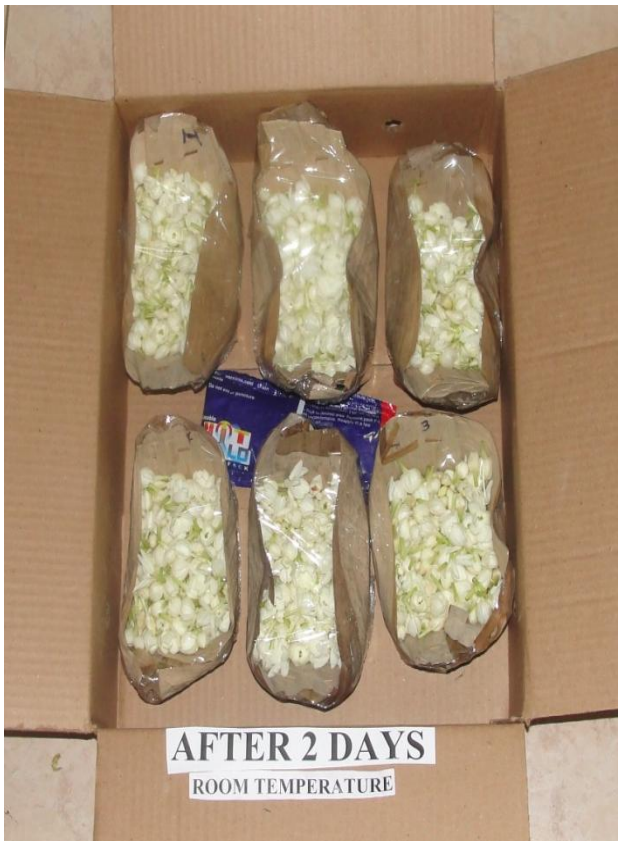

Fig.1c Jasmine flower in banana sheath cup

Fig.2 Jasmine in different packages at low temperature storage (Temp.10^0 C, RH 83%)

Shelf life

The spoilage (%) of jasmine flower in areca nut cup package (7.08%) which was lesser by 50% as compared to peepil leaf packages (15.89%) in low temperature storage (Table 2). The shelf life of jasmine flowers in all the retail packages were 7 days in low temperature storage and 2 days in ambient storage condition.

It was found from the studies that areca nut sheath cup was found suitable eco-friendly retail package for jasmine flower with higher freshness and fragrance indices with lesser spoilage both in ambient (Temp. 25-26°C, RH 52%) and low temperature (Temp 8^0 C, RH 85%) storage (Fig. 1). The jasmine flower had shelf life of 2 days in ambient storage condition with areca nut cup as primary pack and corrugated fibre board box (CFB box) with gel pack as secondary pack. The jasmine flower packed in areca nut package had shelf life of 7 days in low temperature storage.

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