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Value Additions in Flower Crops

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Floriculture is a branch of horticulture that is not only concerned with the growth of flowers and ornamental plants but also with their value addition and marketing. Floriculture is an intricate enterprise in India (Shelke, 2014). As urbanization accelerates and green spaces diminish, understanding the aesthetic and therapeutic values of floriculture becomes increasingly important. The production of flowering and colorful plant life for aesthetic and commercial objectives is the specialty of floriculture, a subfield of horticulture. In the world of flowers, various segments play a part in the overall growth of the sector. From beautiful cut flowers and loose blossoms to plants for landscaping, fillers, indoor greenery, turf grass and even seeds and planting materials each of these elements contributes to the vibrant tapestry of the floricultural industry. Additionally, the inclusion of value-added products adds an extra layer of richness to the sector's overall growth. It serves a crucial purpose in improving environmental beauty, supporting biodiversity and fostering economic expansion via international flower trade.

Flowers have long been a vital component of human culture, representing feelings, customs and beauty. In addition to their aesthetic value, they support environmental sustainability by drawing pollinators, enhancing quality air and reducing urban heat through untested areas. The decorative florist, the subset of floriculture, emphasizes the strategic use of plant life in landscaping to beautify outdoor areas. It expands the past beautification and includes concepts of sustainable landscape, protection of biodiversity and nicely human beings. Sophisticated floral displays in urban landscapes, public parks and personal gardens create a visually attractive, colorful and environmentally beneficial environment. Variants of seasonal shades add dynamic aesthetics, although plants complement the factors of hardcape, soften the built environment and create extra urban spaces. The aesthetic value of floriculture is significant and affects both community dynamics and personal well-being. There is evidence to suggest that being in floral settings can result in happier and less stressful sentiments. The vivid hues, varied forms and aromatic scents of flowers arouse the senses and foster an environment that encourages creativity and relaxation. A study by Bringslimark *et al*. (2009) found that individuals who interacted with flowers reported higher levels of positive emotions compared to those in non-floral environments. Moreover, flowers carry rich symbolic meanings across cultures. Value addition means increasing the value of a raw product anytime between harvesting and sale of the final product through changes by processing.

People focus on perishable produce much since it has minimum validity. Flower crops with less shelf life/Vase life have to be subjected to proper postharvest operation in the limited time. Adding value by processing the harvested flower produce is an ideal

methodology for enhancing the product value in the world market. Essential oils, perfumes, natural dyes extracted from the flowers can be stored for more time and introduced in the market. In our country (India), Traditional flower crops like Jasmine, Marigold, Chrysanthemum, Crossandra etc., have a high demand in day-to-day life. There is a need for value addition in floricultural products through processing, packaging, and supply chain management so that farm incomes expand and employment is generated. Value-added products are products that are obtained from main and by-products after some sort of processing and subsequently marketed for higher profit. A higher price is achieved by means of enhancing the quality (through processing, packing or other such methods) for the same volume of primary product.

Value addition in Flowers

With immense possibilities and prospects of value addition and processing in flowers, some of the prominent avenues are discussed as under:

Dried flowers and plant parts : Because of their durability and multiple uses, dried flowers can satisfy year-round ornamental needs. With its abundant resources, diverse range of goods and expertise in the production of dried flowers and plant parts, India enjoys a clear edge in the global export market. In comparison to other nations, the nation also enjoys the advantages of inexpensive labor and a favorable climate. One crucial post-harvest technique for improving the aesthetic appeal of flowers is dehydration. For decorative purposes, dried or dehydrated flowers or plant parts such as dried shoots, seeds, bark etc. are utilized. No matter the season, dry flowers endure and maintain their visual appeal. The beauty and value of the dried flowers are that they can be kept and cherished for years, which survive the cold of winter and heat of summer. With growing eco-consciousness, the use of more and more nature-friendly things like these come as a natural choice for decoration. The life of dried flowers varies according to the species, texture of their petals and total consistency of flowers. The processing of dried flowers involves drying, bleaching and colouring after their collection.

Natural pigments and dyes : Flowers are used for extracting and preparing natural dyes. From flowers, pigments is extracted which is used as natural colouring agent like from chrysanthemum flower, yellow coloured dye is extracted for use in food products and cosmetics. Orange red dye is extracted from the arils of *Bixa orellana*, which is used in cosmetics and medicine. Golden rod flowers also yield yellow coloured dye and find use in cosmetics. Like this, there are many flowers from which dye can be extracted which may find extensive use in the food, cosmetic, medicine and textile industries. At present herbal dyes market is growing tremendously @ of 12% per annum. India exported natural dyes worth

47.68 Million USD (2016), mainly to UAE, Nepal, Japan. Per capita consumption of dyes is 400g to 5 kg in for their utility in paints, inks, textiles, polymers etc. (Gokhale *et al*., 2015). The use of non-allergic, non-toxic and eco-friendly natural dyes on textiles have become a matter of significant importance due to the increased environmental awareness in order to avoid some hazardous synthetic dyes.

Perfumes, essential oils and concrete : The market for flower extracts, such as perfumes is growing daily. Essential oils are extracted from flowers such as jasmine, rose, tuberose, marigold, plumeria, champaka, magnolia and millingtonia etc. making attar, fragrances or perfumes. In essence the plant's flowering portion is where floral essential oils are made or extracted. The majority of flowers have an inherent sweet and flowery fragrance that contributes to the same kind of aroma that their natural essential oil produces. As a result, their most well-known application is in perfumes and other fragrances.

Flower Rings : Floral motifs serve as the main design element in these well-liked jewelry pieces. Various flower components, including petals, leaves, stems and occasionally even whole blooms, are frequently used into floral rings. Flower rings come in a range of designs to accommodate various preferences and events. Traditional styles have a more understated approach. Historical eras are frequently the source of inspiration for vintage-inspired floral rings. When selecting a flower ring people can give the item more personal meaning by taking into account the flower's symbolic meaning in the design.

Floral earrings : Floral earrings can be made in various styles from delicate and dainty designs to bold and statement-making pieces. Stud earrings that sit directly on the earlobe, often featuring a single flower. Drop earrings that dangle below the earlobe, which can be made in intricate floral designs that sway with the moment. Hoop earrings incorporated with motifs either as charms or as part of hoops design adding touch to classic style. Ear cuffs that wrap around the outer ear offering a unique edgy take on traditional earrings. Chandieler earrings with cascading layers of flowers, create a dramatic and eye-catching look.

Flower bracelets : These are lovely ornaments that give the wearer's wrist a dash of elegance and natural attractiveness. Small beads are combined to mimic floral patterns to create beaded flower bracelets. The stiff, wrist-slippable bracelets with flowery designs are called bracelets. Chain bracelets with floral elements add a chic floral touch by incorporating flowery charms or links into the chain pattern. Wide, stiff bracelets are known as cuff bracelets. Bracelets made of leather or fabric feel handmade and are perfect for bringing some texture and color to your ensemble.

Flower necklaces : Flower necklaces come in a wide range of designs. Some necklaces feature a single flower pendant as a focal point while others may include multiple flowers arranged in a cluster. Flower neckless are versatile accessories that can be worn for various occasions from everyday wear to special events like weddings, parties and formal dinners. They can add a touch of feminity and elegance to any outfit and make meaningful gifts for loved ones. From delicate floral pendants to bold statement necklaces, there's a flower necklace to suit every style and personality.

Value Added Products from Flower Waste

India produces approximately 484 thousand tons of cut flowers and 1659 thousand tonnes of loose flowers annually. Finding practical recycling and reuse strategies for floral waste management can be challenging, though. In an attempt to meet current needs, efforts have been made to create economically accessible, ecologically friendly and effective goods. A focus has been placed on creating products that can effectively recycle floral waste and replace traditional techniques that harm the environment. The amount of waste that must be dumped in landfills can be progressively reduced by developing products in an effective and sustainable manner.

Flower waste as a source of Herbal Incense Sticks: Methods have been developed for utilizing flower waste in the form of herbal incense sticks. Flowers collected from rivers are processed by artisans and small business owners. One such venture has been started by HelpUs Green, a green company based in Uttar Pradesh (India) which recycles floral waste

into charcoal-free incense sticks, organic compost and biodegradable packaging material. These products not only help in reducing flower waste but also aims for making sustainable products for a better future. Similarly in Lucknow, Chandrika devi temple is prime example of sustainable living where rural communities collect waste and make incense stick aiding as one of their economic sources.

Sugar Syrup: Sugar syrup is produced by gathering and processing mahua flowers. Due to its high nutritional content, certain researchers who have contributed to the study of syrup preparation have discovered that it has numerous health benefits (Abhyankar and Narayana, 1942). Along with some health benefits, flower extracts can be used in food industry to prepare jams, cookies and other stuff (Patel and Naik, 2010).

Vermicomposting and Composting: Floral waste is a type of biodegradable waste and the most common method to dispose it can be composting so that it can be used as a soil conditioner or growing media. Hence, various method for degrading floral waste to compost can be used along with earthworms. Compost prepared using floral waste can either be used alone or can be combined optimally with dung or saw dust.

Table 1: Innovative Technologies and products for recycling floral waste

Technologies available	Products/Process	Technology provider
Technology for utilization of waste	Incense sticks from waste flowers	CSIR-Central Institute of Medicinal and Aromatic Plants, Lucknow.
Dehydration of flower and foliage technologies	Artistic greeting cards, wall plates etc.	CSIR-National Botanical Research Institute, Lucknow
Production of vermicompost	Vermicomposting	Department of Microbiology, K.W. College, Sangli, Maharashtra
Antibacterial finishing of soya bean protein	Natural dye	Department of Fibers and textile processing technology, ICTM-Mumbai

Table 2. Value added commercial products from some flowers

Crops	Value Added Products
Rose	Rose water, rose oil, Gulkand, Rose tea
Chrysanthemum	Garlands, Dry flowers & Potpourri , Edible chrysanthemums, insecticide (pyrethrin), Cosmetics
Carnation	Concrete and absolutes, Dry flowers, Edible carnations
Gladiolus	Bouquets, Flower arrangement, Scented gladiolus
Tuberose	Floral ornaments, Essential oils, Medicines, Edible tuberose
Jasmine	Essential oils, medicines, Jasmine tea, Jasmine syrup

Conclusion

There is vast opportunity in value added floriculture trade. The consumption pattern is diversifying towards value added products such as dry flowers, essences, perfumes, beverages and other by-products from flowers for more profit. Moreover, due to Covid-19 pandemic, floriculture sector is facing hardship and trading of fresh flowers has become a big challenge. Under these circumstances it is important to diversify in to value addition where ever possible for alternative income through various feasible products like gulal, agarbattis/dhoopbattis making, Poultry feed, gulkand and rose water, pigment and dyes extraction, essential oil extraction, dry flower for those flowers which are eligible for such conversion and also Vermicompost for recycling the spoiled flowers.

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