



Ornamental Nursery Production To Enhance The Growth Of Farming Sector

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ABSTRACT

Looking to the increasing population, climate change, decreasing land holdings, increasing pressure on natural resources i.e. land & water and high demand of quality produce we are forced to shift towards modern technologies of healthy plant growth like quality nursery production of different horticultural crops viz; vegetables, fruits and flowers. This paper describes an healthy nursery entrepreneurs venture that aims to develop a income generating source of self employment. Although promotion of quality nursery production will certainly help in creation of huge self-employments for unemployed educated youths and will also raise the national economy by sale of high quality produce in domestic and international markets. Selecting ornamental plants with appropriate morphological and physiological characteristics to improve nursery performance and tolerance of harsh environments is of vital importance. The use of native species of wild flora is of increasing interest because of their capacity to adapt to adverse local environmental conditions. A healthy nursery provides seedlings with a considerable capacity to adapt to adverse conditions after transplanted into harsh environments. Suitable environmental conditions and cultivation techniques in the nursery are essential to produce sturdy seedlings, with the above-mentioned capacity. Deficit irrigation is the most commonly used pre-conditioning technique to produce high-quality seedlings. As indicated in this review, appropriate plant selection, microclimatic conditions and cultivation techniques used in the nursery during seedling production are crucial for plant establishment, survival and subsequent growth after transplanted. Vegetable and cut flower nursery production in agri-entrepreneurial models targeting various niche markets of the big cities of the country is regularly inviting attention of the vegetable and flower growers for diversification from traditional ways of crop cultivation to such modern methods. Even the unemployed educated youths who are not attracted or interested in traditional agriculture are also showing good interest and can be further motivated for this kind of modern agricultural technologies.

Keywords: *Natural resources, self-employment, high quality produce, vegetables and cut flowers, Ornamental nursery.*

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INTRODUCTION

Ornamental plants are used for decoration purposes. For decoration in houses, marriages, parties, melas and many other occasion, ornamental plants plays an important role. Without ornamental plants, any occasion looks like boring. The demand of cut flowers and live plants is increasing day by day with increasing standard of living, aesthetic sense and awareness to people. There is always a good demand for high quality seed. Open pollinated seed of many winter, summer and rainy season annual are produced for commercial purposes in India. In many flowers like petunia, pansy, marigold and carnation etc F₁ hybrids are common due to uniformity, earliness and bigger flower. Most of the fragrant flowers like rose, tuberose, jasmine etc can be grown for the production of perfumes (After extraction from flowers). Some flower plants like bougainvillea, rubber tree etc can be used for landscaping or beautification purposes [14].

Need and demand of Ornamental Nurseries

There has been an increasing demand for horticultural crops more particularly ornamental ones in both urban and rural areas of India. With this, the demand for good quality planting materials has gone up and hence the nursery business has developed rapidly in the recent years in our country [12]. Nursery product is no longer restricted to orchards or large parks and gardens. It has entered into high rise buildings, offices, factories, business houses, hospitals, hotels, backyards, roadsides in cities, roof tops, etc.

for decoration purpose [13]. Heavy demand is observed during festive seasons and seasons of fairs and melas. Ornamental nursery business has, therefore, come up in a large scale in areas near city and towns. The production of propagating materials like seeds, bulbs, live plants is being done conventionally and these materials are being sold [17]. Successful nursery men are making handsome money [4, 5]. Selecting ornamental plants for improved nursery performance and tolerance of harsh environments has long been of interest to those involved in landscape horticulture and urban green space design. The use of native species of wild flora is of increasing interest because of their capacity to adapt to adverse environmental conditions [9]. However, it is known that the degree of adaptation to abiotic stresses may vary considerably within a family, within a genus and even within a species. Recent trends in landscaping and gardening under semi-arid conditions include the use of drought-adapted trees and shrubs in low water-use landscape designs, while some municipalities restrict the use of turf and offer incentives to convert to xeric designs [10]. However, planting schemes and maintenance practices often include excessively dense plantings and over-irrigation of xerophytic species, which must then be pruned frequently to limit overcrowding and obstruction of roads and walkways [11]. The decline in traditionally designed gardens, landscapes and urban green spaces is a response to the development of notions of sustainability, biodiversity and to the de-skilling of the maintenance workforce [6].

What is nursery

A nursery is a managed site, designed to produce seedlings grown under favourable conditions until they are ready for planting. All nurseries primarily aim to produce sufficient quantities of high quality seedlings to satisfy the needs of users.

The demand of ornamental plants is also increasing in both municipalities not only due to the major events like Asian Games, World cup, International Expo, conferences, Meetings etc. but also to the expansion of the municipal gardens area and due to the construction of luxurious houses. For nurseries that are being developed to meet in-house seedling needs, the demand is already known. But, for nurseries that plan to supply seedlings to other users, potential customers should be surveyed and detailed information collected to answer these questions:

- (i) What species, number and size of trees are needed?
- (ii) When and where will these trees be planted?
- (iii) How long will these needs persist and will they change over time?

Before starting an ornamental business some following points are kept in mind

1. Selection and Collection of Ornamental Plants
2. Establishment of nursery
3. Management of nursery
4. Cost of development of ornamental nursery

1. Selection and Collection of Ornamental Plants:

Appropriate selection may improve both the nursery and landscape performance of plants (Sharma and Graves, 2004). The selection and collection of native ornamental plants is carried out on the basis of utility of ornamental plants as follows:

A. Ornamental Trees: Ornamental Trees are perennial and tall plants with big trunks growing for several years and bearing flowers and fruits. On the basis of purpose of growing, ornamental trees are classified as;

1. **Flowering Trees:** These trees produce colourful flowers and are planted for their beautiful flowers, e.g. *Cassia fistula* (Amaltas or Indian laburnum), *Delonix regia* (Gulmohar), *Plumeria alba* (Pagoda tree or Kalachuchi) etc.
2. **Shady Trees:** These trees have round canopy or umbrella shaped crown. Leaves are large and dense so that no or very little sunlight is allowed under them. E.g. *Azadirachta indica* (Neem), *F. Bengalensis* (Bargad), etc.
3. **Avenue Trees:** These trees are planted alongside avenues or roads, generally for shade or for flowers. E.g. *Cassia fistula* (Amaltas), *Dalbergia sisoo* (Shisham), *Ficus religiosa* (Peepal) etc.

B. Ornamental Shrubs: A shrub may be defined as a perennial plant having many woody branches arising from the base of the plant. Shrubs are classified as;

1. **Flowering Shrubs:** These shrubs produce spectacular flowers which are grown for mass effect and for carpeting purpose e.g. *Hibiscus Rosa sinensis* (Hibiscus), *Bougainvillea ssp.* etc.
2. **Foliage Shrubs:** These shrubs are grown in the garden for handsome and richly variegated foliage. E.g. *Nyctanthes arbortristis* (Queen of the night), etc.

C. Climbers: Climbers are group of plants which have weak stem and ability to climb up support with the help of modified organs for sunlight and air. E.g. Helicopter Flower (Madhavi lata) *Hiptage benghalensis*, Bread Flower (Dudhi ki bel) *Vallis solanacea* etc.

D. **Edges:** Lining and borders of flower beds, paths, lawns and shrubbery with brick, concrete, living plants etc is known as edging. E.g. *Alternanthera* (Kanchari) *Alternanthera sessilis*, *Justicia* (Karambal) *justicia procumbens*

5. **Hedges:** Shrubs or trees planted at regular intervals to form a continuous screen are called as Hedges. E.g. Peacock Flower (Shankhasur) *Caesalpinia sp.*, Karonda (Karvand) *Carissa congesta*, Jasmine (Kunti) *Murraya paniculata*

6. **Annuals:** Annuals or seasonal are the group of plant which complete their life cycle in one season or in one year. E.g. *Chrysanthemum* (Annual) (Shevanti) *Chrysanthemum*, Globe Amaranth (Gul-e-makhmal) *Gomphrena globosa*, Butterfly Pea (Shankha Pushpa) *Clitoria ternatea*, Balsam (Terda) *Impatiens balsamina*

7. **Bulbous Plants:** The plants which propagate themselves through modified underground stems are called as bulbous plants. E.g. 1. **Canna:** Cannas are hardy and beautiful plants bearing flowers in different colors and shades. This is one of the best plants for growing in beds, especially in the midst of lawns. Cannas are generally propagated by the division of rhizomes. The best season for planting **the rhizomes** is just before the rains, i.e., during June-July. A sunny situation and rich soil are required for the cultivation of canna. The rhizomes are planted 7- 10 cm deep in the soil. 2. **Crinum:** These are tall growing plants with strap-shaped leaves. The plants are grown in borders, pots, and near pools. The plants like swampy or marshy and semi-shady places. **Propagation is from bulbs.** The flowering is profuse during the rains. The plants can remain in pots or borders for several years. It is a hardy plant needing very little care. 3. **Gloriosa superba:** It is a creeping plant which climbs with the tendrils. The longlasting flowers open primrose-yellow and later turn to orange-red or dark red. The petals are long, twisted or wavy, and heavily corrugated. It is suitable for growing in pots or in ground. The flowers last long in vase. The tubers are planted horizontally in March-April and the flowering season extends from July to September. The plant needs a light soil and plenty of watering.

8. Cactus and Succulents

a. **Cactus:** The group of plants belonging to the family Cactaceae with characteristics like presence of areoles (spine-cushion), perennial fruits being one celled berry, dicotyledonous and flower petals arising from top of the ovary are called cactus. Example, *Astrophytum*, *Echinopsis*, *Lobivia*, *Parodia* etc [16].

b. **Succulents:** Plants with very fleshy foliage or stem or both, mostly inhabiting dry desert locations in open situations and capable of withstanding long hot spells of drought are called succulents e.g. *Agave*, *Abe*, *Cotyceda*, *Euphorbia*, etc. [15]

9. Palms:

Plants in this group usually have straight, unbranched, cylindrical or columnar trunks at the end of which there is a spreading canopy of large pinnate or digitate leaves distinguishing the group from almost all other forms of vegetation. E.g. *Date Palm* (Khajur) *Phoenix loureirii var. Humilis*, *Snake palm* (Ran-suram) *Amorphophallus bulbifer*, *Fishtail palm* (Mari) *Caryota urens*, *Talipot Palm* *Corypha umbraculifera*

2. Establishment of nursery

Nursery is developed gradually. The mother plants planted for vegetative and seed propagation and seed propagated plants such as seasonal flower seedlings are raised for sale simultaneously. Important factors considered for establishing a nursery are agro-climatic conditions, soil types, soil pH, location, area, irrigation facilities, communication, market demand, availability of germplasm or mother plants, skilled persons, etc.

Selection of site

The site selected for raising a nursery should preferably be located near marketing centres for the convenience of transportation of the products with minimum or no damage. The site should be convenient enough for transportation of input materials also. It is important to have or develop a perennial source of water inside the nursery. If need arises, wind breaks of tall plants like *eucalyptus*, *aonla*, seedling mango, etc. may be planted to provide necessary shade and protection.

Product choice:

The product choice will primarily depend on the market demand in nearby areas. For wider market coverage, the choice may be dependent on market studies in the desired areas. Varieties of various ornamental plants like shade loving foliage plants, flowering plants, creepers, plants suitable for parks, gardens and roadside plantations, offices, business houses, hospitals, residential buildings, etc. may be propagated in the nursery. Planting materials such as seedlings of flowers, bulbs, corms, etc. may also be produced.

Methods of propagation: Plants may be raised from seeds or by vegetative propagation. Some important aspects of propagation are summarized below along with examples of fruit crops:

1. **Raising from seeds:** Germination from seeds may not be 100% even if the seeds are sown in perfect conditions. The factors that control the germination are age, stage of maturity and viability of seeds, water, free supply of oxygen and the heat or temperature. Some seeds do not germinate easily for variety of reasons such as the dormancy, rest period and presence of hard seed coat. Seeds with hard coats (e.g. palm, cannes, etc.) require some kind of external treatment for germination. Cracking of the coats by mechanical means, abrasion, soaking in water or acid and stratification are some methods commonly applied. E.g. Marigold.

2. **Vegetative Propagation:** Some ornaments are grown through vegetative means like bulbs of tuberose, terminal cuttings of carnation, rhizome of Canna and corms of gladiolus.

3. **Tissue culture:** The propagation of orchid through meristem culture was the first commercially successful venture in tissue culture. The principles of tissue culture can be successfully employed in respect of ornamental plants with soft tissues. Quite a large number of ornamental plants are reported to respond to propagation by tissue culture method. Few such plants are gladiolus, carnation, lily, rose, gerbera, anthurium, magnolia, fern, cacti, etc.

Structures required: A number of structures may be necessary for raising a nursery. To begin with, the following structures need to be constructed:

1. **Workshed:** The workshed of 6 m x 4.5 m with thatch roofs and locally available materials like bamboo, wood, etc. may be constructed. Total amount of Rs.6750/- @ Rs.250 per sq.m. has been considered for this purpose.
2. **Polyhouse:** The polyhouse of 9 m x 4 m dimension with 90 cm, brick wall, 3.6 m tall rhombus netting with expanded metal and polythene roof supported by local materials like bamboo, wood and planks, may be constructed. The cost estimated for such a house is approximately Rs.300.00 per sq.m. An additional lumpsum amount of Rs.2000.00 may be considered for construction of wooden racks inside the poly house.
3. **Store-cum-office:** A store-cum-office of 6.0 m x 4.5 m constructed with locally available materials may serve the purpose. For this, a rate of Rs. 350/- per sq.m. has been considered adequate.
4. **Fencing:** A goat proof fencing only will be effective for a nursery. For this model of 0.5 acre area, an amount of Rs.16250.00 has been considered as the total cost for erecting a goat-proof fencing around the boundary.

Land preparation: The land development for nursery is very important. In nursery, the land may be divided into minimum four parts:

- area for mother plant,
- area for seed production,
- area for raising flower seedlings and
- area for storing of seedlings or vegetatively propagated perennial plants.

The land of a nursery is prepared by ploughing and cross ploughing. All kinds of waste materials are to be removed and the land must be levelled properly.

3. Management of Nursery

Seedbed and nursery beds: For raising flower seedlings, some permanent or temporary structures for seed bed may be prepared. These beds will be minimum 0.5 to 0.75 m high from ground level. The beds may be 0.75m to 1.00m in breadth and length may be as per the availability of land. The nursery beds will be prepared for storing of perennial plants or the plants that should be kept for sale.

Collection and planting of mother plants: The plantation of mother plants is an important work for developing a nursery. The mother plants must be true to the type and true to the variety. The plants should be properly labelled. Collection of exotic type of mother plants is a continuous process or job. The mother plants may be maintained properly for their vigorous growth; otherwise number of propagated plants will get reduced.

Storage of dried, cleaned soil and compost manure: For raising flower seedlings during rainy or early winter season, the soil and compost would be stored during hot or summer months. In rainy season, collection of dried soil and manure is very difficult. Without these, the seedlings cannot be raised during rainy season. Varying microclimatic conditions (low temperature, low air humidity, enrichment with CO₂, light intensity and photoperiod management) are also used to control growth to produce high-quality seedlings with the ability to withstand transplanting shock and be capable of rapid establishment and resumption of growth under different landscaping conditions.

Production of flower seeds: Production of flower seeds is highly specialized job. The seeds should be produced carefully. If the quality of seed is good, the percentage of seed germination, seedlings vigour, vegetative and reproductive growth of the crops will be good. After harvesting of quality seeds, germination percentage of seeds and seedling vigour should be checked before marketing of seeds.

Storage of propagated plants in nursery beds: The propagated plants are planted in nursery beds for better growth or hardening the plants. In general, this type of nursery bed is prepared under partial shade.

Manuring: Manuring is to be done very carefully. Vigorous growth of plant is always attractive to the buyer. Again, heavy manuring is not beneficial for storage of plants.

Watering: Like manuring, watering is also important. Watering will be done according to need of the plant. The nursery should have a water source of its own. For this model, digging a well (12 m deep x 3 m dia) and installation of a 2.0 HP kerosene pump set with accessories are considered. Sprinkler system of irrigation is not advisable at the beginning. Low nursery temperatures continue to affect growth after planting, increasing relative growth rates. Survival of transplanted *P. glauca*, *P. contorta* and *P. Menziesii* seedlings was inversely related to nursery temperature [17]. A similar effect was also found in *L. creticus*, with plants from an unheated greenhouse showing slightly higher root growth than plants from a heated greenhouse after transplanting with different levels of establishment irrigation [4]. When the combined effects of deficit-irrigation and low temperature during the nursery period are studied [5], regimes involving the least water and lowest temperatures produce plants best adapted to stress during transplantation [2, 3].

Drainage: For sufficient vegetative and reproductive growth of plants, good drainage system must be developed in between the beds and around the nursery. Adequately gentle slope in the pot bed surface is also desirable. It is extremely important to ensure that water logging does not occur in and around the pots and beds.

Plant protection: Keen observation on attack of different pests and diseases is required. If the mother plants are infected, the propagated plants will be infected also. Necessary control measures should be taken immediately on observation.

Harvesting

The seeds, bulbs, etc. need to be harvested in the proper stage. Only completely ripe seeds are ready for harvesting. Seed capsules should be covered with muslin cloth or by the paper bag before ripening in cases of light seeds (like calendula, balsam, etc.) which may blow off due to wind or those species the fruits of which may burst while ripening. This will prevent loss of seeds.

Corms and bulbs are generally harvested when the leaves start yellowing or when they dry up. These are dug out carefully without imparting any injury.

Before harvest, nursery stock should be mature. The tissues are hardened against water loss and shrinkage. It is a common practice to defoliate shrubs and trees some days before they are to be dug out. This can be done by chemical defoliants, by withholding water or by hand. Live plants intended for transport are sent with a ball of earth around their roots.

Packing and handling

Seeds are cleaned and stored in close bottles or tins. Before packing, they are dried first in shade for 2-3 days and finally in the sun for a couple of days. In husked seeds, the husks are removed before packing.

It is important to see while packing the plants that the container is neither over-packed nor loose enough allowing the contents to move about. All space should be filled up by some packing materials like straw, dried grass, etc.

For long distance destinations, the ball of earth should be soaked in water and covered with a thick layer of wet moss. Only plants having a well-developed root system should be selected for such destinations.

Bulbs, tubers and corms withstand rigours of handling. They are packed in bamboo-matted boxes in between layers of straw. Rhizomes of water-lily and lotus are wrapped in moist sphagnum moss and polythene to keep them moist during transit and then packed in baskets or cardboard cartons.

Storage

Seeds are stored in a cool, dry place or kept in desiccators. Living plants should be kept in shade. Bulbs, corms and tubers are stored in single layer over dry sand, flat wooden trays or racks in a well-aerated store room with low temperature and low humidity. Before storing, they may be treated with fungicides and insecticides such as 0.1% benlate or 0.1-0.2%, captan 5% , DDT , BHC, etc. Over-Winter survival ratios of various ornamental grasses have been reported by Meyer and Cunliffe [7], who found significant differences between species within the *Miscanthus* genus. Schrader and Graves [13] also found differences in cold-acclimation for the three *Alnus maritima* sub-species. Therefore, substantial differences in cold hardiness should be considered when selecting plants for landscaping purposes

outside their native range. During vegetative reproduction, the influence of cutting position on the mother stem on rooting ability has been widely documented, although the exact effect differs from species-to-species. In *Protea* spp and *Dorycnium* spp. Alegre *et al.*, [1], the best results were obtained with apical cuttings, while in *Rosa centifolia* both apical and subapical cuttings produced equally good results [2]. In *N. oleander*, basal cuttings produced larger root growth, although more roots with a more homogeneous length distribution were obtained from apical cuttings [8].

Marketing

Marketing of plants and planting materials is the most crucial and important part of the nursery business. The production of high quality true to the type and attractive planting materials is absolutely necessary. They must be free from pests and diseases, vigorously growing and bright and colourful.

Export

Export potentiality of nursery products is also very high. Seeds, bulbs, tubers, cactus, flowering plants, foliage plant, unrooted cuttings and cut flowers are exported from India to many countries such as Australia, Netherlands, UAE, Japan, UK, Singapore, Germany, New Zealand, etc.

Allocation of space

A nursery covering a total area of 0.5 acre is considered. The space allocation for different purposes is as under:

Space allotment	Sq. m.
Mother Plants	560
Pot Nursery	200
Polybag Nursery	350
Ball Nursery including beds	550
Workshed	27
Polyhouse	36
Store cum office	27
Total	1750
15% additional for passage, drainage, etc.	260
Grand Total	2010
Approximately	0.5 acre

SOME POPULAR ORNAMENTAL PLANT SPECIES

FOLIAGE: Thuja, Crotons, Alocasia, Anthuriums, Coleus, Colocasia, Monstera, Philodendron, Dracaena, *Ficus pumila*, *Pleomele reflexe variegata*, *Ficus radicans variegata*, *Ficus pumila*, *Asparagus plumosus*, *A. springeri*, *Scindapsus aureus*, Begonia 'Rex', *Caladium* in different colours, *Aglaonema commutatum*, *Aralia elegantissima*, *Dieffenbachia exotica*, *Dieffenbachia picta*, *Philodendron bipinnatifidum*, *Polyalthia longifolia*, etc.

FLOWERING: Roses (Hybrid teas, floribundas, Polyanthus, Miniature roses, etc.) Aster, jasmine, chrysanthemum, tuberose, gerbera, marigold, carnation, crossandra, Baleria, *Begonia glaucophylla*, *Passiflora caerulea*, African violet, *Begonia manicata*, Calceolaria, geranium, *Azalea indica*, etc.

BULBS: Cooperanthes, Alpinia, Gladiolus, Dahlia, Caladium, Crocus, Hyacinths, Daffodils, Tulips, Amaryllis, Canna, Bird of Paradise, Datura, *Vinca rosea*, *Lilium sp.*, etc.

FERNS: Adiantums, *Asplenium nidus*, *Nephrolepis exaltata*, Platyceriums, *Pteris cretica*, Bird's nest, etc.

PALMS AND CYCADS: *Chamaerops humilis*, *Howea belmoreana*, *Phoenix roebelenii*, *Rhapis excelsa*, *Cycus revoluta* (not palm but similar looking), Areca Palm, etc.

CLIMBERS: Bougainvillea, *Hiptage benghalensis*, *Adenocalymma alliaceum*, *Aristolochia sp.*, *Jasminum sp.*, etc

CACTI AND SUCCULENTS: *Aloe variegatta*, *Aeonium haworthii*, *Agave americana marginata*, *Colyledon undulata*, *Euphorbia splendens*, *Sedum sp.*, *Epiphyllum sp.*, *Rhipsalis*, *Zygocactus*, *Opuntia microdasys*, *O. tunicata*, etc.

TREES: Bottle brush, *Bauhinia sp.*, *Erythrina indica*, *Ixora parviflora*, Jacaranda, *Michelia champaca*, *Poinciana regia*, *Cassia sp.*, *Arancaria cookii*, *Brassaia actinophylla*, *Ampherstia nobilis*, etc.

GRASSES: *Agrostis elegans*, *A. nebulosa*, *A. pulchella*, *Apluda aristata*, etc.

ANNUALS: Antirrhinum, China aster, Ageratum, Arctotis, Carnation, Calendula, Pansy, Petunia, Phlox, Sweet pea, Cosmos, Zinnia, Coreopsis, Gaillardia, Dianthus, Chrysanthemum, Calendula, etc.

4. Cost of Development of Ornamental Nursery (0.5 acre)**I. Establishment and maintenance of mother plants (Figs. in Rs.)**

No. of plants : 250

Area : 560 sq.m.

Sl. No.	Items	Year I	Year II	Year III
1	Field preparation, pit digging & filling	1200	-	-
2	Manures and fertilizers [including micronutrients] & application	1800	1200	1200
3	Planting materials @ Rs70/- each + 10% excess for infilling.	19250	-	-
4	Planting	600	-	-
5	Watering	2700	3000	3600
6	Interculture	2700	3000	3000
7	Pruning, cleaning the plants	-	360	480
8	Plant protection	300	450	600
	Total	28550	8010	8880

II. Establishment of Pot Nursery (Figs. in Rs.)

No. of pots : Yr. 1 - 500

2 - 800

3 - 1000

Area : 200 sq.m.

Sl. No.	Items	Year I	Year II	Year III
1	Earthen pots @ Rs.10/- each [including transportation & 5% damage]	5250	8400	10500
2	Soil @ Rs.300/- per truck load	600	900	1200
3	Manures and fertilizers (including micronutrients, etc.) & application	1800	2800	3840
4	Mixing fertilizers and manures with soil, filling pots	840	1320	1680
5	Planting materials @ 25/- each [from outside]	12500 (100%)	10000 (50%)	2500 (10%)
6	Planting in pots @ 50 plants/manday	600	960	1200
7	Watering	2160	2400	3900
8	Interculture including arrangement	4500	6000	7200
9	Plant protection	300	450	600
	Total	28550	33230	32620

III. Establishment of Seedbed nursery

Area : Polybag nursery - 350 sq.m.

Ball seedling nursery - 550 sq.m.

Sl. No.	Items	Year I	Year II	Year III
1	Polybag seedlings (Nos.)	15000	18000	21000
2	Ball seedlings (Nos.)	15000	18000	21000

(Figs. in Rs.)

Sl. No.	Items	Year I	Year II	Year III
1	Land & Beds preparation.	1200	1800	2400
2	Manures and fertilizers & application	720	900	1020
3	Seeds & sowing	480	600	720
4	Polybag [15cm x 10cm x 150G]	1450	1750	2000
5	Sieving soil, mixing with manures & fertilizers, filling sleeves and transplanting 50% of seedlings from beds.	1800	2160	2520
6	Watering	720	960	1200
7	Interculture	900	1080	1260
8	Plant Protection	150	250	350
	Total	7420	9500	11470

IV. Equipments, Implements & Furniture (Figs. in Rs.)

Sl. No.	Items	Year I	Year II	Year III
1	Sprayers (2 nos.)	4000	-	2000
2	Spades, forks, knives, Khurpis, secateurs etc.	3000	-	1000
3	Water pipes, water canes, buckets, etc.	3000	-	1000
4	Furniture	2000	--	
	Total	12000	-	4000

V. Salary for Supervisor-cum-Salesman

Salary	Year I	Year II	Year III
Rs/month	3,000	3,200	3,400

VI. Wages for skilled labourer for budding, grafting, etc. @ Rs.100/- per manday

Wages	Year I	Year II	Year III
Rs/month	-	2000	2500

VII. Goat proof fencing: Rs.16250.00**Summary of the cost estimate: (Figs. in Rs.)**

Sl. No.	Items	Year I	Year II	Year III Onwards
1	Work shed	6750	350	450
2	Polyhouse	12800	-	1300
3	Store-cum-office	9450	-	950
4	Mother plants	28550	8010	8880
5	Pot nursery	28550	33230	32620
6	Seedbed nursery	7420	9500	11470
7	Equipments, Furniture, etc.	12000	-	4000
8	Pumpset & dugwell	27000	1000	1000
9	Supervisor-cum-Salesman	36000	38400	40800
10	Skilled labour (Hired)	-	2000	2500
11	Goat proof fencing	16250	-	-
	Total	184770	92490	103970
	Approximately	184770	92500	104000

Yield Estimates

Sl. No.	Items	Year I	Year II	Year III	Year IV onwards
1	Pot plants (Nos.) (Net sale 80%)	Nil	400	640	800
2	Bouquets (Nos.)	Nil	100	120	150
3	Seedlings (Nos.) (Net sale 80%)				
	a) Polybag seedlings	12000	14400	16800	16800
	b) Ball seedlings	12000	14400	16800	16800
4	Seeds (kg)	-	10	10	10

Sale prices estimated [Average]

Pot Plants - Rs.70.00 each.

Bouquets - Rs.50.00 each.

Seedlings - a) Polybag - Rs.6.00 each

b) Ball- Rs. 2.00 each

Seeds - Rs.5.00/10 g packet

Maintenance cost (average): Rs.1,04,000/- p.a. from year IV onwards.**Year-wise Income: (Figs. in Rs.)**

Sl. No.	Items	Year I	Year II	Year III	Year IV onwards
1	Pot Plants	-	28000	44800	56000
2	Bouquets	-	5000	6000	7500
3	Seedlings				
	a) Polybag	72000	86400	100800	100800
	b) Ball	24000	28800	33600	33600
4	Seeds	-	5000	5000	5000
	Total	96000	153200	190200	202900

Future thrusts of ornamental plant industry:

Consumer demand for nursery crops is driven by housing. Housing initiates the desire of homeowners to be surrounded by aesthetically pleasing environments. The number of hobby gardeners is ever increasing. Demographic experts cite three key demographic trends that show promise for ornamental industries.

1. Landscape gardening as an enterprise has a brilliant future due to the emergence of Tourism and IT industry, which attracts a lot of foreign tourists and business personnel.
2. More self-employment avenues are open due to flair in home gardening and indoor gardening. The flat culture spreading throughout urban India creates demand for indoor gardens, window sill gardens, bonsai, terrariums etc.
3. There are agencies, which employ trained hands to periodically arrange flower vases and potted plants in offices and for functions, which is a lucrative business. Hence, the scope of this area is very wide spread in location.

Nursery Plant Exhibition and Marketing

Nursery Plant Exhibition: Exhibiting plants in shows and fairs can be fun. Customers will enjoy nursery plant when nurseryman displays them at exhibition stall or at community events. Nurseryman can learn by exhibiting. Others can learn by sharing knowledge and experiences with them and observing the exhibiting skills.

While Exhibiting the Nursery Plants

Color: The color should be vivid and bright, whether it is a dark shade or a pastel. Fading colors on petals or on leaf due to over maturity is undesirable. Foliage color should be typical of the plant type, whether dark green or variegated.

Condition: The condition of a plant or flower is based on the appearance of the specimen. For the condition criteria, mechanical injury, bruising, immaturity, age and weather damage should be considered undesirable.

Cultural Perfection: Cultural perfection is a criterion use to evaluate the cultural techniques used in growing a flower or plant. Proper fertilization, watering, pest control, disbudding, dividing, removal of spent blooms and quality of potting soil are cultural techniques that are evident in the appearance of flowers or plants.

Form: The shape is the true or characteristic form of a plant. Poor form may result from mechanical injury, insect and disease damage, or poor cultural practices.

Grooming: Clean plants to remove dirt and residues, as well as dead foliage or flowers. Grooming should not alter the typical features on the plants.

Size: The size of a plant should be as large as the variety allows under proper growing conditions. The stem and foliage should be proportional to the bloom size. Large blooms are not desirable if they are poor in condition or form.

Stem and Foliage: The stem supporting the blooms should be strong and in proportion to the plant. The leaves should be in good condition and in proportional size to the bloom and stem.

Substance: The material of which the plant is made should be strong, firm, crisp, and fresh. Over maturity often brings about a lack of substance, wilting, or thinning at the petal edges.

Symmetry: Beauty in a plant escalates due to a balanced proportion of parts on a plant.

Plant Exhibition: A nursery plant exhibition is organized to promote skill and knowledge of traditional methods of plant raising. At the same time it intends to improve knowledge of indigenous nurserymen and campaign amongst the private and government sector nursery for promoting tree plantation using tall trees, green foliage, and exotic plants to grasses. Plants for exhibitions come in many varieties. Green-leaf plants for exhibitions and large trees, such as Ficus, Palm or Olive Trees are perfect for large areas and can be made the focal point of any exhibition space with dramatic lighting or simply planting them in containers. They look elegant and graceful and can be an eye catcher for exhibition attendees. Ferns and other smaller plants can be filled around them. Flowering containers, potted plants or arrangements of cut flowers are also available. Blooming plants will soften any space and make the area bright and cheerful. More exotic plants such as Hibiscus, Bromeliads or Azaleas can be used to create a custom look designed to draw attention to whatever product you may be exhibiting. Plants will draw attention and make exhibiting space much more inviting, resulting in more leads and possible higher sales.

Flower Shows: The primary objective of flower show is to create interest among the general public to grow quality flowers and maintain beautiful gardens in and around their houses. The display of quality exhibits inculcates the spirit of healthy competition among the participants. Flower shows give an opportunity to the people to know the wide range of plants that can be grown in the locality. The other advantage is that a visitor gets a chance to see all the best materials at a time in one place. A flower show

should be a place for discussing the various garden problems, availability of nursery plants and to find out ways for solving each other's difficulties. Each participant should share his knowledge and experience with others. But unfortunately, due to professional jealousy people sometimes do not want to share their secret to success. It is also an occasion to demonstrate how a perfect exhibit can be grown. Besides all these, the aesthetic value of a show cannot be overlooked flower vases, bamboo stakes, show passes, benches and tables for exhibit should be made available to the participants. Arrangements should be made to open refreshment stalls. Nurserymen, seeds men, companies selling agricultural implements, chemicals, etc. should be allowed to open their stalls on rental basis. Different educative charts on horticulture nursery should be displayed and demonstration on some horticultural nursery operations such as budding, grafting, pruning, etc. should also be arranged. A film Show on flowers, nursery and gardens, preferably in colour, could be arranged in the evening accompanied by a supporting talk. Many flower show committees also make arrangements for bringing in exotic exhibits from abroad.

Tips to Exhibitor: The first and foremost thing is to get a schedule of the flower show well in advance and to convince oneself of the requirements. For example, roses are grouped into several classes for show purposes, such as Hybrid Tea, Floribunda, etc. and one has to exhibit the right type of rose in the appropriate class. Similarly, it may be specified that the annuals are to be displayed in groups of 6, 12, or 18 pots in as many different varieties. After going through the schedule it has to be decided in which groups the entries are to be made. Once the decision is made the plants are raised accordingly and seeds of lower quality annuals procured. It is to be remembered that only best quality seeds can earn a prize and so the seeds are to be purchased from reputable nurseries or seeds men at least a fortnight ahead of the sowing date. The sowing is to be staggered at intervals of 4-7 days so as to avoid disappointment as a result of casualty when planted in one lot. One more reason for staggering the sowing dates is to ensure that at least one group of plants is in perfect condition during the show time, as it may so happen that one group from a particular sowing date may fail to open the flowers on the scheduled date due to climatic or other reasons. The plants for exhibition needs extra feeding with liquid manure but not overfeeding, from the date flower buds start to appear. To obtain large flowers all auxiliary buds in flowers such as Carnation, Marigold, Dahlia, etc. should be disbudded as soon as they appear leaving only the apical bud to bloom the seasonal flowers or any other plant should be grown in the appropriate sized pot and not in an under or over sized pot. To make the plants bushy pinching should start at an early date for flowers such as *Brachycome*, *Carnation*, *Marigold*, *Zinnia* etc., and the operation repeated frequently, especially for *Brachycome*, *Candytuft*, *Petunia*, *Schizanthus*, *French Marigold*, etc. Only one annual should be grown in a pot. In some shows it is often seen that 3-4 seedling are grown in one pot to obtain a compact effect. This is absolutely not needed if the proper size of pot is selected and proper cultural procedure is followed. Some annuals such as *Zinnia* develop flower buds at a very early stage of growth which should be removed constantly until the plants attain sufficient vegetative growth. Some extra pots are to be raised than required as per schedule as few plants may die or fail to bloom on the appropriate date. If annuals are first grown in ground and then transplanted in pots, the operation should be undertaken at least one month before the date of show to enable the plants to spread their roots and overcome the transplanting shock. One should not try to hoodwink the judges by lifting ground-grown plants in pots a few days ahead of the show. Before displaying, the pots are to be cleaned properly or lightly painted with terracotta red (geru). No plants; either annuals or foliage, should be displayed in a crowded fashion. The Judges will like to see the plants individually and will also see the foliage. The foliage and other perennial plants such as *Bougainvillea* and *Hibiscus* are also grown in a similar fashion. They should be fed with liquid manure prepared from oil cake once in a fortnight or 20 days. The leaves should be washed regularly by spraying.

Commercial Display in Nursery

The display area should be separately from the production area because it will contain potting soil, equipment and chemicals. A display area located close to the office and containing a representative display of saleable plant materials, enables customers to view saleable plant material without travelling through the nursery. This saves time for customers and sales personnel. The display area should have tiered shelving for smaller plant display with the top shelves easily reachable and area with covered ground for larger plants and shrubs. The ground under larger plants must be covered to prevent weeds from growing around the merchandise and to stop insects and diseases from entering the planting pots. Also, pathways must be provided and designed in a way that customers can pull the product without interfering with customer traffic and there are no dead ends. The ground should be a hard surface such as brick or concrete so that you can keep it free of mud and dirt with brooms after watering your plants. Keep all plants according to their growing habits like perennial, annual, tree, shrub, herb, hedges, edge,

bush, vine, fruit, vegetable, flowers, medicinal and aromatic, potted, indoor plant, etc. This can give an organized approach to the nursery and one can easily direct the customers to the right section.

Marketing of Nursery Plants

Marketing is planning and organizing the systems in such a way that will make consumers believe that they are buying something special, meets their needs and also supplying the right amount of product when the customers want to buy it. Customer perceptions are not just about price and quality, but may also include status, enjoyment, attractiveness, convenience, health. Producers should decide which factors are special for their product and emphasize these in their promotion.

Direct Marketing

This is sales by the nurseryman direct to the consumer. Different studies show that many consumers prefer direct contact with the nurseryman/seller compared to an impersonal service, although the latter are in some cases more efficient. One of the main advantages of direct sales to consumers is the opportunity to reduce marketing costs and to add value to the product so as to increase the profit margin. Nurseryman need to be aware of existing marketing tools in order to maximize sales.

Retail Outlet

In most cities municipal ordinances regulate places and areas where nursery plant retail outlets operate. In selecting a location the three main factors to consider are: good visibility, accessibility and proximity to buyers. Street or road crossings, the proximity of shopping centers or any other area which has the potential for high volume of customer traffic are good locations for produce sales outlets. Some municipalities give permission to place exhibits on sidewalks to attract customers provided they do not interfere with normal pedestrian traffic.

Street Selling

Although this method of marketing is frequently seen in developing countries like India, selling and peddling is generally not allowed by most municipalities. There are many reasons for this. There are public health security considerations, as this activity generates foul odour as well as insect and rodent proliferation. The second reason is that it constitutes unfair competition for established outlets. These are periodically inspected and are liable to taxes on their operations. Ambulatory selling is undertaken in vehicles either drawn by motor, animal power or humans and plants is peddled from home to home. Street selling has the same characteristics and limitations as ambulatory selling. As scales are unavailable, plants is generally sold by units.

Nursery Markets

A nursery market is a form of direct marketing that is located in or within proximity of a community where growers sell directly to numerous customers. Cash sales and the possibility of selling under or oversize units that cannot be marketed through other marketing channels are the main benefits of this system for nurseryman. For consumers it provides the opportunity to buy new plants and to interact with nurseryman in an informal environment. A nursery market becomes successful when there is cooperation and interaction among three key groups:

1. The sponsoring, organizing or promoting group may be a municipality a group of neighbours, the local Chamber of Commerce, a nurseryman organization or any other association or organized group.
2. Vendors are not only true nurserymen. They should also include backyard producers. This provides a means for them to increase their income.
3. It is estimated that one vendor can be supported by 800 potential buyers. So, a community of 8 000 residents could sustain a farmers market with 10 vendors. The main advantages of selling at nursery markets include: minimum investment required for operating, there is no need for packaging materials, large volume of produce or a wide variety of products made available to the customers at one location.

Regional Markets

Regional markets exist in many developing countries where buyers and sellers meet to trade. From an organizational point of view they are very similar to nursery markets. One of the main differences is that operations; are more concerned with wholesaling, although some retailing is undertaken. A sponsoring organization also exists. Responsibilities include undertaking administrative duties of the market, one or more days per week for operating, stall rental on a daily basis, etc. This system provides many small-scale nurserymen with the opportunity to sell their plants at a fair price.

Nursery Stall Sales

Nursery outlets attract many customers. This form of direct marketing has the advantage of adding value. Location of the nursery outlet is extremely important because it has to be seen from a certain distance. It should be located on relatively busy roads. The main access routes to cities are probably the best places for these types of markets. However, they can also be located in other areas such as tourist areas. Safe paved drives and availability of good parking space are factors to be considered. There is no standard

formula for designing a nursery outlet, as shelters, barns or special buildings may be used. They should be clean and tidy with enough space for displaying produce. A special type of farm sales is the "U-pick" or "pick-your-own" system. Consumers can choose and packaged plants on their own. In this type of nursery outlet, some plant has already been harvested and packaged. Sales are carried out in height, volume or units. The main benefit to the nurseryman with this form of direct marketing method is there is no need to harvest the plant. It also eliminates the need for sorting and packaging costs. This results in lower prices, making the plant more attractive to the consumer. The customer also has the opportunity of spending a day outdoors in contact with nature.

Export of Nursery Plants

Some exports require an export License before you can ship your plants. Some foreign countries have standards that you should be aware. There are some countries where one cannot sell plants. Use this section as a primer to familiarize yourself with the licenses, standards, and legal considerations that may apply to your plants.

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