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A New Ray to Dehydrated Floral Craft-Epoxy Resin Encapsulation Technique

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ABSTRACT

Dry flower industry in floriculture is gaining knowledge with the booming floriculture industry in India. Despite poor weather circumstances, the dry flower sector in floriculture gives an excellent chance for farmers to improve their income throughout the year. Dehydration techniques help to maintain the original colour and shape of flowers for long-term use with little care. In addition to that drying of different plant parts epoxy resin encapsulation technique is a novel approach. In this embedding technique beauty of the flower can be cherished forever and able to protect it from dust and other pest. A detailed variation in embedding technique and time between has been mentioned. Farmers can easily earn 2 to 5 times profit from value addition through epoxy resin encapsulation technique. Input cost is reduced by incorporation of priceless house to get higher returns and waste material available with dried flower used to make floral handicrafts.

Key words: Dehydrated floral craft, Epoxy resin encapsulation, Higher return, Rural economy.

Due to its various agro-climatic and regional geography, India has a vast biodiversity of attractive plants. In many parts of the world, floriculture has become a thriving business. Cut flower is one of the main components of floriculture trade. Shelf-life of cut flower is very limited. In spite of using best chemicals for improvement of keeping quality and enhancement of vase life, the cut flowers cannot be stored for a longer period of time. The current floriculture market is dominated by well-known decorative species and variants. However, new goods are always in demand and necessary in industrial floriculture and flower lovers are always looking for "something new."

There are numerous plant species that have the potential to be commercially exploited in various ways. For our basic needs, we only use a few numbers of well-known plants. Thousands of wild plant species are economically significant due to differences in texture and structure, which offer enormous market potential for attracting a large number of people all over the world (Tomar *et al.*, 2012). Flowers have limited lives in general, but because they are perishable, they can be stored for a long period. Although, several preservatives were used to extend the flower's storage life, the state of fresh flowers quickly deteriorates after a few days.

Resin encapsulation techniques

Resin encapsulation techniques refer to the process of embedding dry flowers in resin. Metal, glass, wood, stone, and polymers all use epoxy resins as adhesives. Dry flowers can be used to make a variety of value-added goods that can be translucent or coloured with epoxy resin. This is a process in which dry flowers are permanently trapped in resin, displaying eternal beauty forever. At the CSIR-National Botanical Research Institute in Lucknow, researchers are using epoxy resin to dehydrate several annual and perennial blooms. Pendants, ear rings, rings, paper weights, key chains and other value-added products.

As consumers become more "eco-conscious," dried flowers have increased in popularity as a more environmentally friendly and biodegradable alternative to fresh flowers (Thakur, 2009). Every country has a lot of potential for developing the dry flower industry and providing jobs for housewives and rural women. This approach has been simplified to the point where it may be learned in two to three days by any group of individuals, including illiterate rural men and women. The lack of knowledge has been a key barrier to the development of the dried flower sector in our country.

In light of this issue, it is critical to provide farmers with adequate technology for the preservation of flowers and floral crafts. One promising technology is the combination of dehydration and resin encapsulation.

Blooms are dried as a method of preservation or as a method of removing moisture from the flowers (Table 1). The CSIR-National Botanical Research Institute in Lucknow is a pioneering institute in floral dehydration research (Datta and Roy, 2011; Radha Rani and Reddy, 2015). Commercially

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feasible drying methods are mostly two. Different procedures have been standardised, but only two of them, press drying and embedding drying, are commercially feasible (Ranjan and Misra, 2002). As the result of which this new embedding method for flower encapsulation has been conducted in CSIR- NBRI lab in year 2021 and 2022.

The first or initial step is to press dry flowers, *viz*. *Aconogonum molle*, *Anaphalis margaritacea*, *A. triplinervis*, *Androsace rotundifolia*, *A. sarmentosa*, *Barleria cristata*, *Buxus sempervirens*, *Cotinus coggygria*, *Decandrum nanum*, *Delphinium vestitum*, *Hypericum oblongifolium* (Singh, 2015), *Inula cuspidata*, *Maesa chisia*, *Persicaria capitata*, *Pistacia integerrima*, *Viburnum mullaha*, *V. cylindricum*, *V. cotinifolium*, *Vitis himalayana*, *foliage of Adiantum capillusveneris*, *Asparagus adscendens*, *Cheilanthes brevifrons*, *Onychium contiguum*, *Polystichum squarrosum*, *Pteris cretica*, *Woodwardia unigemmata etc*., in between blotting paper sheets whereas, naturally dried fruits and seeds of *Abrus precatorius*, *Acer oblongum*, *Hedera nepalensis etc*. can be used to give different designs and textures as such in this technique (Bhattacharjee and De, 2003; Bhutani, 1995).

The second step is to keep ready required resin and hardener *i.e*.,Picture 1 which should be thoroughly mixed before usage. Differently shaped silicon moulds are available to make variety of products. Epoxy resin and hardener are used in the ratio of 3:1 is poured into the moulds first as an initial layer, then press dried flowers, leaves and seeds are arranged artistically on it and then again, this solution is poured over the press dried items as a final coating. These moulds, which contain sculpted flowers and greenery, are let to dry and solidify overnight. The resin and hardener composition should be acceptable, and designs can be created using one's own ability and imagination *i.e*., Picture 2,3.

After drying when plant material is embedded in epoxy resin the best ratio observed is of 3:1 in comparison to 2:1. The material combined in 3:1 ratio has higher degree of transparency in comparison to 2:1 ratio. During the process of embedding of dry plant material within epoxy resin the planting material show some colour change from their original colour.

The embedded resin product takes at least 24 hours in drying at the temperature range of 40-45°C (During Summer) and at least 42 hours at a temperature less than 25°C.

There are some of the Factors which affects the quality of the final product which are:

Table 1: Drying periods for different flowers (Batra, A., 2016).

Flowers	Hot air oven drying	
	35-40°C	45-50°C
Acroclinum	-	48
Bougainvillea	48	-
Candituft	-	48
Chrysanthemum	-	40-45
Dahlia (pompon)	72	-
Dombeya	-	48
Gerbera	-	48
Gomphrena	-	48
Helichrysum	-	48
Ixora	-	24
Marigold (French)	-	72
Marigold (African)	-	72
Narcissus	75	-
Nymphaea	-	120
Pansy	60	-
Statice	-	48



Picture 1: Resin and Hardener.



Picture 2: Final products paper weight.

Table 2: Weight and cost of resin products in national market.

Product	Final product weight (g)	Cost (Rs.) in National markets
Pendant (Small)	3.0-5.5	250- 500
Pendant (Large)	8.5-12.5	1000
Bookmark (Small)	5.5-6.5	200
Bookmark (Large)	9.5-10.5	500
Bangle	21.6-23.5	500-2000
Keyrings	4.5-6.0	80-100
Paper weight	60.0-68.6	250-800



Picture 3: Above pictures contains different types of paper weight, pendants, keyrings, tea coasters *etc*.

Ratio of epoxy resin and hardener

Epoxy resin and hardener of different companies have different consistency. Therefore, the mixing ratio is changed depending upon the consistency of the resin and hardener.

Temperature

Effect of temperature is majorly seen during the drying of the product. The drying process is quick and easy during summers at room temperature but in winters the drying process get slower at room temperature. Due to which it takes two to three days in drying.

Mixing time

Properly mixing of the resin and hardener results in high degree of transparency and reduce the air bubbles formed during its product preparation (Table 2).

CONCLUSION

Almost all types of flowers and foliage are suitable for drying and embedding purposes. It helps to became a choice over fresh flowers because of its long-lasting property. Sophisticated training and expensive equipment are not needed with variety of designs. This dehydration and embedding technique does not require any expensive equipment's. For best result proper techniques and some precautions are needed throughout the process. This is one of the easiest and simple process which can be done by variety of groups of physically challenged persons, rural women, housewives, they can also be involve in business to earn money. For proper guidance and knowledge about Epoxy resin dehydration technology they require some awareness programmes that were organised by CSIR-National Botanical Research Institute, Lucknow every year

for the upliftment of the society. Considering the above points, it is conclude that Epoxy resin dehydration techniques help in uplifting the economic status of many handicapped and rural people, floriculturists, traders and entrepreneurs (Singh, 2008).

Conflict of interest: None.

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