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## A study on impact of drying techniques among carnation flower

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### Abstract

The beauty of flowers is the natural gift of god to human being. Flowers offered a special place in every occasion, due to their variety of colour and their fragrance which makes the surrounding air pleasant to breathe. In the present study three different colours Carnation (Red, pink and White) were selected. The flowers were dried in different drying techniques such as air drying, desiccant (silica gel and mixture (1:1) of borax and sand) drying and microwave oven drying (after embedding flowers in silica gel) techniques and evaluated ANOVA with three replications. With regard to time taken for drying microwave drying technique took less time compared to other techniques. The fresh and dry weight of carnation flower was significantly influenced by flower colours. Significant differences were observed due to different colours and appearance of carnation flower and method of drying techniques used.

**Keywords:** carnation, air drying, desiccant drying, microwave drying and quality

### Introduction

A flower is a special part of the plant. Flowers are also called the bloom or blossom of a plant. The beauty of flowers is the natural gift of god to human being. Flowers offered a special place in every occasion, due to their variety of colour and their fragrance which makes the surrounding air pleasant to breathe. In all type plants, a flower is usually its most colourful part look like world ornament. Flowers are the symbol of love, respect, friendship, beauty and regard.

Fresh flowers constitute a major part but due to their reduced shelf life flowers remain in an acceptable condition only for a short duration. Therefore, drying techniques play an important role to make flower look fresh for several days. The dried flowers have a great potential as substitute of fresh flowers in market. The most common methods of drying of flowers include press drying, air drying, desiccant drying, microwave drying and hot air oven drying.

Drying leads to reduced microbial activity and ageing effect in the flower. Due to absence of moisture these dried flowers can be stored for longer period without losing their appearance, and decorative value (Wilson, D., 2013) <sup>[12]</sup>. The different types of drying technique have been cultivated by which flowers retain their fresh look for several years.

Carnation (*Dianthus Caryophyllus* L.) the divine flower or flower of the Gods' is one of the most important cut flower of the world, due to its excellent keeping quality, wide range of forms, ability to withstand long distances even after continuous shipping. In India, very little research work was done in Carnation flower for production of dry flowers (Sindhuja *et al.*, 2015) <sup>[10]</sup>. Hence, an research was undertaken to study on impact of drying techniques among carnation flower with following objective.

1. To standardize the drying techniques for qualitative characteristics of selected carnation flower.

### Methodology

The experiment was carried out in the Department of Family Resource Management, College of Community Science in 2017-18. In the present study three different colours Carnation (Red, pink and White) were selected. The flowers were dried in different drying techniques such as air drying, desiccant (silica gel and mixture (1:1) of borax and sand) drying and microwave oven drying (after embedding flowers in silica gel) techniques and evaluated ANOVA with three replications. The healthy and disease free of carnation flower with three different colours were harvested at the commercial stage in the morning hours. Immediately after harvest, the cut ends of the flower stalks were placed in water. The stem length of the each flower kept at a uniform length.

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Observation on flower fresh weight, dry weight, moisture loss (%) and time taken to dry were recorded. A panel of 5 judges assessed the quality parameters of dried flowers. To assess quality parameters scale was used given by Dinesh, 2000. The data were analysed using ANOVA.

**Result and Discussion**

Table 1 indicates the time taken for drying of carnation flowers by different drying techniques. With regard to time taken for air drying and mixture of borax and sand drying of pink and white carnation flowers was took 168 hours and red flower took 160 hours and 162 hours respectively. Silica gel took 72 hours and in microwave oven drying red and pink carnation flowers took 6 minutes took 0.05 minutes and white carnation for drying. Different colour of carnation flowers took different time for drying it is due to vary in fresh weight and moisture content of flowers. Radha Rani and Reddy (2015) [7] revealed that with regard to time taken for air drying of carnation has taken more time i.e., 12 days. In borax mixture carnation taken 7-8 days followed by in silica gel 4 days and in microwave oven taken only 4 minutes.

The data reported in Table 2 indicates the effect of different drying techniques on fresh and dry weight in selected carnation flowers. The fresh and dry weight of carnation flower was significantly influenced by flower colour viz., red, pink and white and drying techniques such as air drying, silica gel drying, mixture of borax and sand drying and microwave oven drying and 3.34 per cent coefficient of variance was observed. In carnation flower maximum dry weight was observed in pink colour flower i.e., 0.70 g followed by red colour (0.80 g) and white colour recorded 0.90 g. Among different drying techniques maximum dry weight was observed in silica gel drying technique with mean score 0.54 followed by mixture of borax and sand drying (0.86 g), microwave oven drying (0.81 g) and minimum dry weight was observed in air drying with a mean score 2.34. With respect to interaction (ABC) the minimum moisture loss in all the colour of carnation flowers was observed in silica gel drying technique and minimum moisture loss was observed in air drying and followed by microwave oven drying technique. Gupta and Prashant (2005) [4] opined that among four desiccants (boric acid, silica gel, river sand and saw dust) silica gel has been found to be the best absorbent for removing moisture from flowers.

The data with respect to colour retention of the dried carnation flower in different drying techniques are presented in Table 3. Significant differences were observed due to different colour of carnation flower and method of drying techniques used. Among four the drying techniques, silica gel drying technique scored higher mean value i.e. 4.7 compared to other drying techniques such as air drying (4.3), mixture of borax and sand drying (4.4) and microwave drying recorded 4.1. Among the three colour of carnation pink colour carnation flower recorded maximum mean score of 4.7 followed by red colour recorded 4.5 and less mean scored recorded by white i.e., 4.3. In all drying techniques critical difference ranges from 0.27 to 0.79 and minimum critical difference was observed in silica gel drying (0.77) and more critical difference was observed in the mixture of borax and sand drying (0.79). Among three flowers pink colour flower was more superior to the red and white colour flower in all four drying techniques based on the critical difference and mean values of the pink colour flower. Sindhuja, et al. (2015) [10] opined that colour of carnation flower differed

significantly due to cultivars and desiccants used for study, cv. Harvey with yellow colour had retained good colour and received the maximum score of 1.80.

Table 4 showed the effect of drying techniques on appearance of dried carnation flower. The appearance differences of dried carnation flowers were significant with respect to colour of flower and drying techniques. Among the different types of drying techniques silica gel drying method proved superior than the other drying techniques with mean score of 4.7 and followed by microwave drying (4.6) and equal proportion i.e., 4.4 mean score recorded by both mixture of borax and sand drying and air drying. Among the different colour of carnation flower evaluated, dry flowers of pink had retained good appearance and received the maximum score of 4.7, whereas red colour scored 4.5 and white colour flower recorded the least score of 4.3. Interaction between the flowers colour showed the significant difference on appearance of dried carnation flower and critical difference recorded less in silica gel drying and more in mixture of borax and sand drying. Datillo (2001) [2] reported that rose colour that dry well and retain bright colour include orange, medium and dark yellow, medium red and medium and dark pink. Dark red tends to turn black and light pink becomes pale.

The data with respect to shape of the flowers dried in different drying techniques are presented in the Table 5. Non-significant differences were observed with respect to different colour and drying techniques. Among the four drying techniques silica gel drying method score highest (4.6) followed by microwave drying (4.5), in air drying 4.4 mean score recorded and low mean score was observed in mixture of borax and sand drying i.e., 4.2. In dried carnation flower pink colour flower scored high i.e., 4.6 for the shape retention, followed by red colour flower (4.4) and less score recorded by white colour carnation flower i.e., 4.3. Interaction among different colour of carnation flower such as red, pink and white showed the non- significant difference with respect to retention of shape after drying. Nirmala et al. (2008) [5] opined that maximum score for shape of dry carnation flower was recorded with silica gel (2.66) followed by quartz sand (2.05) and minimum score recorded with borax (1.97).

**Table 1:** Time taken for drying of carnation flower by different drying techniques

Carnation	Air drying (Hours)	Silica gel drying (Hours)	Borax + Sand drying (Hours)	Microwave drying (Minutes)
Red	160	72	162	0.06
Pink	168	72	168	0.06
White	168	72	168	0.05

**Table 2:** Effect of drying techniques on moisture loss (%) in selected carnation flowers

Drying techniques	Carnation colour						Mean value	
	Red		Pink		White		F.W	D.W
	F.W	D.W	F.W	D.W	F.W	D.W		
Air drying	11.04	1.06	12.92	1.02	12.80	0.80	12.25	2.34
Silica gel drying	5.20	0.52	6.72	0.28	7.12	0.82	06.34	0.54
Borax drying	10.06	0.86	9.98	0.92	9.16	0.80	09.73	0.86
Microwave drying	8.02	0.88	7.10	0.46	07.00	1.10	07.37	0.81
Mean	8.60	0.80	09.20	0.70	09.00	0.90		
S.D.	2.6	0.2	2.9	0.4	2.7	0.1		

**Note:** F.W. - Fresh weight, D.W. - Dry weight

**Table 3:** ANOVA for effect of drying techniques on moisture loss of carnation flower

Factors	DF	Cal 'F' value	'F' critical value	C.D. value 5%	C.V. value
A-Techniques	3	1996.748	0.000	0.083	03.340
B-Flower colour	2	27.527	0.000	0.072	
C-F.W and D.W	1	75300.607	0.000	0.059	
AB	6	70.781	0.000	0.144	
AC	3	1965.334	0.000	0.118	
BC	2	54.878	0.000	0.102	
ABC	6	85.167	0.000	0.204	

**Table 4:** Effect of different drying techniques on colour of dried carnation flower

Techniques	Flower colour (Mean value)			Mean	'F' value	CD
	Red	Pink	White			
Air drying	4.3	4.6	4.2	4.3	4.2*	0.71
Silica gel drying	4.8	4.9	4.6	4.7	10.5*	0.27
Borax + Sand	4.4	4.6	4.2	4.4	5.56*	0.79
Microwave drying	4.7	4.8	4.5	4.1	10.09*	0.32
Mean	4.5	4.7	4.3	4.3		

Note: 5 = Extremely good, 4 = Very good, 3 = Good, 2 = Bad, 1 = Very bad

**Table 5:** Effect of different drying techniques on appearance of dried carnation flower

Techniques	Flower colour (Mean value)			Mean	'F' value	C.D.
	Red	Pink	White			
Air drying	4.4	4.6	4.3	4.4	4.43*	0.62
Silica gel drying	4.8	4.9	4.5	4.7	14*	0.27
Borax + Sand	4.4	4.6	4.2	4.4	4.74*	0.81
Microwave drying	4.7	4.8	4.5	4.6	9.17*	0.40
Mean	4.5	4.7	4.3	4.5		

Note: 5 = Extremely good, 4 = Very good, 3 = Good, 2 = Bad, 1 = Very bad

**Table 6:** Effect of different drying techniques on shape of dried carnation flower

Techniques	Flower colour (Mean value)			Mean	F-value	F-Crit
	Red	Pink	White			
Air drying	4.3	4.6	4.5	4.4	0.27	3.55
Silica gel drying	4.6	4.8	4.4	4.6	2.36	5.14
Borax + Sand	4.3	4.4	4.1	4.2	1.40	3.55
Microwave drying	4.6	4.7	4.4	4.5	0.25	4.25
Mean	4.4	4.6	4.3	4.4		

Note: 5 = Extremely good, 4 = Very good, 3 = Good, 2 = Bad, 1 = Very bad

## Conclusion

The main aim of the study was standardize the different drying techniques for carnation flower. From this study, it is concluded that with respect to time taken to dry carnation in different drying techniques all three colour (red, pink and white) has taken less time to dry completely in microwave drying technique (6 minute). Maximum moisture loss was observed when the flowers were dried in silica gel drying technique and minimum moisture loss was observed in air drying technique. The colour and appearance of dried carnation flowers differed significantly and shape of the dried flowers non – significantly differ at 5 per cent level due to three different colour of carnation and method of drying

technique used. Pink colour carnation flower in all the drying techniques had retained good colour, shape as well as appearance. It was also observed that silica gel drying technique showed the best results for retaining the quality parameters like colour, shape and appearance in all three colour (red, pink and white) of carnation flower.

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