Int.J.Curr.Microbiol.App.Sci (2018) *7*(8): 870-874

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 7 Number 08 (2018)**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2018.708.098

Post-harvest Life of Cut Gladiolus cv. Nova Lux Influenced by Packaging Material and Environmental Conditions

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Keywords

Gladiolus, Packaging materials, Temperature, Post-harvest life

Article Info

Accepted:
06 July 2018
Available Online:
10 August 2018

ABSTRACT

An investigation was carried out during the year 2017 to study the post-harvest life of gladiolus spikes by using different packaging materials (blotting paper, brown paper, butter paper, cellophane paper and news paper) in various environmental condition (16ºC and 22 ± 2ºC). All the post-harvest studies were conducted at Post-harvest Laboratory, Department of Horticulture, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, U.P. Experiment was laid out in Completely Randomized Design with three replications. Harvested gladiolus spikes were packed with different packaging materials and kept in ambient temperature condition and cool chamber condition. The results revealed that spikes stored in cool chamber condition were found significantly higher than the ambient condition. Slow opening of florets, diameter of florets and percentage of opened florets were found maximum in cool chamber condition (16ºC). While, maximum diameter of first floret and length of third and fifth floret were observed with the spike packed in brown paper. Different packaging materials were failed to give any significant effect on days to opening of floret, percentage of opened florets, diameter of fifth floret and length of first floret. Maximum weight and shelf life of spikes were recorded with spikes stored in cellophane paper.

Introduction

Gladiolus is an important commercially higher value flower crop. It is very popular as cut flower in domestic as well as international market (Singh and Sisodia, 2017). It is also known as sword lily, has gained much importance as a cut flower and valued for its majestic spikes. The flower contains attractive, elegant and delicate florets of different attractive colours and shapes. Transportation of gladiolus spikes to the consumer without deteriorating quality of spikes is the most necessary and challenging task for the sellers. For this, the post-harvest life of the spikes needs to prolong. Post-harvest life depends on genetic as well as environmental factors. Various environmental factors *viz.*, temperature condition, humidity etc. can influence the flower quality as well as post-harvest life of cut spikes of gladiolus. Similarly, different packaging materials *viz.*, blotting paper, brown paper, butter paper, cellophane paper and news paper can also affect the quality of cut gladiolus spikes. During senescence leakage of the cell constituents due to loss of structural integrity of the cell membrane results in the death of flowers (Bhattacharjee, 1994). Hence, an effort was made to known the effect of packaging materials and environment on post-harvest life of gladiolus cut spikes.

Materials and Methods

The corms of gladiolus cv. Nova Lux were raised at Horticulture Research Farm, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, U.P. following standard cultural practices. Investigation was carried out in the Post-harvest Laboratory of Horticulture Department during February 2017. Experiment was laid out in Completely Randomized Design with three replications. Spikes were harvested at 8:00 am in the morning when three lower florets show colour by giving a slant cut at base of spikes. After harvesting cut spikes were kept in a bucket containing water and immediately brought to the laboratory for post-harvest study.

Unwanted leaves were removed and standard length was maintained in all cut spikes of gladiolus. After that, spikes were kept in envelops of different packaging materials such as (blotting paper, brown paper, butter paper, cellophane paper and news paper) after taking observation of fresh weight and length of cut spikes. Envelops were put in cardboard boxes and place at different temperature conditions. Observations were recorded on various post-harvest attributes and data were analyzed statistically.

Results and Discussion

Significantly slow opening of first, third and fifth floret was observed under cool chamber condition (16ºC). Diameter of first, third and fifth floret and percentage of opened florets were found maximum in cool chamber condition (16ºC), whereas, length of fifth floret was observed highest at ambient condition compared to cool chamber condition. Gladiolus spike stored at cool chamber condition (16ºC) and ambient condition (22 ± 2ºC) failed to exert any significant effect on length of first and third floret. Similar work was also done by Beura and Singh (2003) in gladiolus cv. Her Majesty and by Grover *et al*., (2005). Different packaging materials were failed to give any significant effect on days to opening of floret, percentage of opened florets, diameter of fifth floret and length of first floret. Whereas, there was significant effect of different characters due to various packaging materials were also observed (Table 1). Maximum diameter of first floret was observed with brown paper packing which was statistically at par with packaging of blotting paper, butter paper, cellophane paper and news paper. Minimum diameter of first floret was found with control condition.

Diameter of third floret found maximum with packaging of cellophane paper which found statistically at par with the packaging of brown paper, butter paper and news paper. Whereas, minimum diameter of third floret was observed with packaging of blotting paper followed by spikes stored in control condition. Maximum length of third and fifth florets was observed with spikes packed in brown paper which was found significant with the spikes kept in control condition. This might be due to low production of O_2 and higher production of CO_2 in cellophane paper diameter of floret remains smaller and respiration rate also low in such condition. Results of present experiment are also in the line with the observations made by Munsi *et al.,* (2011) in gladiolus and Reddy (2016) in tuberose.

Table.1 Effect of temperature and packaging materials on days to opening of floret, percent of opened florets, diameter of floret and length of floret in post-harvest life of gladiolus cultivar Nova Lux

	Days to opening of floret			% of opened florets	Diameter of floret (cm)			Length of floret (cm)		
	First floret	**Third floret**	**Fifth floret**		**First floret**	**Third floret**	**Fifth floret**	**First floret**	**Third floret**	**Fifth floret**
Temperature										
Ambient condition (22±2ºC)	2.22	3.72	5.22	60.41	7.14	7.07	7.14	9.37	8.68	8.64
Cool chamber condition (16ºC)	2.94	4.44	6.50	70.24	7.39	7.38	7.14	8.95	8.63	8.04
CD at 5%	0.38	0.59	0.52	7.33	0.17	0.20	0.17	NS	NS	0.40
Packaging material										
Control	2.17	4.00	5.50	69.75	6.97	7.03	7.02	8.93	7.85	7.43
Blotting paper	2.50	4.00	5.83	68.71	7.27	7.00	6.98	9.05	8.68	8.70
Brown paper	2.50	4.33	6.00	64.38	7.48	7.30	7.15	9.05	8.98	8.93
Butter paper	2.83	4.00	6.333	66.54	7.32	7.40	7.22	9.32	8.93	8.32
Cellophane paper	3.00	4.67	6.00	62.50	7.23	7.47	7.37	9.38	8.77	8.23
News paper	2.50	3.50	5.50	60.08	7.33	7.15	7.10	9.22	8.72	8.45
CD at 5%	NS	NS	NS	NS	0.29	0.34	NS	NS	0.71	0.69

Table.2 Effect of temperature and packaging materials on weight of spike, days to withering of floret and shelf life in post-harvest life of gladiolus cultivar Nova Lux

	Weight of spike (g)			Days to withering of floret			Shelf life (days)
	Third day	**Sixth day**	**Ninth day**	**First floret**	**Third floret**	**Fifth floret**	
Temperature							
Ambient condition (22±2ºC)	61.56	56.68	52.45	2.28	2.67	3.39	6.44
Cool chamber condition (16ºC)	63.23	60.55	54.11	2.50	2.56	2.28	6.89
CD at 5%	NS	NS	NS	NS	NS	0.516	NS
Packaging material							
Control	52.64	44.34	38.70	2.17	2.17	2.17	5.50
Blotting paper	69.11	65.26	59.77	2.50	2.67	3.00	6.33
Brown paper	59.84	60.38	51.13	2.17	2.83	2.83	7.33
Butter paper	62.07	56.85	51.74	2.17	2.67	3.00	6.67
Cellophane paper	72.34	71.00	68.77	3.17	3.00	3.17	7.83
News paper	58.39	53.87	49.59	2.17	2.33	2.83	6.33
CD at 5%	7.87	6.92	6.70	0.60	NS	NS	0.96

Significant difference was not found by the spikes stored in ambient (22 ± 2ºC) and cool chamber condition (16ºC) on different characters such as weight of spike at third, sixth and ninth day, days to withering of first and third floret and shelf life of spike (Table 2). Whereas, spikes stored in ambient condition resulted in maximum days to withering of fifth floret which found significantly higher than cool chamber condition. Maximum weight of spike at third and sixth day of packaging was recorded with spikes stored in cellophane paper which found statistically at par with the spike stored in blotting paper and significant to other packaging materials. Whereas, maximum weight of spikes at ninth day was recorded with the cellophane paper which found statistically significant with the packaging of blotting paper, brown paper, butter paper, news paper and control condition. Maximum days to withering of first floret were found with cellophane paper which found statistically significant to the spikes packed in brown paper, butter paper, news paper and control condition. A non-significant difference was found in days to withering of third and fifth florets due to packaging of spikes in different packaging materials. Cellophane paper packaging resulted in longest shelf life of the spikes which found significantly higher than the spikes packed in control condition and statistically at par with the spikes packed with brown paper. This might be due to evaporation rate in cellophane paper was negligible therefore, variation in weight of spike was lesser. Freshness of spike was remaining for longer duration due to lower production of ethylene gas. Palanikumar and Bhattacharjee (2001), Naz (2003), Jain (2006) and Ahmad *et al.*, (2013) were also found similar result in rose flower.

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How to cite this article:

Priyanka Kumawat, Anjana Sisodia, Anil K. Singh, Minakshi Padhi and Kalyan Barman. 2018. Post-harvest Life of Cut Gladiolus cv. Nova Lux Influenced by Packaging Material and Environmental Conditions. *Int.J.Curr.Microbiol.App.Sci.* 7(08): 870-874.
doi: https://doi.org/10.20546/ijcmas.2018.708.098