Employment Generation using Dehydration Technology for Drying Flowers and Foliage and Floral Craft

ABSTRACT: Wild/unutilized/underutilized plant species and ornamental cut flowers can be converted into value added products using simple dehydration technique. Dehydration techniques have been standardized under room temperature, sun drying, press drying, hot air oven drying, microwave oven and solar cooker. Dried flowers and foliage have multipurpose use. A cottage-scale industry based on floral craft can come up for self-employment of unemployed youths and for earning money to the housewives as well as rural women through this creative occupation.

Key words: Dry Flowers, hot air oven, micro wave oven, solar cooker, floral craft

Almost every country is bestowed with rich wealth of biodiversity of ornamental plants due to diverse agro-climatic and regional topography. Floriculture has become a profitable industry in many parts of the globe. 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 long time. Non-availability of flowers at time and places where one wants them very much is an additional problem. Present floriculture market is dominated by standard well utilized ornamental species/varieties. But in industrialized floriculture there is always demand and necessity for new products and flower lovers always seek “something new.”

There are wide range of wild/unutilized/underutilized plant species which have the potential for commercial exploitation in different forms. We use only small number of crop plants for our basic requirements. Many thousands of wild plants have great economic and cultural importance and tremendous market potential for vast number of people throughout the world. There is an increasing interest throughout the world, in “neglected and underutilized crop species” (NUS). Neglected and underutilized crop species should be identified for new uses. But the majority are still unknown to science. Rural and hilly areas are covered with different types of colourful flowers and foliage at different seasons round the year and all these are wasted under natural process. The entire seasonal colourful vegetations can be converted into value added products by using dehydration technique. Dehydration technology can also be exploited for dehydration of promising colourful cut flowers in its original colour and shape for long term enjoyment and for commercial utilization of unutilized/underutilized plant species. Dry flowers that are near natural, dried and preserved, have an ever lasting value that can be cherished for longer periods and require little care. Dry flower market has grown exponentially as consumers become “eco-conscious” and choose dried flowers as the environmentally friendly and biodegradable alternative to fresh flowers. There is large potential to develop the dry flower industry in every country and to provide employment to housewives and rural women.

Simplified indigenous techniques have been developed by which flowers, branches, twigs, foliage etc. retain their fresh look for several months or even years. The original shapes, colours and size remain as they were before dehydration and, thus, making them highly suitable raw materials for interior decoration and may be enjoyed for a long time and can be used for any occasion. The technique has been simplified in such a way that any group of people including uneducated rural men/women can learn it within two to three days.

Non-availability of information has been a major constraint in the promotion of dry flower industry in our country. The main aim of the present article is to popularize a simplified technique which can be profitably utilized by all class of people. This will provide guidelines to researchers, growers, florists and industry members for quick commercial utilization of dehydration technique and floral craft.

Materials and Methods: Technology Package: A full package of technology protocol is available for dehydration of flowers and foliage and floral craft. Information on selection and collection of plant materials, their processing before dehydration, different methods of dehydration, utilization of dehydrated materials for preparation of interior decorative items etc. are available. No sophisticated infrastructure is required for dehydration. Different methods have been standardized but two methods are commercially viable i.e. Press Drying and Embedding and Drying.

Naturally available unutilized flora and cultivated colourful annuals can be dehydrated through press drying.
Standard cut flowers and other attractive flowers can be dehydrated in its original colour and shape through embedding and drying using either hot air oven or micro wave oven or solar cooker.

**Press Drying**: The flowers and foliage are kept in blotting sheet/news paper and pressed dried with the help of “Plant Press”. The plant press has been specially designed in a very simple way. The plant press is made up of two wooden board fixed with nuts and bolts at four corners. The size of plant press may vary (6" X 12" to any desired size). Collected leaves and flowers are kept between blotting sheets and one type of leaves/flowers are always pressed in one sheet. All blotting sheets containing leaves/flowers are kept between two ply boards and tightened with nut and bolt. The materials may be kept at room temperature for dehydration. Blotting sheets are changed every 3rd and 5th day to avoid fungal effect/contamination. This helps maintenance of original colour of flowers and leaves.

For quick drying, the pressed materials may be kept in hot air oven at 60°C.

**Embedding and Drying**: Flowers are embedded either in sand or in silica gel in earthen/plastic/tin/glass pots and pots are kept for dehydration in hot air oven / micro wave oven / solar cooker. The hot air oven is thermostatically controlled.

**Hot air oven**: The temperature is maintained 40 – 45°C.

**Microwave oven**: Flowers are dehydrated within 5 – 10 minutes. Pots after taking out from micro wave oven are kept for two hours at room temperature for setting.

**Solar Cooker**: Flowers can be directly embedded in the container of solar cooker and it can be dried under sun. The time of exposure vary according to day temperature. The solar cooker can also be operated electrically. Solar cooker will be most suitable for rural women. They can cook their food in solar cooker and rest of the time can utilize for dehydration work.

**Results and Discussion**: Time (days – in parenthesis) required for press drying of some common materials are Fern (9 days); Rorippa, Caeselpinia (13); Mimusops, Digitaria setigera, Setaria glauca, Digera muricata, Echinochloa colonial (12); Mussandra, Vernonia cinerea (18); Ixora, Opitsnemus hirtellus, Wedelia chinensis (11); Bamboo, Azadirachta indica, Acalypha, Sapium cebiferum (14); Bougainvillea (8); Thuja (28); Opitsnemus spp., Polygonum spp., Sida acuta, Synedrella nudiflora (16); Brassica (25); Phlox (29) etc (Fig. 2-5).

It has been observed that the fern leaves take 9 days to dry at room temperature but it is dried within 2 days in hot air oven. Similarly Caeselpinia flowers (petals) dry within 2 days in hot air oven whereas it takes 13 days to dehydrate in room temperature.

Normally it is difficult to dehydrate uniformly the flowers with thick pedicel/disc. Pressed Cosmos flowers with thick disc are exposed to a temperature of 50°C for the first 48 hrs followed by drying at room temperature. This resulted in good quality of intact flowers after dehydration.

The optimum stage, time of harvesting and time required for dehydration varies from material to material. Some common flowers have already been categorized on the basis of their suitability for dehydration.


**Hot Air Oven drying**: *Helpterum roseum*, chrysanthemum, Candytuft, Gerbera, *Gomphrena globosa*, *Helochrysum bracteatum*, *Euphorbia*, *leucocephala*, *Delphinium ajacis*, *Rose*, *Zinnia linearis*, *Bougainvillea*, *Narcissus*, *Dahlia*, *Gladiolus*, *Tagetes petula*, *Tagetes erecta*, *Nymphaea* sp. etc. (Fig. 6-7; 10-13)

Different flowers take different time to dehydrate in hot air oven like *Acroclinum*, Aster, *Bougainvillea*, Candytuft, *Marigold* (small), *Zinnia linearis* - 48 hours; Ixora – 36 hours; Chrysanthemum (small flower) – 45-48 hours; Dahlia (pompon), Marigold (large), Narcissus, Zinnia liliput – 72 hours; *Nymphaea* – 120 hours.

**Microwave oven drying**: *Antirrhinum majus*, *Callistephus chinensis*, Chrysanthemum, Gerbera, Gladiolus, *Legestroemia indica*, Narcissus sp., *Delphinium ajacis*, *Helichrysum bracteatum*, Phlox, *helipterum roseum*, *Ixora coccinea*, *Nymphaea* sp. (Fig. 9)

A quantitative estimation has also been done i.e. fresh flowers approx. 8,000 of *Acroclinum*, 2,600 of *Helichrysum*, 2,700 of Aster, 350 of Rose, 800 of Marigold large, 550 of Dahlia, 1,17,500 of Ixora and 16,000 of Annual Chrysanthemum are required for preparation of one Kg. of dry flowers.

Passport data of each cultivated ornamental and unutilized species are being prepared on the basis of their suitability for dehydration.

**Techno-economics**: Plant Press costs Rs. 100 to Rs. 200/- per piece.
Hot air oven is easily available in the market or it can be fabricated of any desired size. The price varies from Rs. 5,000/- to Rs. 40,000/-. Micro wave oven costs from Rs. 6,000/ to Rs. 20,000/ and the price of Solar Cooker varies from Rs. 2500/- to Rs. 3,500/-. Therefore, initial capital cost for starting dry flower business is not high. For press drying approx. Rs. 2000/- and for Hot Air Oven drying Rs. 10,000/- (along with other raw materials) initial investment required to start dry flower business.

**Production Cost and profit margin** : Rs. 4,250/- are the production cost for 1600 Greeting Cards (9 x 25 cm size) and profit is Rs.3,744/-. Similarly for production of 100 pieces of three dimensional floral arrangements in sealed glass containers Rs. 3,515/- are the production cost and the profit is Rs. 2,485/-.

**Suitability of Technique and Utilization**: Press dried materials may be used for preparation of diversified value added products. Dry flowers with original colour and shape, developed through embedding, can be utilized for preparation of three dimensional arrangements (Fig. 14-15). There is no limit of product range. However, some have already been designed like : bouquets, gift boxes, wall hanging, pot pourries, artistic greeting cards, get well cards, wall plates, calender, pictures, flower baskets, refrigerator magnets, mirror decoration, hats, embedding in gold/silver or resin to use as jewelry, landscape, table mats, coasters, three dimensional arrangements of flowers for interior decoration etc (Fig. 16-19). Floral album may be prepared for identification of plants for taxonomic studies. Dehydrated flowers may be used as botanical specimens for demonstration and for teaching students. A cottage scale industry based on dehydrated floral craft can come up for self employment of youths and for earning money to the house wives as well as rural women by providing them with a part time creative occupation. It

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**Fig. 1.** Plant Press. Figs. 2 and 3. Pressed dried leaves and inflorescence. Figs. 4 (Ixora) and 5 (Cosmos) Pressed dried flowers. Fig. 6. Embedding in sand. Fig. 7. Hot Air Oven. Fig. 8. Solar Cooker. Fig. 9. Microwave Oven. Fig. 10. Dried Helichrysum. Fig. 11. Dried Aster. Fig. 12. Dried Dahlia. Fig. 13. Dried Rose. Figs. 14 and 15. Three dimensional arrangements of dry flowers in sealed glass container. Fig. 16. Greeting Cards. Figs. 17-19. Landscapes with pressed dried materials.
takes little practice but the results are rewarding. Bose Institute, Kolkata imparts training in the art and science of dehydration of plant materials.

Present techniques have the ability to develop new markets through diversification of products. There is need to create sufficient awareness about the potential of this technology. Proper education/training to farmers/florists, rural women, house wives, unemployed youths etc is necessary about the dehydration technology, true novelty of the products utilizing neglected and underutilized plant species.

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