

Effect of different packages on the post harvest behaviour and shelf life of jasmine (*Jasminum sambac*)

P. Karuppaiah*, S. Ramesh kumar and M.Rajkumar

Department of Horticulture, Faculty of Agriculture, Annamalai University, ANNAMALAI NAGAR (T. N.) INDIA

ABSTRACT

Investigation was carried out in the Department of Horticulture, Faculty of Agriculture, Annamalai University during 2004-2005 to find out the effect of different packages on the post harvest behavior and shelf life of Jasmine (*Jasminum sambac*) in CRD with five replications. Thirteen types of packages such as 100,200,300 gauge of polyethylene (PE) bags each with 0.25 per cent ventilation and without ventilation, HDP bag, bamboo basket each with muslin cloth and news papers as cushioning materials, palmyrah leaf sheath box, gunny bag, corrugated card board box and CFB box were used. The periodical observations recorded every 24hrs from 0hrs to 72 hrs were physiological loss of weight, freshness index, flower opening index, colour retention index, fragrance index, phenol content and shelf life. Results of this experiment envisaged that flowers packed in 200 gauge PE bags without ventilation proved effective in extending shelf life of Jasmine flowers up to 81 hours with less physiological loss of weight and phenol content and high freshness index, flower opening index, colour retention index and fragrance index. This was closely followed by 300 gauge PE bag without ventilation.

Key words : Jasmine, Packages, Post harvest technology, Shelf life.

INTRODUCTION

In the innumerable lovely creations of nature, flowers have moved the human mind more than anything else. Among the different kind of flowers, Jasmines take unnumero position because of their elegant star like flowers, rich fragrance and their multifaceted aesthetic utilities. Hence, it is the very human nature to crave for preserving or prolonging the life of such things, which are the source of immense pleasure. Presently, Jasmines are grown for fresh flower trade with obsolete technologies and lack of improved method of harvesting, packing, storing and transporting. Under normal condition, Jasmine flowers do not retain for more than a day and show a sign of browning or rotting on the second day with an abrupt loss in fragrance. Krishnamoorthy (1990) reported that packaging is a fundamental tool for post harvest management of highly perishable commodities and adequate packaging protects the produce from physical, physiological and pathological deterioration during transport and marketing and enhancing their shelf life by retaining their attractiveness. Even if two per cent wastage of horticultural produce is reduced from the production centers to the market, there will be a saving of rupees 100-200 crores per year in India (Ramana *et al*, 1988). Therefore, a study was undertaken to assess the feasibility of packages on the post harvest behaviour and shelf life of Jasmine (*Jasminum sambac*).

MATERIALS AND METHODS

The present investigation was carried out in the Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalainagar during 2004-2005. Uniform size flower buds of malligai (*Jasminum sambac*) free from bruising and mechanical injury were harvested during evening time. Thirteen types of packages such as 100, 200, 300 gauge of polyethylene (PE) bags each with 0.25 per cent ventilation and without ventilation, high density polyethylene(HDP) bag, bamboo basket each with muslin cloth and news papers as cushioning material, Palmyrah leaf sheath box, gunny bag, Corrugated card board box and Corrugated fiber board box were used. The experiment was carried out with fourteen treatments in CRD under room condition with five replications. Observations recorded daily during storage were physiological loss in weight (PLW), freshness index, flower opening index, colour development index Fragrance index, phenol content and shelf life. The PLW was computed by subtracting fresh weight of flowers on any day from its weight on the previous day and expressed as percentage. The freshness index and flower opening index were worked out using the procedure of Madhu (1999). The colour

development index and fragrance index were estimated through organoleptic method using a panel of judges up to the end of the storage. The score was expressed on 0-9 Hedonic scale and averaged (Amerine *et al.*, 1965) Shelf life of flowers was assessed by recording the number of hours up to which 50 per cent or more flowers kept fresh with out exhibiting brown pigmentation. Total phenols were estimated using the procedure of Swain and Hills (1959). The data were statistically analysed using the method of Panse and Sukhatme (1978).

RESULTS AND DISCUSSION

Packaging of Jasmine flowers in PE bags of different thickness and vents, gunny bags, bamboo baskets and corrugated boxes in general recorded the improved shelf life, freshness index, flower opening index, colour development index and fragrance index with less PLW (Table 1 and 2).

Different packages were significantly affected the PLW (Table 1). The minimum PLW at 24, 48 and 72 were noticed in flowers packed with 200 gauge PE bag without ventilation (T_4) followed by (T_3) 200 PE bag with 0.25 ventilation (T_1), while the unpacked flowers recorded the maximum value at 24, 48 and 72 hrs of storage. This might be due to maintenance of optimum humidity and proper balance of CO_2 and O_2 concentration which interns slows down the process of respiration and evapotranspiration and ultimately reduced the PLW (Ahn-Gwiyeen and Ahn, 1997). The results are in close agreement with the findings of Nirmala and Venkatesh Reddy (1993).

It is revealed from the results that the freshness index and flower opening index were significantly influenced by the treatments (Table 1). The high freshness and flower opening index were observed with 200 gauge PE bag with no ventilation, while the unpacked flowers lost their freshness and bud stage within 24 hours. The corrugated boxes maintain the normal freshness and flower opening index up to 48 hours. While the gunny bag, bamboo baskets, Palmyrah leaf sheath box and HDP bag failed to maintain the freshness up to 48 hours. Marchal and Nolin (1990) and Madaiah and Venkatesh Reddy (1994) reported that polyethylene films of 200 to 300 gauge are capable of modifying the atmosphere in the packs and thus allowing the flowers to be stored for several days without affecting the freshness. The results are in line with the findings of Anandaswamy *et al.* (1963). Packaging of Jasmine flowers in PE bags of 200 and 300 gauge thickness with no ventilation retained the characteristic white colour and fragrance up to 72 hours and corrugated boxes retained up to 48 hours, while the flowers packed

*Author for correspondence

Table 1 : Effect of different packages on physiological loss in weight, freshness and flower opening index of Jasmine flowers.

Treatment	logical Loss in Weight			Freshness Index				Flower Opening Index			
	24hrs	48hrs	72hrs	0hrs	24hrs	48hrs	72hrs	0hrs	24hrs	48hrs	72hrs
T ₁ -Non-packed (Control)	25.11 (30.06)	45.28 (42.29)	61.21 (51.48)	100.00	77.33	0.00	0.00	100.00	48.52	36.52	16.32
T ₂ -100 gauge PE bag, no vent	10.06 (18.47)	16.65 (24.08)	18.22 (25.26)	100.00	99.93	80.33	52.67	100.00	67.32	54.53	44.56
T ₃ -100 gauge PE bag, 0.25% vent	18.37 (25.37)	28.45 (32.23)	32.71 (34.88)	100.00	80.11	0.00	0.00	100.00	90.32	80.12	71.08
T ₄ -200 gauge PE bag, no vent	0.34 (3.31)	1.40 (6.89)	1.45 (6.91)	100.00	100.00	96.82	87.12	100.00	98.58	93.43	78.57
T ₅ -200 gauge PE bag, 0.25% vent	4.63 (12.30)	7.84 (1.62)	8.21 (16.65)	100.00	100.00	89.98	62.85	100.00	93.93	82.53	75.12
T ₆ -300 gauge PE bag, no vent	2.48 (9.20)	4.90 (12.78)	5.04 (12.97)	100.00	100.00	91.25	70.65	100.00	96.32	87.63	77.53
T ₇ -300 gauge PE bag, 0.25% vent	7.86 (16.24)	13.33 (21.41)	14.31 (22.22)	100.00	100.00	85.50	58.12	100.00	86.42	75.48	65.32
T ₈ -HDP bag	13.55 (21.58)	21.82 (27.84)	24.47 (29.64)	100.00	100.00	0.00	0.00	100.00	73.56	61.56	50.42
T ₉ -Bamboo basket (muslin cloth as cushion)	21.18 (27.74)	32.97 (35.04)	38.98 (38.63)	100.00	79.68	0.00	0.00	100.00	68.43	57.43	48.52
T ₁₀ -Bamboo basket (news paper as cushion)	22.36 (28.21)	33.98 (35.65)	40.40 (39.46)	100.00	78.98	0.00	0.00	100.00	63.14	51.58	40.67
T ₁₁ -Palmyrah leaf sheath box	19.33 (26.07)	29.84 (33.11)	34.64 (36.05)	100.00	79.51	0.00	0.00	100.00	65.56	53.47	42.57
T ₁₂ -Gunny bag	15.23 (22.96)	24.28 (29.52)	27.43 (31.58)	100.00	80.96	0.00	0.00	100.00	56.72	45.82	30.52
T ₁₃ -Corrugated cardboard box	10.98 (19.32)	18.27 (25.30)	20.15 (26.67)	100.00	99.26	0.00	0.00	100.00	55.12	39.57	25.73
T ₁₄ -Corrugated fiber board box	6.81 (15.06)	11.80 (20.09)	12.39 (20.78)	100.00	100.00	84.98	59.65	100.00	88.52	72.53	60.52
SEd	0.94	0.89	1.26	-	00.33	0.68	1.42	-	1.52	1.48	1.62
CD @ 5%	1.91	1.70	2.55	-	0.68	1.37	2.87	-	3.07	2.98	3.27

Table 2: Effect of different packages on colour retention index, fragrance index, phenol content and shelf life of Jasmine flowers.

Treatment	Color Retention Index				Fragrance Index				Phenol content				Shelf life
	0hrs	24hrs	48hrs	72hrs	0hrs	24hrs	48hrs	72hrs	0hrs	24hrs	48hrs	72hrs	
T ₁ -Non-packed (Control)	9.00	8.00	2.00	1.00	9.00	6.00	2.00	1.00	42.00	51.87	61.23	75.06	36.37
T ₂ -100 gauge PE bag, no vent	9.00	9.00	2.00	1.00	9.00	8.00	2.00	2.00	42.00	49.87	57.12	70.68	46.45
T ₃ -100 gauge PE bag, 0.25% vent	9.00	9.00	2.00	1.00	9.00	8.00	2.00	1.00	42.00	50.65	59.81	71.82	48.52
T ₄ -200 gauge PE bag, no vent	9.00	9.00	8.78	6.61	9.00	8.00	6.52	3.00	42.00	46.87	52.86	67.85	81.42
T ₅ -200 gauge PE bag, 0.25% vent	9.00	9.00	6.85	4.98	9.00	8.00	4.68	3.00	42.00	47.82	52.06	68.99	80.23
T ₆ -300 gauge PE bag, no vent	9.00	9.00	8.30	6.00	9.00	8.00	5.63	3.00	42.00	46.78	51.98	68.95	78.52
T ₇ -300 gauge PE bag, 0.25% vent	9.00	9.00	4.33	3.67	9.00	8.00	4.68	2.00	42.00	40.01	56.98	75.25	76.24
T ₈ -HDP bag	9.00	9.00	2.00	4.98	9.00	7.00	2.00	1.00	42.00	50.68	58.12	70.98	75.26
T ₉ -Bamboo basket (muslin cloth as cushion)	9.00	9.00	2.00	6.00	9.00	7.00	2.00	1.00	42.00	50.12	60.80	71.65	55.42
T ₁₀ -Bamboo basket(news paper as cushion)	9.00	9.00	2.00	3.67	9.00	7.00	2.00	1.00	42.00	51.28	60.89	74.60	57.32
T ₁₁ -Palmyrah leaf sheath box	9.00	9.00	2.00	1.00	9.00	7.00	2.00	1.00	42.00	50.25	59.16	71.85	54.52
T ₁₂ -Gunny bag	9.00	9.00	2.00	1.00	9.00	7.00	2.00	1.00	42.00	49.18	58.68	71.36	50.12
T ₁₃ -Corrugated cardboard box	9.00	9.00	2.00	1.00	9.00	8.00	2.00	2.00	42.00	50.18	57.62	70.88	62.52
T ₁₄ -Corrugated fiber board box	9.00	9.00	3.33	4.00	9.00	8.00	3.02	3.00	42.00	48.92	56.08	69.19	65.32
SEd	-	1.58	0.242	0.197	-	1.43	0.201	0.082	-	0.104	0.325	0.252	1.38
CD @ 5%	-	NS	0.484	0.394	-	NS	0.403	0.163	-	0.209	0.660	0.505	2.76

in ventilated and HDP bag, gunny bag, bamboo basket, palmyrah leaf sheath bag and unbaged flowers lost their white colour and fragrance in 24 hours. The phenol accumulation was also found to be minimum with normal colour retention and fragrance in the packed flowers than the control (Table 2). Burzo *et al.* (1998) reported that the brown colouration and loss of fragrance might be due to the accumulation of flavins and other phenolic substances in flower cell vacuoles. The results are in conformity with the above findings.

In this investigation flowers packed in 200 gauge PE bags with no ventilation proved effective in extending the post harvest life of Jasmine up to 81 hours which was closely followed by 300 gauge PE bag with no ventilation. The results are in line with the findings of Mukopadhyay *et al.* (1980) and Nirmala and Venkatesa Reddy (1993).

REFERENCES

Ahn-Gwiyeon and Ahn G.Y. (1997). Effects of pre treatment, packaging materials and transportation temperature on quality of cut rose 'Mary devor'. *J.Korean.Soc Hort.sci.*, **16**: 224-225.

Amerine, M.A., Pangborn R.M. and Rocssler E.B. (1965). Principles of Sensory evaluation of food. Academic press. London.

Anandaswamy, B., Vikramath C.S. Subba Rao K.R. Suryanarayana B.N. Iyengar N.V.R. and Srivastava H.C. (1963). Prepackaging studies on fresh produce – IV Okra (*Hibiscus esculantus*). *Food Sci.*, **12(11)**: 332-335.

Burzo, I., Amariute A. Cracium C. and Cachita D. (1988). Changes in the potential difference across membranes and ultra structure of Gladiolus flowers preserved in water at room temperature. Fourth international symposium on Post harvest *Physiology of Ornamental Plants.*, pp.119-127.

Krishnamoorthy, S. (1990). Packaging of horticultural crops. *Packaging India.* pp17-20.

Madaiah, D. and Venkatesh Reddy T. (1994). Influence of polyethylene packaging on the postharvest life of tuberose (cv. Single) florets. *Karnataka J. Agric. Sci.*, **7(2)**:154-157.

Madhu, G.R. (1999). Studies on the effect of different packaging materials and chemicals on the post-harvest shelf life of Jasmine flowers. M.Sc.(Ag) Thesis, Annamalai University, Annamalainagar, Tamilnadu.

Marchal, J. and Nolin J. (1990). Fruit quality, pre and post harvest physiology. *Fruits (Paris), Special issue*, pp. 119-122.

Mukhopadhyay, T.P. Bose T.K. Maity R.G. Mitra S.K. and Biswas J. (1980). Effect of chemicals on the post harvest life of Jasmine flowers. National seminar on production technology of Commercial flower crops. TamilNadu Agricultural University, Coimbatore. pp 47-50.

Nirmala, S and Venkatesh Reddy T. (1993). Shelf life of Jasmine (*Jasminum sambac*) flowers as influenced by packaging and ventilation. *Mysore .J. Agric. Sci.*, **27(3)**: 272-276.

Panse, V.G and Sukhatme P.V. (1978). Statistical methods for agricultural workers.III Edn. ICAR, New Delhi.

Ramana, K.V, Rodoviguez R. and Rao V. (1988). Packaging of fresh fruits and vegetables. *Ibid* 31-38.

Swain, T. and Hillis W.E. (1959). The phenolic constituents of *Prunus domestica*. I. The quantitative analysis of phenolic constituents. *J.Fd.Sci. Agric.*, **10**: 63-68.

Received : August, 2005; Accepted : March, 2006