Potential of Floriculture in India's Arid and Semi-Arid Zones

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Abstract:

Globally, floriculture is fast expanding and in India it presents a profitable prospect for farmers. Since flower crops produce more returns per unit area than other agricultural or horticultural crops, the commercial floriculture sector has lately grown increasingly profitable. India's sector is moving from conventional flowers to cut flowers and value-added programs as export-oriented floriculture grows. In India, dry and semi-arid areas marked by low humidity and little rainfall support scant vegetation and animals. In certain places, integrated agricultural systems fit horticulture rather perfectly. Protected farming and other new technology have greatly expanded the floriculture industry as compared to past decades. Many dry areas have regular agricultural practices whereby modest plots of floral crops are kept. Floriculture is still developing and only now has commercial importance. Beginning growers, farmers, and nursery operators are tending to a range of flowers, including *Rosa* (rose), *Kusum*, marigold, *Phulwari*, *Jafari*, and *Jawara*. Due mostly to inadequate research on dry zone flowers, lack of certified planting material, poorer production technology, and poor scientific management, the area and output of significant floral crops in Rajasthan have showed a gradual development. Inadequate infrastructure for post-harvest processing, lack of cold storage facilities, restricted cargo space on aircraft, and poor marketing campaigns are among the further difficulties. The floriculture sector's future depends on addressing these problems in dry and semi-arid environments.

Keywords: Floriculture, Arid regions, Flower crops, Semi-arid regions, Rajasthan

INTRODUCTION

Excessive heat and little precipitation—lower than the potential evapotranspiration and with irregular distribution—define the arid and semi-arid areas. Semi-arid areas get rather more precipitation than arid ones. In terms of biological features and agricultural potential, semi-arid climates—based on Koppen's climate classification (Koppen, 1936)—are midway between desert and humid climates. These climates typically support short or scrubby vegetation, primarily covered in grasses or bushes. Particularly in arid areas, the severe climatic circumstances impede the growth and survival of plants and animals, thereby rendering them xeric or desertic. Desert areas cover 38.7 million hectares in Rajasthan, Gujarat, Haryana, Punjab, Karnataka, and Andhra Pradesh in India, including the cold desert regions of Leh, Ladakh, and Himachal Pradesh (Sharma *et al.,* 2013). Low

and unpredictable rainfall (100–500 mm), high temperatures (1–48 oC), and severe wind velocities in these regions affect human

Especially in horticulture, dry land agriculture fits very nicely into farming systems to provide food, livelihood, and nutritional security (Bhandari et al., 2014). pearl millet (*Pennisetum glaucum*), cluster bean (*Cyamopsis tetragonoloba*), mothbean (*Vigna aconitifolia*), greengram (*Vigna radiata*), cowpea (*Vigna unguiculata*), sesame (*Sesamum indicum*), and sorghum (*Sorghum vulgare*), which complete their life cycle between 2–3 months. Common crops in the winter season, with irrigation, are chickpea (*Cicer arietinum*), mustard (*Brassica juncea)* and wheat (*Triticum aestivum*). Commonly grown among medicinal plants are cumin Khejri (*Prosopis cineraria*), marwak teak (*Tecomella undulata*), gum Arabic (*Senegalia senegal*), Israeli babool (*Acacia tortilis*), and tamarind (*Tamarindus indica*). Nutritious fruit crops in these regions are Indian jujube (*Ziziphus mauritiana*), Kair (*Capparis decidua*), bael (*Aegle marmelos*), pomegranate (*Punica granatum*), mango (*Mangifera indica*), Indian gooseberry (*Emblica officinalis*), Indian cherry (*Cordia myxa*), sitaphal (*Annona squamosa*), papaya (*Carica papaya*), karonda (*Carissa carandas*), kinnow (*Citrus reticulata*), and kachri (*Cucumis callosus*).

Still, yields from these crops are sometimes erratic, low, and inadequate to support farmers' salaries. Incorporating floriculture into varied agricultural systems helps to reduce this risk by providing consistent and fairly distributed revenue while addressing growers' demands and so encouraging sustainability by means of the conservation and enhancement of natural resources in vulnerable arid ecosystems. Covering 309.26 thousand hectares, flower crops generate 593.41 thousand tonnes of cut flowers and 1652.99 thousand loose ones (Indiastat, 2016-17). India exported 22,086.10 MT of floral products valued at an estimated 548.74 crores in 2016–17 (APEDA). Along with attractive cut flowers like rose, carnation, gerbera, tulip, lilium, alstroemeria, orchid, and anthurium in protected buildings, arid states have embraced ornamental horticulture producing tuberose, chrysanthemum, crossandra, marigold, jasmine, and aster in open fields. Beyond manufacturing and selling, a big business is growing foliage plants and flower seedlings. Despite difficulties, market opportunities are great because of their "low volume high value". Arid floriculture thus seems to be an economically feasible choice for farmers seeking higher income.

Significance of Floriculture in Arid Regions

Flowers offer a visual feast for the senses and represent grace and elegance. With many allusions in ancient literature including the Vedas, Ramayana, and Mahabharata, the custom of using flowers in India goes millennia back. Older artworks and coins also show the value of gardens and flowers. Flowers are part of many social, cultural, and religious offerings nowadays. Historically, the commercial value of flowers was not stressed since producing flowers was considered mostly as a gardening hobby connected with aesthetic sense and environmental beautification. But modern times have brought floriculture commercial importance thanks to changing lifestyles and fast urbanization. Commercial floriculture has grown in value over the last 4–5 decades and is now a profitable agro-business alternative (Singh and Singh, 2004).

Floriculture has become more well-known as a business in the last ten years of the last millennium.

India has had a small share of world trade (less than 0.5%), but statistics on world trade show that emerging countries make up more than 20% of the sector. The Indian government has made floriculture a high priority and put in place many rules to promote the growth of premium roses because they know that floriculture can help them earn more foreign currency. Many greenhouse-based flower farms were built for sale in the 1990s thanks to big investments made through this program. With these changes, the availability of different agro-climatic conditions and a lot of natural resources has had a big impact on the growth of flower crops in open fields, which has led to a big rise in the flower business.

Production technology, varietals, packaging, storage, infrastructure, product quality, quantity, and marketing methods are all seeing notable developments in India's floriculture industry. Driving innovation and using market possibilities is mostly based on farmers. Especially by substituting cut flower crops for conventional food crops like wheat and sugarcane, entrepreneurial farmers are starting floriculture projects to profit from these advancements. These businesspeople's initiative and creativity have been much praised. Still, information on flower crop development in arid areas is lacking since commercial floriculture has just lately become somewhat important. Reflecting the sector's growing economic importance and momentum, flower crops are grown in small amounts in most dry areas as part of routine farming methods. In these places, beginners, growers, and nurserymen are busy tending to several flower harvests.

Although arid ecosystems usually include little vegetation, certain robust decorative plants flourish in such demanding environments. Significant potential for landscaping in dry areas exists among plants such *Nerium oleander* (kaner), *Dodonaea viscosa* (Hopbush/Rallia), *Bougainvillea*, and *Tabernaemontana coonaria* (Chandni). Certain introduced flower species, such *Althea rosea*, *Jasminum*, *Gladiolus*, and *Clerodendron inerma*, have been somewhat acclimatized to these arid environments and are mostly grown in metropolitan areas where water supplies are readily available. Depending on consistent water supply despite the severe winter circumstances, winter-flowering annuals also offer great possibilities for garden flowerbeds in these areas.

The Contribution of Research Institutions in Advancing Floriculture in Arid Regions

The All India Coordinated Research Project (AICRP) on floriculture started systematic study in floriculture in 1970–1971. To do an interdisciplinary study (Saha *et al.,* 2014), this project connected ICAR institutes with state agricultural universities (SAUs) all throughout India. Operating via 21 centers now, the project has made major progress in creating new and improved kinds of flower crops, standardizing production technology, strengthening plant protection strategies, and improving post-harvest handling.

Coordinating research on genetic resource use, crop improvement, standardizing production technologies, efficient water use, data repositories, engineering plant architecture, and developing technology for crop protection and value addition is the AICRP on Floriculture's main emphasis (Kumar *et al.,* 2012). It seeks to provide cheap, ecologically benign, user-friendly solutions fit for various agro-climatic environments, thereby lowering dependency on costly outside technologies.

Among these centers, Maharana Pratap Agriculture University in Udaipur set up one organizing

center for arid areas in 1980. Focusing on roses, gladiolus, chrysanthemums, and marigolds—especially customizing these crops for arid environments with suitable farming methods—this center answers still, there has been little targeted work using the AICRP to address dryland floriculture problems in India.

Historical Evolution of Horticulture Practices in Arid Regions

Particularly during the Rajputana era, the history of gardening in Rajasistan's desert areas shows a rich legacy of designing gardens for both aesthetic and leisureful uses. This legacy was greatly improved by rulers such Jai Singh II (1699–1743 AD) and Man Singh (1590–1615 AD). Initiated by Man Singh and finished by Jai Singh II, the gardens at Amber Fort in Jaipur have terraces and a lake, so showing their grandeur. Established by Raja Abhai Singh (1724–1749 AD), another famous park is Mandor park close to Jodhpur. Jai Singh II founded Jaipur and built a palace including a central garden.

Renowned for designing a garden palace known for its water channels and fountains, Suraj Mal of Deeg Furthermore showing amazing horticultural success around this time were the gardens at Chittor and Bundi. Garden designs in Rajasistan changed from symmetrical to unstructured patterns under British influence, stressing parks and including yearly flowering plants including asters, chrysanthemums, and marigolds. Combining modern British-inspired designs with traditional Rajputana features, this shift fundamentally changed the scene of Rajasistan's parks.

Famous Gardens in Arid Regions

Many gardens were created during Rajputana, Mughals, viz. Sahelion Ki Bari, Udaipur; Rambagh, Jaipur; Mandor Garden, Jodhpur; Lotus garden, Deeg; Sayaji park, Baroda, Gujarat. Among all these gardens, Mandor Garden, Jodhpur (Rajasthan) and Sayaji Park, Baroda (Gujarat) are the first ones arranged with different kinds of xeric plants and kept for the advantages of public (Randhawa and Mukhopadhyay, 1986).

(a) Sayaji Park, Baroda (Gujarat)

Former Maharaja Sayajirao III founded the garden in 1879 under his name. Designed as a verdant green refuge in Baroda's dry climate, it comprises 40 hectares. With around 8000 decorative trees, the garden features uncommon species including Hyphaene thebacia, a branching palm utilized as an avenue plant. Spaced over a little more than one acre, the bandstand is among its most striking elements. The formal part of the garden consists in the arbor-like bandstand, paved walkways, lush grass, four fountains, some lit with colorful lights, and piped music. Children find activities in the garden including a toy train, a large wheel, a children's park, and a traffic training center. Within the park are also the recently opened planetarium and the Baroda Museum (1894). A zoo comprising rare species, including a white tiger, calls the park home as well (Singh and Singh, 2004).

(b) Mandor Garden, Jodhpur (Rajasthan)

About five kilometers from the center of Jodhpur city in Rajasthan, sits this garden. One of the most exquisitely arranged garden settings in our nation. Raja Abhai Singh (1724–1749 AD) has

credit for laying the garden. The garden is rather big, and terraces on hill slopes have been built to stretch it up to the tops. The garden gains especially charm from the spacious areas under grass, the flower beds, trees, and plants. There are colorful light fountains fitted. The garden gains attractiveness from the tea stall on a higher terrace. One classic model for water collecting is this garden (Singh and Singh, 2004).

Xeriscaping in Arid and Semi-arid Regions

With rising urbanization, the phenomenon of urban heat island (UHI) is of great intensity, so it is highly important to reduce its negative consequences by using xeric plants in landscaping.

Xeriscape is a great approach to "living green," given the growing water scarcity issue and increasing water use in landscapes. Using perennial shade trees in landscaping lowers water use, evapo-transpiration, and more shadows, thereby providing different thermal comfort. The selection of native plants for landscaping depends much on their natural capacity to adapt to the hostile, dry environmental circumstances and their local adaptability (Spinti *et al.,* 2006).

Designed especially for locations sensitive to climate change and drought, xeriscaping is a kind of excellent landscaping that maximizes rainfall, helps conserve water, and safeguards the surroundings. Xeriscapes absorb far less water than conventional lawn-dominated designs (Wade *et al.,* 2010). Xeriscapes are much easier to maintain because certain xeric plants need little or none at all once established. Contrary to popular belief (Welsh *et al.,* 2007),

Xeriscaping does not completely eliminate lawns and waterscapes, nor does it rely solely on cactus, succulents, gravel, and rock gardens. Many different plants fit xeriscape environments, and there are many choices that save water more efficiently than conventional lawn designs. Xeriscapes also go by the names smart scapes, water-conserving landscapes, and drought-tolerant gardening. While reducing water loss through evaporation and runoff, they give top priority to plants that naturally thrive at the local temperature. The particular temperature of the area selects the plants to be used in xeriscaping. The public view of xeriscaping has been found to improve with instruction on water-saving methods (Cynthia and Robert, 1995).

Principles of Xeriscaping

Originally established by Denver Water, the seven principles for xeriscaping have been streamlined and made relevant to produce landscapes that efficiently save water. These ideas are appropriate for different areas and work as a useful manual for creating landscapes with water efficiency:

(i) Planning and Design: Start by creating a scaled diagram that includes key elements of the landscape, like the house, driveway, pathways, and patio.

(ii) Soil Improvement: Most *plants* benefit from compost, which enhances soil water retention. However, certain *desert plants* prefer gravelly soils over heavily amended soils. It's important to match *plants* with the soil type or amend the soil to suit the *plants*.

(iii) Efficient Irrigation: Xeriscapes can be watered efficiently either by hand or using an automatic sprinkler system. Spray, drip line, or bubbler emitters are the most effective methods for watering

trees, *shrubs*, *flowers*, and *ground covers*. Water deeply but infrequently to encourage deeper root growth. Avoid watering during the day to minimize water evaporation. For automatic sprinkler systems, adjust the controller monthly to adapt to changing weather conditions.

(iv) Selection of Appropriate Plants: In xeriscaping—where several areas of the landscape get varied levels of light, wind, and moisture—selection of suitable plants is absolutely vital. Group plants with like light and water requirements and arrange them such that best use of resources is achieved. Low-lying drainage regions, next to gutters, or shaded by other plants should house moderate-water-use plants. While shrub and perennial beds need about half that amount, turf calls for the greatest water. Low-water-use plants that flourish in arid conditions find perfect habitat in dry, sunny locations. Planting a range of heights, hues, and textures will help to provide visual interest and attractiveness.

Some of the most suitable plants for xeriscaping include:

- **Trees:** *Prosopis gladulosa, Prosopis cineraria, Acacia arabica, Acacia ehrenbergiana, Acacia tortilis, Ziziphus spinachristi, Vitex agnuscastus, Tecomella undulata, Haloxylon persicum, Tamarix aphylla, Ficus carica, Prunus maacki, Koelreuteria paniculata, Pinus flexilis, Magnolia grandiflora, Quercus macrocarpa, Plumeria* spp., *Delonix regia, Tamarindus indica, Butea monosperma, Azadirachta indica, Thespesia populnea, Ficus benghalensis, Ficus religiosa.*
- **Shrubs:** *Aerva javanica, Atriplex leucoclada, Abelia grandiflora, Calligonum comosum, Haloxilon salicarnicum, Hesperaloe parviflora, Lawsonia innermis, Leptadenia pyrotechnica, Ochradenus arabicus, Pluchea dioscoridis, Salvia greggii, Salvadora persica, Tamarix nilotica, Juniperus, Lantana sellowiana, Duranta plumeri, Carissa caranda, Callistemon lanceolatus, Tecoma stans, Gardenia jasminoides, Bougainvillea* spp., *Punica* spp., *Tabernamontana coronaria, Atriplex halimus, Dodonaea viscosa, Pluchea dioscoridis, Ilex cornuta rotunda, Rosa odorata, Rosa chinensis, Hibiscus syriacus, Leucophyllum* spp., *Jasminum* spp., *Lonicera fruticans, Lagerstroemia indica, Nerium oleander, Yucca gloriosa, Adenium obesum, Cuphea miniata, Nerium* spp., *Cassia biflora, Pedilanthus.*
- **Turf Grasses:** *Cynodon dactylon, Buchloe dactyloides, Eremochloa ophiuroides, Zoysia* spp., *Cenchrus ciliaris, Cymbopogon commutatus, Panicum antidotale, Panicum turgidum, Pennisetum divisum, Coelachyrum piercii.*
- **Ground Covers:** *Alhagi graecorum, Convolvulus virgatus, Crotalaria aegyptiaca, Dipterygium glaucum, Heliotropium bacciferum, Heliotropium curassavicum, Rhazya stricta, Rhynchosia minima, Salsola imbricata, Senna italica, Tribulus arabicus, Zygophyllum mandavillei, Pulicaria glutinosa, Irisine lindenii, Alternanthera versicolor, Wedelia trilobata, Ipomoea tricolor, Cuphea gracilis, Zebrina pendula, Tradescantia fluminensis, Strobilanthes scaber, Lantana sellowiana, Oxalis* spp., *Aptenia cordifolia, Ophiopogon japonicus, Browallia speciosa, Juniperus horizontalis, Sedum rupestre, Hedera helix, Vinca minor, Verbena canadensis, Artemisia stelleriana, Leucophyllum frutescens, Juniperus horizontalis, Buxus macrophylla, Raphiliopsis indica, Myrtus communis, Opuntia ficus-indica.*

- **Flowering Plants:** *Achillea* spp., *Althea rosea, Baptisia australis, Berlandiera lyrata, Centaurea montana, Coreopsis* spp., *Eschscholzia californica, Gaillardia aristata, Gaillardia x grandiflora, Hemerocallis* spp., *Limonium latifolium, Mirabilis multiflora, Papaver orientale, Penstemon grandiflorus, Penstemon linarioides, Phlox subulata, Rudbeckia fulgida, Salvia argentea, Zinnia grandiflora, Centaurea cyanus, Cosmos bipinnatus, Gomphrena globosa, Lantana camara, Petunia hybrida, Portulaca grandiflora, Senecio cineraria, Tropaeolum majus, Verbena* hybrids.

(v) Mulching/Water Conservation Measures: Mulching serves multiple purposes in xeriscaping. It helps cool plant roots, prevents soil from crusting, minimizes evaporation, and reduces weed growth. Organic mulches like bark chips, pole peelings, or wood grindings should be applied 2 to 4 inches deep. Fiber mulches are resilient to wind and rain due to their intricate web structure. Inorganic options such as rocks and gravel should be applied 2 to 3 inches deep, although using rocks extensively can increase the surrounding area's temperature and should be minimized.

(vi) Limited Turf Areas: A significant challenge in promoting xeriscaping is the cultural preference for turf grass lawns. Originating in England, lawns have historically symbolized prosperity, order, and community. In countries like the United States, turf grass covers vast areas and is the most irrigated crop by surface area, spanning nearly 128,000 square kilometers. Xeriscaping provides an alternative to excessive turf grass use but faces resistance due to entrenched perceptions. While xeriscaping can include lawn areas, the approach advocates for reducing turf to functional spaces, rather than default landscaping. Choosing appropriate grass types and limiting their extent helps minimize water and maintenance needs.

(vii) Care and Maintenance: Like all landscapes, xeriscapes require ongoing care and maintenance. Keeping grass height around 3 inches and allowing clippings to decompose naturally supports soil health. Trees, shrubs, and perennials benefit from occasional pruning to remove dead branches, encourage flowering, or manage growth. Shredded plant material from pruning can be composted, contributing to soil enrichment and sustainable garden practices.

Value Addition of Arid Flowers

i. Extraction of Pigments and Essential oils

Flower crops have been given not only beauty but also bright hues and appealing smells by nature. Anthocyanins, flavonols, carotenoids, and xanthophylls, among other plant colors, help to explain the range of colors found in flowers (Delgado *et al.,* 2000). Globally, limitations on synthetic compounds are driving growing demand for natural colors, perfumes, and dyes (Priyanka *et al.,* 2016). The pigment and scent markets depend heavily on many industrial floricultural crops, including rose, tuberose, jasmine, and marigold.

Aromatherapy uses Indian floral extracts because of their medicinal qualities. Geranium oil, for example, is well-known for treating skin conditions such as depression and acne and encouraging relaxing benefits (Delgado *et al.,* 2000). The production of premium perfumes worldwide rests on jasmine species such as Jasminum grandiflorum and Jasminum sambac. The ability of jasmine oil to reduce cramping, back pain, dermatitis, anxiety, and sadness makes it prized. Renowned for their antibacterial traits, roses help with fever, migraine, sadness, and grief. After harvest, roses are often

used in India to make rose water, rose attar, Gulkhand, Pankhiri, and rose otto.

Renowned for its intensely aromatic blossoms, tuberose mostly consists of geraniol and nerol from a chemical perspective. Conversely, marigold is prized for its carotenoid pigment extraction—lutein, zeaxanthin, and xanthophylls. Lutein, concentrated in the eye macula, protects the skin and other tissues, including the cervical and breast tissues. Another carotenoid from marigold, zeaxanthin, promotes color awareness and helps avoid macular degeneration. Also crucial in chicken feed are carotenoids to improve broiler skin quality and egg yolk color (Santos-Bocanegra *et al.,* 2004).

Because of its high-grade perfume and insect-repellent qualities, Tagetes oil extracted from Tagetes minuta is much sought after in cosmetics and skincare (Piccaglia and Marotti, 1996). Furthermore, marigolds are well known for their thiophane compounds, which have nematicidal effects (Wang *et al.,* 2007). Commercial food colorants also include marigold's lutein, betalains from bougainvillea, zebrina, and Tradescantia's anthocyanins.

ii. Dry flowers

Value addition occurs at every level in floricultural trade to produce new goods to satisfy different customer needs. For consumer use are dry flowers including dry flower arrangements, waxing of flowers, artificial coloring of flowers to generate novelty, potpourris to distribute the pleasant aroma and petal embedded craft papers to construct greeting cards (Janakiram et al., 2012). Among the natural arid flower crops, *Gomphrena globosa*, *Helichrysum bracteatum*, *Acroclinum roseum*, various species of *Bougainvillea*, *Dendranthema grandiflora*, species of *Tagetes*, *Calendula officinalis*, and species of *Verbena*. can all be used somewhat well for these purposes.

iii. Natural Dyes

Plant-based natural dyes, which are utilized in many sectors including food coloring, textiles, leather, and handicrafts, have been driven in demand by growing global knowledge of their negative impacts from synthetic colors (Jothi, 2008). Renowned for its great variety, India offers several plant species fit for dye manufacture: *Spathodea* spp., *Milletia*, *Acacia*, *Bixa*, *Helichrysum*, *Bougainvillea*, *Cineraria*, *Canna*, *Balsam*, and *Cassia fistula* (Cyrus, 2008).

Henna (*Lawsonia inermis*), known as Mehandi in India, is commercially cultivated in Rajasthan and surrounding areas primarily for its use as a dye crop. There are two recognized types: Desi and Marliya, both of which hold significant economic potential in arid and semi-arid regions. Henna is resilient and thrives in drought-prone, marginal lands, offering reliable economic returns with low investments (Singh, 1994).

Moreover, its planting helps to stop desertification in sensitive places. Apart from being a natural pigment, henna has other medical uses. With almost 0.01 to 0.02% on a dry weight basis, the oil extracted from Henna is highly valued in the perfumery industry and can yield about 0.01 to 0.02% on a dry weight basis (Singh and Singh, 2004). In the Pali region of Rajasthan, Henna yields up to 2.5 tons per hectare, with dry leaf prices ranging from Rs. 15-30 per kg. However, market prices for Henna dry leaves can vary widely, ranging from Rs. 80-150 per kg (Rao *et al.,* 2002).

Apart from boosting local businesses, this plant helps to preserve biodiversity and advocates sustainable farming methods in arid areas.

Challenges faced in Floriculture Practices in Arid Regions

Still a major obstacle for India is the growth of floriculture in dry areas. Apart from the variations in the temperature, several elements lead to this difference. These include restricted availability of certified planting materials, poor scientific management techniques, obsolete production technologies, and insufficient research attention on flower crops fit for arid areas. Given their great perishable nature, flowers must be carefully handled all through the supply chain to preserve quality; estimated losses of these kinds range from 30 to 40 percent of farm value. Ensuring lengthy vase or shelf life depends critically on proper time, technique, and stage of harvest. Further aggravating these problems are issues including insufficient post-harvest infrastructure including cold storage facilities and space restrictions on aircraft. Furthermore absent are efficient marketing plans catered to the special needs of arid zone flower harvests, which emphasizes the need of thorough changes in the whole industry.

Government Schemes

At the central level, there are not now any particular plans specifically aimed at arid zone flower crops. Still, several projects within the Mission for Integrated Development of Horticulture (MIDH) help the larger floriculture industry. These comprise plans for growing areas of land, supporting protected farming, building nurseries (low-cost and hi-tech), improving water supplies via farm ponds, creating market infrastructure, establishing tissue culture labs, building pack houses and cold storage facilities.

With 35% of the budget set for PHM and enhancement of marketing infrastructure, post-harvest management (PHM) activities have attracted much attention. Though at now without particular targeted plans for dry zone flower harvests, these initiatives seek to strengthen the whole floriculture industry in India.

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