

Review Article

DRYING TECHNIQUES FOR PRESERVATION OF ORNAMENTAL PARTS OF PLANT

Kamal Kant

Aspee Shakilam Biotechnology Institute, Navsari Agricultural University

Athawa Farm, Surat – 395 007

E-mail: kamalkantphysio@gmail.com

Abstract: Drying techniques are one of the best methods to preserve ornamental parts of plant especially flowers for their year round availability, longevity, quality, novelty, easy handling, low transportation cost as well as eco-friendly. Some of the methods of drying *viz.* air drying, press drying, oven drying, glycerine drying, freeze drying, embedded drying etc. applied in preparation of decorative floral crafts items like cards, floral segments, wall hangings, landscapes, calendars, potpourris etc. for various purposes. The environmental factors *viz.* day length, temperature, rainfall etc. of particular area determine vegetation and flowering. Diversifications in these factors compel to produce diverse range of ornamental materials which provide great opportunities for rural as well as urban people to engage themselves in drying industry. It is not only flowers but also other plant parts *viz.* foliage, branches, seed pods, grains, cones, nuts, berries, fruits, etc. can be dried and marketed to generate job and self employment.

Keywords: Air drying, flowers, foliage, freeze drying, oven drying, press drying.

Introduction

Flowers keep their importance in all the auspicious occasion, functions, ceremonies, rituals and celebrations. They are associated with our society since the dawn of civilization and mainly grown for cut and loose flower purposes. Moisture content is one of the factors that determines longevity and storability of agricultural and horticultural produce. Particularly, flowers having the few days' vase life, longevity and attractive appearance mostly depend on the presence or absence of moisture content within the petal and sepal (Kant & Arora 2012). There are different approaches to dehydrate the flowers other than the drying technique to keep for few days to week but applying drying techniques flowers can be preserved for long time even months to year after drying or dehydration (Deshraj and Gupta 2003). The drying techniques approach are less expensive, sustainable, need low cost machinery as well as keeping their attractive and natural appearance which facilitate the availability of off-season flowers at all the occasion. Moreover, this technique need less input with less expertise for producing dried products and operating drying industry (Malcolm 1994). Percentage of

moisture content must be determined before ensuring drying technique for different flower. The best preservation of flowers through drying technique require the moisture range between 8-11.5 percent in keeping their firmness, quality and longevity more in comparison to below or above this range (Pandey 2001). Plucking or cutting of flower/foilage at suitable stage helpful in storage and utilization for drying industry. It would be the best time for harvest when flowers in a stage of reaching full bloom stage and foliages at their peak of growing season. The dry grasses, seeds, pine cones and most seed heads harvested at full maturity stage at the end of their growing period (Sankari and Anand 2014) (**Table 1.**)

Name of flowers	Stage of harvest	Parts used for Dry
<i>Alstroemeria</i> hybrids	4-5 florets open	Flower
<i>Althea rosea</i>	1/3 florets open	Flower
<i>Anemone coronaria</i>	buds begin to open	Flower
<i>Bellis perennis</i>	fully open flowers	Flower
<i>Bouvardia</i> hybrids	flowers begin to open	Flower
<i>Dahlia variabilis</i>	fully open flowers	Flower
<i>Eucharis grandiflora</i>	Almost open flowers	Flower
<i>Helianthus annuus</i>	fully open flowers	Flower
<i>Papaver spp.</i>	colored buds	Flower
<i>Thuja orientalis</i>	Immature stage	Foliage

Techniques of drying

Air drying

This is the technique require well ventilated room with low humidity and must possess dark and clean area. The drying materials should be kept in hanging position either in dark or in the sun for quick drying with the help of rope/wire. Flowers of helichrysum and statice having the crisp in texture can be easily dried in hanging position either in erect or inverted. It has been reported that this technique applied mostly in dry and summer season in shade for getting better results particularly in crisp texture flowers namely acroclinum, helichrysum and limonium (Bhutani 1995).

Sun drying

Sun drying is a method suitable for some of the flowers like Chrysanthemum, Carnation etc. in which flowers are hanged in air with rope in Sun shine. It is the method to keep advantage

over air drying in the sense that there is less shrinkage in dried products as well as their diameter, and looking appearance remains same as fresh flowers (Wilson et al. 2013).

Press drying

This is a very old technique and applied mainly for the preparation of herbarium by the botanists/herbalists. The press drying commonly applied in *viz.* leaves of Silver oak, Thuja, Adiantum, Marigold, candytuft, chrysanthemum, lantana, rose, verbena, euphorbia etc. for getting best dried products. Press drying performed by putting the sample between the folds of newspaper sheets or blotting papers giving some space among flowers. Corrugated boards of the same size should be placed in between the folded sheet so that water vapour comes out from the sample easily (Lourduswamy 2002). Another way is to put the flower and foliage in between the blotting paper/news paper and pressed dried with the help of "Plant Press" made up of two wooden board fixed with nuts and bolts at four corners. The size of plant press may vary from 6" X 12" to any desired size. This technique generally requires 1-3 weeks depending on the flower size and moisture content (Datta, 2004).

Embedded drying

This is the technique require silica gel, sawdust, sand, borax, perlite and combination of these for preparation of media and embedding the sample. These are used as desiccant materials and among these desiccants, silica gel has been considered to be the best in Embedded drying. It has been reported that silica gel as embedding media resulted into excellent dried products that retain the colour and shape of the Carnation flowers (Nirmala et al. 2008).

Oven drying

It is the process for putting the sample at higher temperature for removing moisture at faster rate. Higher the temperature, faster will be the dehydration process but drying of flowers at higher temperature will enhance degradation of pigments *viz.* chlorophylls, carotenes, xanthophylls and anthocyanins. This is the technique applicable on the basis of nature, texture and colour of flowers/foiliages. The fully opened flowers with large petals are not suitable for this technique (Prasad et al. 1997). The drying temperature and time period also depend on the species, genotypes, texture and colour of the flowers. The drying temperature and time for French marigold were 45-49°C and 72 h, respectively while at same temperature range African marigold took 96 h for drying (Ranjan and Mishra 2002).

Glycerine drying

This is the technique applied for drying mainly foliage of plants. Immersing plant material in 33% glycerol solution found to be the best preservation methods for leaves or crushed stems.

During loss of moisture from fresh ornamental parts, flaccidity and shrinkage is the common phenomena that led to losing the shape, appearance and market value of the samples but using this technique they retain their original shape and texture after drying (Joyce 1998).

Freeze drying

It is the most effective technique based on the principle of sublimation, whereby liquid phase escapes and ice directly converted into vapour. It is done by putting the sample in partial vacuum (less than 4.58 torr) and low temperature (less than 0°C), forming ice crystal thereafter started heating slowly which form vapour without going through a liquid phase. This technique can be performed in freeze drier (lyophiliser) in which temperature of the flower chamber of freeze increased from -5°F to 25°F. This process facilitated loss of maximum moisture and preserve the flower and foliage in their natural shape, texture and colour (Sankari and Anand 2014).

Conclusion

The drying techniques require low input with diversified vegetation which is readily available in tropical and sub-tropical countries. These techniques have tremendous potential as substitute for fresh flowers and foliage as well as uplifting the economical status of floriculturist, entrepreneurs and traders.

References

- [1] Bhutani, J.C. (1995). Drying of flowers and floral craft. *Advance Horticulture and Ornamental Plants*, 12, 1053-1058.
- [2] Dahiya, D.S. (2003). Dehydration of annual chrysanthemum (*Chrysanthemum coronarium*). *Acta Horticulturae*, 624, 385-387.
- [3] Datta, S.K. (2004). Dehydration of flowers: A new diversified product for floriculture industry emerging trends in Ornamental Horticulture. *Indian Society of Ornamental Horticulture*, pp.157-161.
- [4] Deshraj, P., and Gupta, P.K. (2003). Standardization of dehydration technology for ornamental plant parts of shrubs from mid-hills of Himachal Pradesh. *Journal of Ornamental Horti-culture*, 6, 357-361.
- [5] Dhatt, K.K., Singh, K., & Kumar, R. (2007). Studies on methods of dehydration of rose buds. *Journal of Ornamental Horticulture*, 10, 264-267.
- [6] Joyce, D.C. (1998). Dried and preserved ornamental plant material not new, but often overlooked and under rated. *Acta Horticulturae*, 454, 133-145.

- [7] Jawaharlal, M., Visalakshi, M., Cintu S. & Ganga M. (2013). Standardization for drying, bleaching and dyeing processes in dried flowers. *Journal of Horticultural Science*, 8, 65-69.
- [8] Kant, K. & Arora, A. (2012). Characterization of proteases during flower senescence in gladiolus (*Gladiolus grandiflora hort.*). *Indian Journal of Plant Physiology*, 17, 44-51.
- [9] Lourdasamy, D.K., Vadivel, E. & Manavalan, R.S.A. (2002). Studies on drying of Globe amaranth for dry flower decoration. *South Indian Horticulture*, 50, 546 -548.
- [10] Malcolm, H. (1994). Guide to arranging dried flowers. Step by step. *Handbook of growing, drying and displaying*, Dorling Kindersley Ltd, London.
- [11] Nirmala, A., Chandrasekar, R., Padma, M. & Rajkumar, M. (2008). Standardization of drying techniques of carnation (*Dianthus caryophyllus*). *Journal of Ornamental Horticulture*, 11, 168-172.
- [12] Pandey, P.H. (2001). Principles and practices of post harvest technology. *Kalyani Publishers*, Ludhiana.
- [13] Prasad, J.J.K., Pal, P.K. & Voleti, S.R. (1997). Drying of flowers: an upcoming industry. *Floriculture Today*, pp. 20-23.
- [14] Ranjan J.K. & Misra, S. (2002). Dried flowers: a way to enjoy their beauty for long period. *Indian Horticulture*, 47, 32-33.
- [15] Sankari, A. & Anand, M. (2014). Process of making - waste into wealth - dry flower technology. *The Asian Journal of Horticulture*. 9, 466-483.
- [16] Wilson, D., Attri, B.L. & Sharma, S.K. (2013). Evaluation of different methods for drying of Chrysanthemum flowers. *The Asian Journal of Horticulture*, 8, 743-745.