

Quality and economics analysis of dry flower products

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ABSTRACT

Fresh flowers have an important role in our daily life, but despite of using several preservatives, its vase life is limited to few days only. For enjoying the enhanced beauty of flowers, dry flowers and its products are only the substitute. Indian dry flower industry is endowed with huge untapped potential in terms of diverse climate, availability of innumerable wild genotypes, creative minds and low labour cost. Eco- friendly dry flower products made for temperate countries of high snowfall, would give new arena to dry flower business. Flowers with high shelf life when dried with correct drying method would help in less natural colour deterioration, thus fetching higher prices in national and international dry flower markets. Dry flower product has more benefit cost ratio and its economics varies depending on input cost, selling price, finishing, covering material and shelf life of product. Planting material with high shelf life of more than five years (paper flower, statice, Gomphrena, rose, Aparajita, larkspur, sun flower, verbena, mussaenda, Ixora, helichrysum and zinnia) when utilized for making dry flower products yielded quality produce with durable presentability. When dry flower products were laminated or covered with polyethylene, transparency sheet, cello tape, glass and plastic frames, then the products with lamination and cello tape covering showed no insect-pest and fungal infestation with best physical integrity and natural colour retention. For most of the 2-D products like coasters, greeting card, bookmark and photo frames, covering through lamination was found best followed by cello tape covering, whereas in case of sceneries laminated glass frames gave the best result. For 3-D products like pen stand, cello-tape covering followed by plastic sheet cover was found best in terms of shelf life and quality. Over the existing unpacked or low quality packaging material, there was the difference of Rs. 2.00 only for book mark and pen stand, whereas a maximum difference of Rs. 10.00 was calculated for products like sceneries, coaster set and greeting cards. For simple and finely designed sceneries the production cost per piece ranged from Rs. 92.50 to 368.00 and Rs. 555.00 to 847.00, respectively. With improved packaging technology, the dry flower products were qualitative superior with at least five times higher shelf life and comparatively more natural flower colour retention than the existing products in the market. Thus, qualitative superior diverse dry flower products can be produced which has more chances to enter export market with higher returns. The technology is novel with reasonable cost and with lesser time consumption than the existing ones.

Key words: Dry flower products, eco-friendly, economics, quality, shelf life

Dry flower technology is an art as well as science of depriving the moisture from fresh flowers and maintaining shelf life of flowers up to many years. Dry flower is a wide term for the planting material which can be dried by one or the other method and covers ornamental flowers, weeds, grasses, foliage, shoots, barks, peduncle, shoot and even root. These are the everlasting

flowers which along with the involvement of innovations, creative ideas and a bit of patience and hard work can convert the waste and perishing flowers into diverse value added products with novel and unique designs (Singh, 2018). Due to availability of diverse Indian flora, dry flower industry is undergoing an impressive growth from 8-10 per cent and covers 65 per cent of the Indian

floricultural export. Except few plants, almost 90 per cent of the indigenous flora can be converted to dry forms. Though dry flower technology appears to be an easy technique, but it strictly requires in-depth knowledge of correct drying method and post harvest techniques in various flowers. Flower shattering, petal deformation and natural colour discoloration is a big hurdle towards quality dry flower products preparation. In present situation of labour migration, this technique can provide a hope to poor and middle class families, in terms of low cost business with higher profit margins. Dry flower industry has a better chance of performance, provided the businessman is full of creativity, enthusiasm, hard work, proper market intelligence and patience. This can also be linked up with women empowerment who can apply their designs and techniques in different products. Dehydrated plant parts may be arranged aesthetically and covered with plastic or glass cover to protect them from atmospheric humidity, wind and dust (Datta, 1997). In this era of pandemic situation, a small scale cottage industry with limited inputs can also be started at home with the help of family members. One can initiate the business even with waste flower collection or by the use of waste bouquet or gifted flora (Singh, 2019). In the era of eco-friendly environment, petal embedded gifting paper, hand bags, greeting cards and bookmarks would sort out the purpose, provided it is supported with experienced learning with quality production and proper export channels. Due to lack of awareness and limited research work, dry flowers still is in the underrated zone and are often subjected to colour fading, flower shattering and post-harvest insect pest and fungal infestation. On the other hand, efficient use and maintainence of natural colours and packaging techniques is of utmost importance in dry flower industry. Hence the present study is taken to study the shelf life, colour retention and economics in different dry flower products under different covering materials.

MATERIALS AND METHODS

The present research was carried out in the value addition laboratory of department of Horticulture (Vegetable and Floriculture), Bihar Ag-

ricultural University Sabour during 2017-2020. Diverse flora like flowers, weeds, grasses, foliage, shoots, peduncles and other plant parts were dried with their best drying method and then were stored since last three years in Thermocol boxes and shelf life of dry flowers were assessed at one month interval. Colour retention studies were done as per the method given by Arnon (1949) and Ranganna (1997). Meanwhile the dried planting material was also utilized for making thirteen eco-friendly products like birthday caps, book marks, coaster set, decorative pieces, bouquet or dry flower arrangement, greeting card, paper weight, pen stand, photo frames, simple and fine art sceneries, table mats, and wall hangings. After product preparation, the shelf life of planting material was assessed at one month interval under eight treatments comprising of different covering structures like display board, cellophane sheet, transparency sheet, laminated condition, plastic cover, glass cover and cello tape covering along with uncovered control conditions. During the study, each product on per piece basis was assessed for benefit cost ratio by calculating the input cost (via adding cost incurred on labour, raw material and finishing of the product) and the selling price of the product in domestic dry flower market.

RESULTS AND DISCUSSION

The planting material depicted in Table 1 displayed five categories shelf life of dry planting material stored under Thermocol boxes from July 2017 to June 2020. Planting material having shelf life lesser than six months were kept under least shelf life category and flowers like canna., dog flower, gladiolus, lupin, nasturtium, tuberose, gazania, zephyr lily, portulaca, balsam, jasmine, nyctanthes arbour tristis, pansy, Caesalpinia, weeds like Krishna Neel, *Digeria arvensis*, inflorescence of coleus, foliage of dracaena, ficus, croton and lupin were put in this category. Flowers like calendula, coreopsis, cosmos, gypsophila, salvia, poppy, dimorphothea, hydrangea, Sita ahoka, Sadabahar, floss flower, red gulmohar, weed like lantana, leaves of bahunea, parthenium, pine and shami, inflorescence of maize, coleus, sarpagandha, Ocimum and tradescantia having

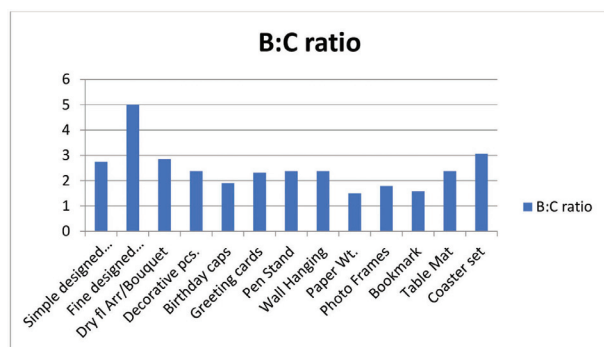
low shelf life of less than one year were incorporated in second category, whereas third category of dry flowers comprised of planting material with high shelf life up to 2 years and under it flowers of chrysanthemum, gerbera, aster, lotus, bougainvillia, candytuft, carnation, corn flower, cock's comb, cineraria, tulip, red kaner, gaillardia, and yellow Gulmohar along with leaves of thuja, Amertia, larkspur, rose, marigold, ferns, chrysanthemum and bauhinia were kept. The fourth category was of higher shelf life dry material (up to 3 years) and covered flowers of dahlia, Caesalpinia, sweet william, golden rod, cassia, bougainvillea, pride of India, sawani, marigold, ursenia, phlox, hollyhock, dendrobium, alstroemeria, euphorbia, Heliconia, weeds like crab grass and *Phalaris minor*, fennel inflorescence, leaves of cosmos, bamboo and fish tail palm. The last but not the least category was with the highest shelf life (more than 3 years) and planting material like paper flower, statice, Gomphrena,

rose, Aparajita, larkspur, sun flower, verbena, mussaenda, Ixora, helichrysum, zinnia, leaves of arucaria and Gulmohar, grasses like briza, brumus, and Cuphea grass, weeds like *Sorghum halepense*, Napier grass, and fox tail grass, shoots of lagestroemia and peduncle of candytuft were a part of it. The results are in line with the work of Datta, 1997.

Similarly, Graph 1 displayed the estimated benefit cost ratio of different value added dry flower products like pen stand, wall hanging, paper weight, photo frames, book mark, table mat, coaster set, greeting cards, decorative pieces, birthday caps, dry flower arrangements or bouquet and sceneries of simple and finer designs. Among different dry flower products benefit cost ratio on per piece basis were calculated keeping in mind the input, finishing and labour cost and the benefit cost ratio ranged in between 1.5 to 5.0. For making one piece of paper weight, B:C ratio was 1.5, whereas for birthday cap, photo frame

Table 1. Categorization of dry planting material under Thermocol boxes

Least Shelf life up to 6 months	Low shelf life up to 1 year	High shelf life up to 2 years	Higher shelf life up to 3 years	Highest shelf life more than 3 years
Canna	<i>Callendula</i>	<i>Chrysanthemum</i>	Caesalpinia	Paper flower
Dog flower	<i>Coreopsis</i>	Gerbera florets	Dahlia	Statice
Gladiolus	<i>Cosmos</i>	Aster	Sweet William	Gomphrena
Lupin	<i>Gypsophila</i>	Lotus	Golden rod	Rose
Nasturtium	<i>Salvia</i>	<i>Bougainvillia</i>	Cassia	Aparajita
Krishna Neel grass	<i>Bahunea laeves</i>	Candytuft	Madhvilata	Larkspur
Coleus inflorescence	Maize tassels	Carnation	Pride of India	Sun flower
<i>Digeria arvensis</i>	<i>Ocimm</i> inflorescence	Corn flower	Sawani	Verbena
Ageratum	<i>Oxalis</i> grass	Cock's Comb	Marigold	Mussaenada
Dracaena	<i>Parthenium</i> leaves	<i>Cineraria</i>	Ursenia	Ixora
Ficus spp.	Poppy	Tulip	Phlox	Helichrysum
Tuberose flowers	Dimorphotheca	Red Kaner	Hollyhock	Zinnia
Gazania	Sarpgandha inflorescence	thuja	Crab grass	S. halepanse
Zephyr lily	<i>Vinca rosea</i>	Amertia leaves	heliconia	Napier grass
Portulaca	<i>Saraca asoka</i>	Larkspur leaves	dendrobium	Candytuft peduncle
Balsam	Hydrangea	Rose leaves	Fennel flower	Shoots of lagerstroemia
Jasmine	Floss flower	Marigold leaves	Fish tail palm	Gulmohar leaves
Nyctanthus arbor tristis	Tradescantia	Ferns	Bamboo leaves	Briza
Croton	Pine leaves	<i>Chrysanthemum</i> leaves	alstroemeria	Brumus
Pansy	Shami leaves	<i>Bahunea</i> leaves	<i>Euphorbea hirta</i>	Cuphea grass
Lupin leaves	Red Gulmohar	Yellow gulmohar	Cosmos leaves	Arucaria leaves
Caesalpinia	Coleus inflorescence	Gaillardia	<i>Phalaris minor</i>	Fox tail grass



Graph 1. Benefit cost ration of different dry flower products

and book mark on per piece basis B:C ratio was between 1.5 to 2.00. For simple designed scenery, dry flower arrangement or bouquet, decorative pieces, greeting card, pen stand, wall hanging coaster set and table mat B:C ratio was between 2.00 to 3.00 and for sceneries (8x10" size) with finer art, it was 5.0. The results are in line with the work done by Singh (2019).

In the given study, Table 2 depicted eight different types of flowers and leaves (which were strictly used to make all the mentioned products) which were kept under different covering and their colour deterioration was studied after one year. It clearly showed that colour deterioration was maximum in all the eight dry materials kept in uncontrolled or uncovered condition, whereas under display board and polyethylene covering, the dry products showed a little higher range towards colour deterioration. This might be due to the reason that in display board there was partially controlled condition and the products were prone to air and dust when it is being opened to and fro for cleaning or arrangement purpose. Similarly the cellophane covering due to thinner

gauge, might have let air and light penetration which is responsible for higher colour deterioration. The work is in line with the experiments performed by Oulakh, 2012. Similarly, transparency sheet was the third best performer in colour retention in case of Gulmohar leaf, larkspur and pride of India flowers and glass cover attained third rank in colour retention in case of Ixora, amaltas, phlox and Gomphrena flowers. This might be due to clear visibility and thicker gauge of transparency sheet and glass cover in comparison to cellophane sheet. In class cover there may be the limitation of heavy weight, maintainence and improper framing or sealing at corners, which might have stopped to be the best covering material of dry flower products. Contrary to this, laminated products retained maximum colour pigments in the dry flower products made of rose, amaltas and pride of India florets and gave second highest value in case of phlox flowers. Plastic cover reported minimum colour deterioration values in the products made by Ixora and Gomphrena florets and second highest value in case of rose and amaltas. This might be due to the reason that lamination and plastic cover made the product air tight with consumer acceptability, good visibility and keeping quality. The results are in line with the research of Oulakh, 2012. Cello tape shielding gave best results in case of products made from Gulmohar leaf, phlox and larkspur, second highest value in case of Ixora and Gomphrena and third highest value in case of rose. This might be due to the reason that cello tape provided air tight sealing along with its durable and sticky nature and gave strong bonding to the cover. Moreover proper and compact packing gives cushioning to dry flowers and act as a

Table 2. Natural colour deterioration (%) in dried plant parts under different coverings

Petals/ Leaf	Ixora petals	Gulmohar leaf	Rose petals	Amaltas petals	Phlox flower	Pride of India	Gomphrena petals	Larkspur petals
Uncovered condition	39.29	51.25	58.80	68.33	74.73	66.01	77.47	53.85
Display board	11.68	40.73	50.77	66.56	72.58	58.98	71.03	41.45
Polyethylene cover	8.79	19.18	46.21	58.77	59.14	51.56	41.74	28.47
Transparent sheet cover	17.06	13.11	42.59	55.99	60.22	22.66	32.48	7.35
Laminated condition	21.24	13.14	27.39	44.88	53.76	14.06	27.33	16.99
Glass cover	06.48	12.99	33.35	48.27	59.14	19.73	21.42	5.86
Plastic cover	3.82	12.99	29.15	46.56	65.05	24.61	15.82	12.17
Cello tape sheilding	4.89	8.73	29.92	49.71	51.61	35.74	18.89	2.64

moisture barrier and the results are in line with the work of Rengasamy and co workers in 1999.

CONCLUSION

Though dry flower is a neglected floricultural component but it has huge potential in terms of research, extension and earning foreign exchange. Lower quality along with lesser shelf life of dry

flower products directly affects the export and sale. Due to cellulose rich material it is easily infested by various fungus and insect-pest. So efficient covering of products is a pre requisite for getting a quality produce with maximum returns values. Quality dry flower products full of unique designs and creativity can revolutionise the dry flower industry with eco-friendly and durable products.

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