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Drying Techniques of Selected Flowers - A Review

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Abstract: Drying is a mass transfer process consisting of the removal of water or another solvent by evaporation from a solid, semi-solid or liquid. There different types of method for drying like Air drying, Sun drying, Press drying, Oven drying, Microwave drying, Embedded drying, Glycerine drying, Freeze drying. The flower of rosa has 5 petals. Flowers are usually white or pink but in a few species are yellow or red. Seeds are hairy and produced in a fleshy pericarp called a rose hip. Gerbera flower possesses three different types of flowers, an outer ring of ray florets, a middle ring of trans florets, an inner ring of disk florets. The both ray and disc flowers are packed tightly into a flower head is called as capitulum. From the dried flowers different products are made like floral jewellery, pot pourri, candle making, press dried flower products, petal embedded handmade paper, etc. This dried flowers are also used in industry. For rose embedded drying technique is best in which flower shape, colour, size are maintained and for gerbera press drying and microwave drying techniques are best in which shape, size, colour are maintained.

Keywords: Drying Technique, Rose, Gerbera, Microwave, Hot air oven.

I. INTRODUCTION

Drying means mass transfer process consisting of the removal of water or another solvent by evaporation from a solid, semi-solid or liquid. Since flowers and foliage consists of more water, dehydration is necessary for getting dry flowers. Methods used for removing water from plants are air drying, oven drying, embedded (sand, borax, silica gel and combination of these materials), glycerining (glycerinating), microwave oven drying, freeze drying, press drying.

A. Drying Methods

1) *Air Drying:* Air drying is a cheapest method of drying in which flowers are hanged for the drying. Healthy and a bit immature stage are selected for drying. Flowers are tied in bunches, ventilated at warm air in the dark area. Flowers take upto 1-2 weeks for drying and it depends upon the surrounding moisture content, humidity and temperature (Shailza Rana, 2018).
2) *Sun Drying:* In this method the plant material is embedded in the sand for drying. This medium is filled into a container and expose daily to the sun for the fast dehydration. Sun drying methods is followed by India for drying many flowers. In the sand the flowers are embedded in upside down form and put in the sun for drying for day or two (P. Arul Murugan *et al.*, 2007).
3) *Press Drying:* Press drying is very simple and cheap method among all the methods. In this method a flower are put in folds of blotting paper, newspaper, old notebook paper etc. and at the top heavy object is being put. For drying it takes upto 3-4 weeks because it depends upon the water content of tissue in flowers. Time should be reduced if flower folded sheets is put in oven at appropriate temperature.
4) *Hot air Drying:* Flowers are dry in convection chamber, it has fan inside. For drying temperature should maintain between 30 to 35°C. This method takes few hours to many days to dry flowers. In the chamber flowers are placed in slots in a wire mesh. In this process time for drying depends upon the amount of flowers dried at one time within the chamber.
5) *Microwave Drying:* This method is very fast method for drying which generates less amount of heat. It works on the principle of liberating moisture by agitating water molecule in organic substances with the help of microwave. For drying it takes 5-10 minutes in microwave. After this process the flowers are taken out from microwave and kept in the room temperature for some particular period of time because the remaining moisture evaporates from the plants materials and it's fully dried. This process is known as setting the time which varies from species to species.
6) *Embedded Drying:* This method is mainly useful for delicate flowers having high moisture content that shatter or misshapen when air dried. Embedded drying is mainly preferred over air or oven drying and even it reduces the petal shrinkage problems. In this method water content in the flower is completely absorbed by surrounding desiccant material. The desiccants which are commonly used silica gel, borax, corn meal, etc. By using this, desiccants moisture is removed very fast from the flowers than the air drying method and besides that maintain the flowers in natural form. At the seashore fine white sand (river sand) are

found which can be used for embedding method because it is easily handled and available also. For excellent quality of dry flowers, retaining of color and shape, silica gel is the best dessicant. If embedded for a long time it can't brittle or shrinkage because it does not cause bleaching. It has aerogel of silicic acid that is why it is called as gel and it has granular in shape. For removing moisture from flowers, silica gel (60-120 mesh) is the best absorbent (Shailza Rana, 2018).

II. SELECTED FLOWERS

A. *Roses*

It is known as a symbol of affection and honor for a wide range of human events, in both celebration and sad ceremony. Modern roses obtain some part of DNA from one or more of eight rose species were native to Europe and Asia.

Roses are produced into bush either climbing or shrub roses. Although there are more than two centuries of breeding and hybridizing which have served to produce thousands of more species and cultivars, each are with a unique mixture of characteristics. Every rose has a flower head that is round in shape and symmetrical face and at downwards having vertical axis. As far as the flower is concerned, central ovary is present at center of bloom under the petals and between green downward pointing sepals. Around the central ovary anther and stamens are present. Rose petals are ranges in shape like pointed cone with a rounded tear shape and some layer flat and the edges of others curl up or under. Roses has five or more than 60 petals which overlapping in layers on each flower head (D.C.Winston, 2017).

Adventitious rooting during stunting propagation depends on several factors, which includes the physiological condition of stock plant and environmental condition during adventitious root formation. Factors affecting on rooting in stunting propagation includes node position, numbers of leaflets left and time of cuttings, light intensity, temperatures, humidity, medium and plant growth regulators (Byoung Ryong Jeong, 2012).

B. *Gerbera*

In the cut flowers gerbera is important having single, double and spider flowers belongs to Asteraceae family. Size of flowers, color variations, long lasting behaviour and wide adoptability for culture make gerbera flower of choice which cultivate in Bangladesh. In Bangladesh, demand of gerbera is very high.

Floriculture is fast emerging as high in competitive commercial and economic activity with potential for earning valuable foreign exchange. Classification of flower bloom is technique of grouping for bloom using specific feature such as arrangements of florets. Gerbera cultivars vary with the region, other growing condition and season.

1) *There are three types of florets in Gerbera Blooms*

a) The center contains disc florets.
b) Around the center is a ring of intermediate trans florets.
c) Petals compose the outer ring is known as ray florets.

2) *There are 5 types of Gerbera Flowers*

a) *Single:* The flowers that posed one row of non-overlapping petals are usually with green center. Belongs to the class of singles, 24 gerbera cultivars are available.
b) *Doubles (duplex):* Flowers that posed two rows of overlapping petals having dark center.
c) *Crested Doubles:* Flowers that posed two rows of overlapping petals, one or more inner rows of short petals and green or dark center.
d) *Full Crested Doubles:* Flowers that posed solid overlapping rows of petals, inner rows are covered the whole center with shorter petals.
e) *Quilled Crested Doubles (Spider):* Flowers that posed overlapping rows of spike shape petals, inner rows of shorter petals in the number of one or more, green and dark center (H.Mehraj *et al*., 2016).

According to Singh and Dhaduk, 2005 drying at higher temperature, oven showed quick result as compare to lower temperature (room). Silica-gel showed quick result than borax and sand. In silica gel and sand the flower quality was very well maintained. Bhalla *et al.,* 2006 observed that maximum carotene content and minimum size reduction obtained when flowers was embedded in silica gel and dry at 3°C for 24 h in hot air oven and in microwave oven for 30secs of drying. Safeena *et al.,* 2006 had studied the response of drying in hot air oven at different temperature (30°C, 40°C, 50°C) on the quality of rose (lambada, skyline, ravel and first red) and even found that drying of dutch rose flowers at 40°C by embedding in silica gel which gives the best result for texture, colour and appearance. According to Verma *et al.*, 2012 rose flower if embedded in sand, kept in face up position for 2 weeks best when buds are half open. According to Pertuit, 2002 silica gel is appropriate for drying of flowers with closely packed petals of rose.

Bryan, 1992 reported that air drying was the earliest method to dry rose. According to Champoux, 1999 flower hung in dark area that took 8-10 days for drying when there is sufficient ventilation. Seabird, 1997 has reported that rose bunches could be hung and dried in shade within 5-10 days. According to sell, 1993 the rooms with 75 percent or more relative humidity should be avoided because it encourages the mould growth which spoils the flowers. Gill *et al.*, 2002 has reported that time required for press drying of rose flower is 120 hrs. According to Lourdusamy *et al.*, 2001 press drying was earliest method of preserving rose flowers.

Champoux, 1999 reported that silica gel is best medium to get excellent dried flowers which retain color and shape of flowers. Dhatt *et al.*, 2007 studied that the method of drying rose buds and embedding of rose buds in silica gel has the best quality with shape and color. Sell, 1993 has reported that mixture of corn meal and borax (1:1 v/v) for drying and embedding of flowers produced good result. Smith, 1993 has reported that flowers like rose should be dried well in borax.

Singh *et al.*, 2004 has reported that drying in silica gel is faster without any deterioration in quality; however there is slight roughness in petal texture which was aesthetically accepted. Orduno and Baltazar, 1995 studied effects of river or sea sand in combination of borax for drying rose and gerbera they have reported that rose dried well in river sand which contains high proportion of borax within 15-20 days period, while sea sand with low proportion of borax for 10-15 days is good for gerbera.

Prasad *et al.*, 1997 had observed that fully opened flowers were not suitable for oven drying. According to Bull, 1999 chrysanthemum, marigold, roses are best suited to hot air oven or microwave. According to Miller, 1997 the large roses required two and a half minutes to dry. Dahiya, 2003 has found that the weight and moisture content of dried flowers were decreased significantly with an increase in the temperature of hot air oven and duration of drying. According to Behera, 2009 maximum moisture loss and maximum total sugars content were obtained in the flowers which was dried in freeze. Ravichandra and Pedapati, 2014 has observed that dried flower quality greatly depends on the flowers structure, moisture content, drying stage of harvest, time of harvest and drying methods.

Dhatt *et al.*, 2007 dried rose buds in microwave oven for 3 minutes, 4 minutes and 5 minutes and has found that in microwave, drying of rose buds for 4 minutes exhibited good colour and shape retention. White *et al.*, 2002 has reported microwave oven dried flowers were looked fresh and more colourful than obtained by other methods. According to Paul and Shylla, 2002 in glycerine drying quality of the product was good as moisture in flower were replaced by a mixture of water and glycerine. According to prasad et al., 1997 glycerine serves as good source for micro-organisms so a pinch of antibiotic is necessary to prevent microbial growth in the dried specimens.

Brown, 1999 had conducted freeze drying method with different varieties of roses and determined the freezing time and temperature at which the drying were perfect to keep the quality of flowers good. Chen *et al.*, 2000 had evaluated the effect of different freezing time (2 and 4 hours), freezing temperature (-35°C) and vacuum drying temperature (27°C, 37°C, 47°C) on moisture content, stem, colour and petal strength of roses. Sohn *et al.*, 2003 studied the effect of freeze drying for 14 days on the shape and colour of rosa hybrida (CVS Tineke, Saphir, Roulette, Golden Gate, Rote Rose).

Crepeau, 2016 has concluded that drying roses is great way to preserve their beauty long after the season had ended for beautiful looking blooms and for the weddings specially and for varieties of beautiful craft items. Datta, 1999 had given the drying period for different flowers in hot air oven at temperature of 45-50°C. He had also listed the name of flowers suitable for oven drying technique. Rengasamy *et al.*, 1999 has reported that rose buds and small flowers can be kept for 48 hours in oven at a temperature of 40-44°C for drying.

III. CONCLUSION

Here we can conclude that for rose flower, embedded drying technique is best in which shape, size, colour are maintained compared to others and for gerbera flower press drying and microwave drying technique is best in which shape, size, colour are maintained. so by using these techniques we can dry flowers appropriately and use these dried flowers to make so many products like dry flower arrangement, floral jewellery, pot pourri, candle making, press dried flower products, petal embedded handmade paper. This dried flowers are also used in industries.

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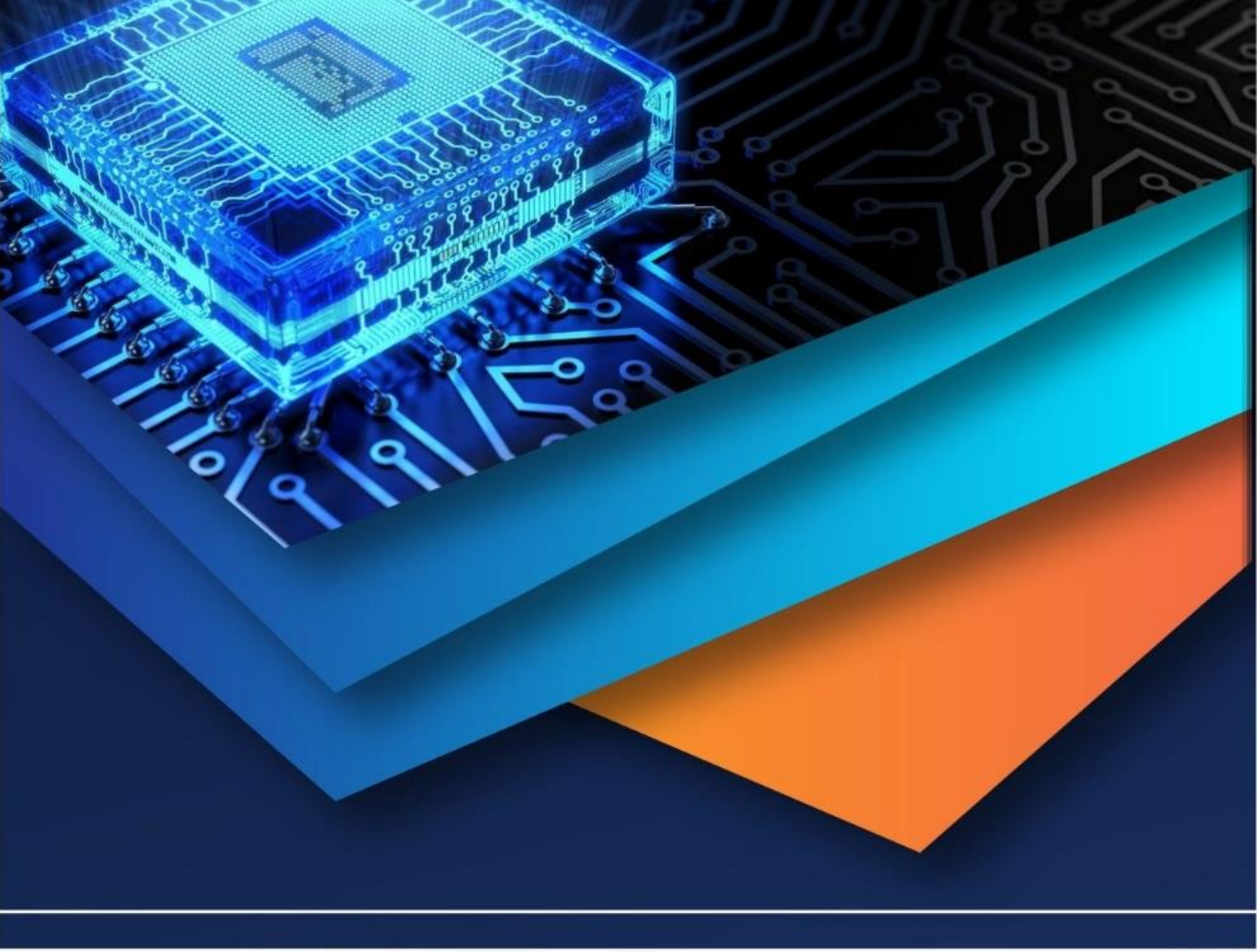

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