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Effect of Different Drying Techniques of Flowers and Foliages and Its Value Addition

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Fresh flowers and foliages are delightful and visually striking, it can be arduous to sustain their charm and pristine appearance over an extended duration, However this obstacle can be overcome by drying the flowers and foliages, enabling them to retain their allure. The present investigation the effect of different drying techniques of flowers and foliages and its value addition was carried out at the post harvest laboratory of Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (UP) during 2022-23. The experiment was laid out in Completely Randomized Design comprising of two different methods of flower drying i.e. microwave oven drying with silica gel and microwave oven drying with sand and replicated three

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times containing six flowers per replication for six different flowers and foliage i.e. Rose, Gerbera, Jatropha, Dracaena, Fern and Thuja. The aim of this investigation was to evaluate the drying techniques of Rose, Gerbera, Jatropha, Thuja, Fern and Dracaena. Maximum moisture loss was obtained in (T3) Jatropha embedded in silica gel and dried in microwave oven (77.13%). Best score in sensory evaluation in terms of colour, shape and texture was found highest in (T5) Dracaena embedded in silica gel and dried in microwave oven (scores- 4.18, 4.38, 4.03). So, the best drying technique considered was microwave oven drying with silica gel as an embedding medium.

Keywords: Drying; flowers and foliages; microwave oven; silica gel.

1. INTRODUCTION

Flowers and foliages have long held a special place in the hearts and minds of humanity. Throughout history, these botanical wonders have been cherished for their beauty, admired for their resilience, and utilized for their practicality. From the delicate petals to the lush green leaves, flowers and foliages have played a significant role in shaping our environments, cultures, and daily lives.

The dry flower industry was brought to India by British and is almost five decades old. In India, dried flower industries are mostly concentrated in Tamil Nadu, West Bengal, Andhra Pradesh and Karnataka. Exporting companies in Kolkata in West Bengal, Thoothukudi in Tamil Nadu, Mumbai in Maharashtra and Hyderabad in Andhra is earning 10-15 times higher returns than domestic markets [1].

Dry flowers and foliages offer a unique and captivating way to preserve the beauty of nature long after the blooms have faded. These delicate treasures, carefully dried and preserved, retain their original form, providing a lasting reminder of the natural world's splendor. Whether used in floral arrangements, crafts, or home decor, dry flowers and foliages lend an enchanting touch to any setting.

Dry flower market has grown exponentially as consumers become “eco-conscious” and choose dried flowers as the environment friendly and biodegradable alternative to fresh flowers. Dried flowers are exported either as assortments or value added items. Dried flowers are commonly known as “everlasting flowers” or “dehydrated flowers”. They are nature's treasures, beautiful and ever lasting and make a perfect gift, which can be treasured over the years [2].

Numerous methods are practised for dehydration of different flowers or its plant parts. In these methods, removal of moisture is done artificially either by using desiccants or controlled temperature, humidity and airflow. The principle involved in all the techniques is that the plant material is exposed to a vapour pressure deficit, which induces water vapour to move by transpiration or evaporation from the plant material (source) into the surrounding environment (sink). The techniques are Air drying, Water drying, Sun drying, Press drying, Hot air Oven drying, Microwave drying, Embedding, Freeze Drying and Glycerine drying [3]. This experiment aimed to evaluate the drying techniques of Rose, Gerbera, Jatropha, Thuja, Fern and Dracaena.

2. MATERIALS AND METHODS

Study on “Effect of different drying techniques of flowers and foliages and its value addition” was carried out at the Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj.

The experiment was laid out in Completely Randomized Design (CRD) which has twelve different treatments and was replicated thrice, number of flowers per treatment were six.

Drying method which was used for drying of flowers and foliages was microwave oven drying with two different embedding media i.e, sand and silica gel. The observations were recorded on basis of physiological and quality parameter. For physiological parameter flowers and foliages were dried and weighed and moisture content was calculated and for quality parameter sensory evaluation was done.

Table 1. Treatment details

Treatment Symbol	Treatment Combinations
T_1	Rose + Silica gel
T_2	Gerbera + Silica gel
T_3	Jatropha + Silica gel
T_4	Fern + Silica gel
T_5	Dracaena + Silica gel
T_6	Thuja + Silica gel
T_7	Rose + Sand
T_8	Gerbera +Sand
T_9	Jatropha + Sand
T_{10}	Fern + Sand
T_{11}	Dracaena + Sand
T_{12}	Thuja + Sand

3. RESULTS AND DISCUSSION

Data revealed that microwave oven drying with silica gel as a drying media noted maximum percent of moisture loss (77.13%) recorded in Jatropha (T_3). Similar results were observed by Acharrya et al. [4], Hemant et al. [5], Malakar et al. [6], Kumari et al. [7] and Jagadeeswari et al. [8].

Silica gel has a higher absorption capacity than sand. It can efficiently extract moisture from the flowers and foliage, helping them dry faster and more effectively. Its porous structure allows it to absorb and retain moisture at a much higher rate than sand.

Utmost score for colour (4.18), shape (4.38) and texture (4.03) was found in microwave drying with silica gel in dracaena (T_5). So on basis of qualitative character which includes colour, shape and texture of flowers and foliages similar results were observed by Aravinda et al. [9], Sharma et al. [10], Renuka et al. [11], Sharma et al. [12] and Joshi et al. [13].

Silica gel has a fine texture, which makes it easier to handle and work with compared to sand. Its small particles can be easily distributed around delicate flowers and foliage without causing damage or leaving residues. Silica gel helps retain the original shape and color of the flowers and foliage during the drying process. Its gentle drying action minimizes shrinkage and distortion, preserving the natural form and appearance of the plant material.

Table 2. Moisture loss of flowers and foliages in different embedding media

Treatments		Moisture loss of flowers and foliage (%)
T_1	Rose + Silica gel	35.25
T_2	Gerbera + Silica gel	45.71
T_3	Jatropha + Silica gel	77.13
T_4	Fern + Silica gel	56.38
T_5	Dracaena + Silica gel	61.66
T_6	Thuja + Silica gel	48.97
T_7	Rose + Sand	21.49
T_8	Gerbera + Sand	26.08
T_9	Jatropha + Sand	57.61
T_{10}	Fern + Sand	41.22
T_{11}	Dracaena + Sand	39.70
T_{12}	Thuja + Sand	34.53
F test		S
SE(d)		6.064
C.D.		12.591
C.V.		16.331

Maximum *Minimum*

Table 3. Score for colour of flowers and foliages in different embedding media:

Treatments		Score for colour of flowers and foliages
T_1	Rose + Silica gel	3.68
T_2	Gerbera + Silica gel	3.90
T_3	Jatropha + Silica gel	3.93
T_4	Fern + Silica gel	4.10
T_5	Dracaena + Silica gel	4.18
T_6	Thuja + Silica gel	3.70
T_7	Rose + Sand	3.38
T_8	Gerbera + Sand	3.45
T_9	Jatropha + Sand	3.28
T_{10}	Fern + Sand	3.36
T_{11}	Dracaena + Sand	3.30
T_{12}	Thuja + Sand	2.88
F test		S
SE(d)		0.088
C.D.		0.184
C.V.		3.012

Maximum *Minimum*

Table 4. Score for shape of flowers and foliages in different embedding media

Treatments		Score for shape of flowers and foliages
T_1	Rose + Silica gel	3.78
T_2	Gerbera + Silica gel	4.13
T_3	Jatropha + Silica gel	4.16
T_4	Fern + Silica gel	4.15
T_5	Dracaena + Silica gel	4.38
T_6	Thuja + Silica gel	4.23
T_7	Rose + Sand	3.53
T_8	Gerbera + Sand	3.61
T_9	Jatropha + Sand	3.58
T_{10}	Fern + Sand	3.31
T_{11}	Dracaena + Sand	3.36
T_{12}	Thuja + Sand	3.45
F test		S
SE(d)		0.071
C.D.		0.147
C.V.		2.283

Maximum *Minimum*

Fig. 1. Before and after drying photos of rose in silica gel embedding media dried in microwave oven

Table 5. Score for texture of flowers and foliages in different embedding media

Treatments		Score for texture of flowers and foliages
T_1	Rose + Silica gel	3.78
T_2	Gerbera + Silica gel	3.95
T_3	Jatropha + Silica gel	3.86
T_4	Fern + Silica gel	3.88
T_5	Dracaena + Silica gel	4.03
T_6	Thuja + Silica gel	2.53
T_7	Rose + Sand	3.45
T_8	Gerbera + Sand	3.63
T_9	Jatropha + Sand	3.13
T_{10}	Fern + Sand	3.18
T_{11}	Dracaena + Sand	3.26
T_{12}	Thuja + Sand	2.18
F test		S
SE(d)		0.084
C.D.		0.174
C.V.		3.004

Maximum *Minimum*

Fig. 2. Before and after drying photos of thuja in silica gel embedding media dried in microwave oven

Fig. 3. Before and after drying photos of jatropha in silica gel embedding media dried in microwave oven

Fig. 4. Before and after drying photos of gerbera in silica gel embedding media dried in microwave oven

Fig. 5. Before and after drying photos of fern in silica gel embedding media dried in microwave oven

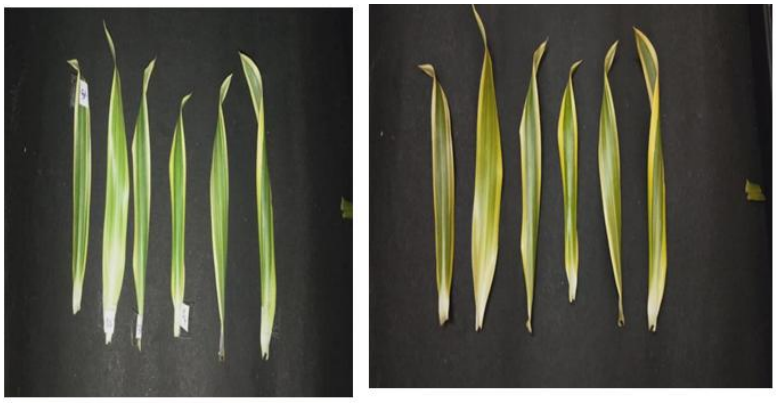

Fig. 6. Before and after drying photos of dracaena in silica gel embedding media dried in microwave oven

4. CONCLUSION

From this investigation it was concluded that silica gel was better desiccant compared to sand in terms of higher moisture loss and in retaining colour, shape and texture of flowers and foliages.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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