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Evaluation of different methods for drying of chrysanthemum flowers

■ **DEENA WILSON, B.L. ATTRI**[1] AND **SATISH K. SHARMA**[2]

Members of the Research Forum

Associated Authors:
[1]Central Institute of Temperate Horticulture, Regional Station, Mukteshwar, NAINITAL (UTTARAKHAND) INDIA

[2]Department of Horticulture, G.B. Pant University of Agriculture and Technology, Pantnagar, U.S. NAGAR (UTTARAKHAND) INDIA

Author for correspondence :
DEENA WILSON
Department of Horticulture, G.B. Pant University of Agriculture and Technology, Pantnagar, U.S. NAGAR (UTTARAKHAND) INDIA

ABSTRACT : An investigation was conducted for evaluation of different methods for drying of chrysanthemum (*Dendranthema grandiflorum* Tzevlev) flowers. Fully opened flowers of chrysanthemum were dried by four different methods *viz.*, air drying, sun drying, mechanical dehydration and low cost solar drying at different durations. Results indicate that among different methods of drying solar drying registered the maximum moisture loss (79.31 %) after 15 days of drying as compared to other methods. Among different method tested, the reduction in floral diameter was highest (55.97 %) in air drying as compared to other methods. Low cost solar drying obtained better score (4.60) for colour retention than other methods. Therefore, solar drier after being embedded in sterilized sand was rated to be better as compared to other methods of drying.

KEY WORDS : Chrysanthemum flowers, Drying methods, Sand embedding, Colour retention

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Drying and preserving flowers and plant materials is a form of artistic expression that was very popular during the victorian age and has once again gained popularity. Dried or dehydrated flowers or plant part or botanicals (roots, leaves, stem, bark or whole plant) can be used for ornamental purposes. The flower drying is an important post harvest technique for enhancing keeping quality and providing value addition. The flower drying technique involves reducing moisture content of flowers to a point at which bio- chemical changes are minimized while maintaining cell structure, pigment level and flower shape (Singh and Dhaduk, 2005).

In floriculture trade, fresh flowers constitute a major part but due to their reduced self life flowers remain in acceptable conditions only for a short duration. Therefore, to overcome this problem and maintaining the charm of the flowers, techniques of dehydration and drying play a vital role. Dried flowers and plant parts are the major segment and constitute 70 per cent of the total share of floriculture products exports from India (Singh, 2005). But our country's share in the dry flower industry is below 5 per cent of global market (Singhwi, 2001).

Drying leads to reduced microbial activity and ageing effect. Due to absence of moisture, these dried flowers can be stored in moisture free atmosphere for longer periods without loosing their appearance and decorative value. Thus, the flowers become free from bondage of seasons (Bhutani, 1995). Drying of flowers and foliage by various methods like air drying, sun drying, oven drying, microwave oven drying, freeze drying and embedded drying can be used for making decorative floral craft items *i.e.* cards, floral designs, wall hanging, landscapes, calendars etc. for various purposes (Bhutani, 1990; Bhalla and Sharma, 2002).

Various flower crops which respond well to drying techniques are anemone, zinnia, allium, gypsophilla, Shasta daisy, roses, tulip, dahlia, sweet-william, carnation, stock, freesia, narcissus, pansy, daffodils, marigold and foliages like ferns, aspidistra, beech, box, eucalyptus, ivy, magnolia, mahonia(Rogers, 1967 and Healey, 1968).

Chrysanthemum (*Dendrathema grandiflorum* Tzvelev.) has tremendous popularity as an ornamental flower crops. It is valued as a potted plant and is commercially cultivated cut flower crop in many countries. It is widely grown in open fields in India for their loose flowers. It has wide range of

colours, shapes and sizes. The vase life of this flower varies from 10-15 days and if stored in dry form, they can remain attractive for longer periods (Baskaran *et al*., 2009).

Dried chrysanthemum flowers are in considerable demand in the global trade. Therefore, keeping in this view the tremendous potential of dried chrysanthemum flowers, the present studies were made to standardize the dehydration technology for chryasanthemum flowers (Dandranthema *grandiflorum* Tzvelev.) under mid hill conditions of Uttarakhand to encourage entrepreneurship on floral crafts.

RESEARCH METHODS

The present investigations were carried out in the Department of Horticulture, College of Forestry and Hill Agriculture and Hill Campus Ranichauri, during 2009-2010. Fully opened flowers of chrysanhthemum were subjected to drying by four different methods *viz.*, air drying, sun drying, mechanical dehydration and solar drying. In air drying the flowers after harvesting, were tied with thread and hung upside down in a dry, dark and well ventilated room at room temperature (17.5 to 29.3^0 C, 64 to 78 % RH) and dried for 1 month. For sun drying the card board boxes of size 25 cm (l) x 17 cm (b) x 7 cm (h) were selected for drying. The embedded boxes were kept in direct sun light for 20 days (till the flowers dried). For mechanical dehydration the embedded boxes were kept in mechanical dehydrator at 50 $\pm$ 2^0 C for 6 to 8 hrs. Similarly, in solar drying embedded card board boxes were kept inside a low cost solar drier. For measuring the temperature minimum - maximum and dry - wet bulb thermometers were also kept inside the solar drier (31.6 to 55^0 C, 47 to 67 % RH) for 15 days. Observations were recorded for moisture loss per cent and reduction in floral diameter immediately after the dehydration treatment. Dried samples were observed for retention of colour using five point scale from 1-5 (1 - Very poor, 2 - Poor, 3 - Good 4 - Very good, 5 – Excellent) as described by Ranganna (1997). The recorded data on various characters were subjected to statistical analysis using completely randomized design with five replications as per the methods described by Panse and Sukhhatme (1967).

RESEARCH FINDINGS AND DISCUSSION

The effect of different methods of drying on moisture loss and reduction in flower diameter of chrysanthemum flowers has been given in Table 1. The data revealed that drying of flowers in solar drying resulted in maximum moisture loss (79.31 %) after 15 days of drying followed by sun drying showed a range of moisture loss (76.63 %) for about 20days of drying. The mean values for moisture loss per cent showed a range of (74.56 %) in air drying after one month of drying and 71.39 per cent in mechanical dehydration at 50^{0}C after 6 hrs. Bhalla *et al.* (2006) observed flower quality as appearance was found better with final moisture content after drying. A range of 8 to 11.5 % moisture content in the dried flowers provided optimum drying with good quality, firmness and maintained keeping quality for more than six months. Excessive drying of flowers resulted into petal shedding during handling. Drying below 8.0 % moisture contents showed shedding effect. On the other hand reduction in floral diameter was the highest (55.97 %) in air drying as compared to other methods with respective mean values of 38.88 % in sun drying after 20 days, 30.58 % in mechanical dehydration at 50^0 C for 6 hrs and 28.82 % in solar drying after 15 days. The per cent reduction in floral

Table 1 : Effect of different methods on moisture loss (%) and reduction in floral diameter (cm) of chrysanthemum flowers

Methods of drying	Initial wt (g)	Final wt (g)	Moisture loss (%)	Initial diameter (cm)	Final diameter (cm)	Reduction in floral diameter (cm)	Reduction in floral diameter (%)
Solar drying (embedding in sand)	1.16	0.24	79.31	3.4	0.98	2.42	28.82
Air drying (by hanging in shade)	1.14	0.29	74.56	3.18	1.78	1.40	55.97
Mechanical dehydrator drying (at 50 $\pm$ 2^0 C)	1.14	0.32	71.39	3.4	1.04	2.36	30.58
Sun drying (embedding in sand)	1.07	0.25	76.63	3.24	1.26	1.98	38.88
C.D. (P=0.05)			0.157			0.198	

Table 2 : Influence of drying methods on quality parameters of dried chrysanthemum flowers of white colour as assessed through sensory evaluation

Methods of drying	Colour
Solar drying (embedding in sand)	4.60
Mechanical dehydration (by embedding in sand)	1.74
Sun drying (at 50 $\pm$ 2 ^{0} C)	4.06
Air drying (by hanging in shade)	2.52
C.D. (P=0.05)	0. 523

Scoring on a five-point scale i.e. 1-Very poor, 2-Poor, 3-Good, 4-Very good, 5-Excellent

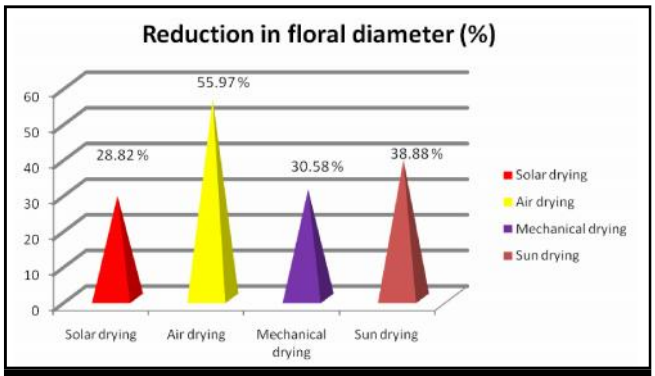

Fig. 1 : Reduction in floral diameter (%) in different methods

diameter has been has been depicted in Fig. 1. These results are in conformity with the findings of Dhatt *et al.* (2007) who also reported that inverted hanging resulted in shrinkage of petals. Though the method is cheap, the shrinkage of petals is the disadvantage. The flowers of carnation and *Helichrysum* gave equally good results when dried by solar drying and by embedding in sand, respectively (Gill *et al*., 2002). Kher and Bhutani (1977) reported that in sun drying quality of the flowers is affected due to changes in day and night temperatures and extra labour is involved for shifting of the containers.

Low cost solar drying obtained better score (4.60) for colour retention followed by mechanical dehydration (4.06) as compared to sun drying (2.52) and air drying (1.74) in which lower scores for colour retention were recorded (Table 2). Stewart (1997) in his trials to dry roses in air drying found that they shrivelled to some extent and colour would darken. Bright red roses usually become the colour of dried blood, while white roses become a yellow parchment colour. Silhol and Denis (1994) reported that the drier has to operate at moderate temperatures in order to preserve the colour, flavour and active ingredients of the plant material. It is concluded that solar crop driers whose initial and running costs are relatively low compared to a diesel/firewood drier can provide good quality dried products and cost effective systems for farmers in Tanzania (Simalenga *et al*., 1990). The quality of the dried flowers was found to decrease with increase in microwave oven drying period from 2 to 4 minutes in carnation flowers (Biswas and Dhua, 2010).

REFERENCES

Baskaran, V., Janakiram, T. and Jayanthi, R. (2009). Evaluation of post harvest quality of some cultivars of chrysanthemum. *J. Ornamental Hort.*, **12** (1): 59-6.

Bhalla, R. and Sharma, B. (2002). Dry flowers: status, scope and potential. In: Choudary, M.L.*et al*. (eds.). *Production and management of flower crops*. Division of Floriculture and Landscaping,IARI,New Delhi.pp.162-173.

Bhalla, R., Dhiman, S.R., Mona and Thakur, K.S. (2006). Standardization of drying techniques of chrysanthemum (*Dandranthema grandiflorum* Tzvelev.). *J. Orna. Hort.*, **9** (3): 159-163.

Bhutani, J.C. (1990). Capturing nature, a way with flower "everlastings". *Indian J. Hort.*, **34**(3): 15-18.

Bhutani, J.C. (1995). Drying of flowers and floral craft. *Adv. Hort. Orna. Plants*, **12**: 1053-1058.

Biswas, C. and Dhua, R.S. (2010). Microwave oven drying of cut carnation. *J. Ornam. Hort.*, **13** (1): 45-49.

Dhatt, K.K., Singh, K. and Kumar, R. (2007). Studies on methods of dehydration of rose buds. *J. Ornam. Hort.*, **10** (4): 264-267.

Gill, S.S., Bakhshi, R. and Arora, S. (2002). Standardization of drying methods for certain cut flowers. Floriculture research trend in India Proceedings of the-National Symposium on Indian Floriculture in the New Millennium, Lal Bagh, Bangalore, 25-27 February, 2002. pp 357-358.

Healey, D. (1968). *Handbbok of soil, fertilizer and manure*. Agro Botanica, Bikaner. 431p.

Kher, M.A. and Bhutani, J.C. (1977). Dehydration of flowers and foliage. Extension Bulletin No. 1, National Botanical Research Institute Lucknow, Uttar Pradesh, India, 20p.

Panse, V.G. and Sukhatme, P.V. (1967). *Statistical methods for agricultural workers*. ICAR Publication, New Delhi (INDIA).

Ranganna, S. (1997). *Handbook of analysis and quality control for fruit and vegetables products*. 3rd Ed. Tata McGraw Hill Pub. Col. Ltd., New Delhi (INDIA).

Rogers, J. (1967). *Flower arranging*. London: Paul Hamlyn.pp.152-157.

Silhol, M. and Denis, P. (1994). A solar drier. Commissariatz a l'energie atomique, La Blachette, BP 111, 26700 Pierrelatte, France. pp. 31-38.

Simalenga, T.E., Hatibu, N., Salokhe, V.M. and Ilangantileke, S.G. (1990). Solar drying of agricultural products in Tanzania: prospects and constraints. Proceedings of the Intl. Agril. Engg. Conf. and Exhibition, Bangkok, Thailand, 3- 6 December, 517-522.

Singh, Alka and Dhaduk, B.K. (2005). Effect of dehydration techniques in some selected flowers. *J. Orna. Hort*, **8**(2) : 155-156.

Singh, H.P. (2005). Current status of floriculture in India. *Floriculture Today*, **5** : 6.

Singhwi, M.R. (2001). Dried flowers. Proceedings of Demonstration-cum-Workshop on dried flowers.

■ WEBLIOGRAPHY

Stewart, G.M. (1997). Drying roses. *http://www.toreadors.com/martha /projects/roses.html*. (page visited April 01, 2011).