



## Seed Production Technology in Flower Crops: A Profitable Venture

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### Article History

Received: 21.02.2022

Revised: 6.03.2022

Accepted: 11.03.2022

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### INTRODUCTION

The Commercial flower seed production of  $F_1$  hybrids and open pollinated is considered a profitable enterprise and hence, it is popular amongst farmers on limited scale. Earlier, seed production was being done on limited scale in Sri Nagar and plains of North India and in other localities due to limited demand. Mr. Man Mohan Attawar, owner of M/s Indo American Hybrid Seeds, (India) Pvt. Ltd. (Bengaluru) has started producing  $F_1$  hybrid seeds of Petunia for 100% export during mid-sixties. However, production of seeds of open pollinated flower crops was revolutionized by Mr. Avtar Singh, M/s Beauscape farms, Sangrur (Punjab) who started flower seed production involving farmers on large scale. Now many companies have started producing seed on large scale for export to Holland, U.K., USA, France, Germany and Japan etc. At present in India, the area under flower seed production is about 1000 ha. The main areas of flower seed production in India are: Punjab (Sangrur, Patiala, Ludhiana); Haryana (Panipat, Sirsa); Karnataka (Bengaluru, Ranebennur); Himachal Pradesh (Kullu Valley); J&K (Sri Nagar Valley); and West Bengal (Kalimpong). The cost of seed production per ha varies from Rs. 10,000 to 15,000 and generate a net profit of Rs. 25,000 to 75,000. Farmers have started using innovative techniques for harvesting seed as well as their cleaning which made the seed production easy and profitable. However, flower seed production is labour intensive.

It has been observed that for wheat and paddy crops the labour requirement is 50 men days/acre whereas for flower seed production the labour requirement varies between 120-366 men days per crop. In a survey conducted in Ludhiana Dist. it has been observed that farmers mostly prefer those crops which are easy to harvest, clean and whose seed size is bigger but this preference seems to have no value as they have to grow those crops which the companies suggest.

**Climatic Requirement for Seed Production:**

Seasonals as term indicate are divided in to three seasons-Summer, rainy and winter season. Summer and Rainy seasonal in India are available in limited number whereas winter annuals are rich in kinds and available in huge range of colours and height and bring riot of colours in the garden and hence, very popular amongst gardeners.

Thus from seed production view point also winter annuals cover large area. Ideal climate condition for seed production is long duration of cool and dry season which helps in good seed setting of bold size. While excessive hot and dry season hampers seed setting of summer annuals in north Indian plains. Excessive rain at the time of flowering washes away pollen grains resulting in poor seed set. According to climatic requirements, the production of flower seed is divided in following climatic zones.

1. Mild climate area (Kashmir Valley, Kullu Valley etc.)- Delphinium, Giant Pansy, Zinnia etc.
2. Sub-Topical area- Antirrhinum, Anchusa, Ageratum, calendala, Brachycome, Linaria,

Californian poppy, Candytuft, Carnation, Dianthus, Daisy, Dimorphotheca, Nasturtium, Petunia, Portulaca, etc.

3. Tropical area- Tagetes, Salvia, Ipomea, etc.

**Mode of Pollination:**

For successful seed production of flowers, it is necessary to know whether the particular flower is self, often cross or cross pollinated crop. To find out whether a particular flower is self or cross pollinated, the very simple method of bagging or growing in complete isolation may be followed. A number of plants are grown in flower bed and when flowers are about to open some of them may be covered with muslin bags and tied properly at the base so that no insect can enter.

If the plants or flowers which were covered with muslin bags produce seeds, then it is obvious that variety or species is self-pollinated. If the bagged flowers do not produce seeds, it is an indication that flowers have to be hand pollinated. Some-time this is not true of certain species or varieties. (Table 1.1).

**Table No. 1.1: Mode of Pollination in different flower crops**

Self Pollinated	Often cross pollinated	Cross pollinated	Preferential outbreeds
Balsam	Antirrhinum	Alyssum	Ageratum
Clianthus	Aster	Arctotis	Corn Flower
Lupin	Dahlia	Calendula	Dephinium
Sweet Pea	Salvia	Cineraria	Marigold
	Wall Flower	Gazania	Verbena
	Linum	Stock	Chrysanthemum
	Linaria	Zinnia	Nemasia

For production of pure seeds numerous devices are adopted for cross pollination. Most common method is to grow them in isolation. (Table 1.1) This means to grow two species/variety or strain of the same species at certain distance from one another.

Other methods such as bagging flowers, growing them under nets or in glass houses, emasculation or special methods e.g. collection of pollen grains with vacuum pump in petunia, use of floor guns etc. or use of male

sterile line for seed production are followed to produce seeds in cross pollinated crops.

**Seed Production Techniques**

The techniques are: 1. Selection of Soil 2. Raising of Seedlings 3. Direct Sowing of Seeds 4. Preparation of Land and Transplanting of Seedlings 5. Isolation Requirement 6. Management of Annuals 7. Rogueing 8. Insects, Pests and Diseases 9. Harvesting and Storage of Seeds.

**Technique 1. Selection of Soil:**

For successful seed production, soil should be preferably loam. Other soils like sandy loam to clay are also good. The soil should be well fertile and free from water stagnation and have 6.5 to 7.5. Since most the crops have tendency to shatter the seeds in the field and hence, the same crop may not be selected to grow year after year to avoid contamination.

**Technique 2. Selection of seed and raising of seedlings:**

Selection of seed should adoptable to agro climatic conditions, i.e., released/notified kind of variety.

Generally seeds of annuals are sown in controlled space for better handling owing to small size of seeds. In general, 10-15 cm raised nursery beds of 1 m width and 2-3 m long are prepared. The soil should be well prepared by mixing 10-15 kg/m<sup>2</sup> well rotten farm yard manure. To check the soil borne diseases in nursery, soil should be drenched with 0.2% brassicol or captan or soil can be sterilized by drench with 2% formaline and covering with polythene.

For better handling of small seeds, these are mixed with bulky material like sand or ash. Seeds are sown by hand in line 5-6 cm apart and 0.5 cm deep. The depth can be increased with the increase in size of seed.

After sowing seeds are covered with well sieved mixture of farm yard manure and soil. Watering should be done twice or thrice a day or use sprinkler system. The seeds are covered with newspapers or bed sheet to create darkness which helps in better germination. The seeds start germinating within 2-3 days and covering is removed.

It takes about one month to grow the seedling sufficiently and is ready for transplanting when seedlings have 3-4 true leaves. For raising one acre nursery 8-10 beds of 5 × 1 m are required. The quantity of seed will depend upon size and weight of seeds for nursery raising.

Following amongst of seed is required for raising seedlings for keeping 3 seeds

required for raising one seedling: Marigold (African)-400-500 g, Petunia-200 g; Island Poppy-150 g; Oenothera-200 g; Nemophylla-500 g; Eschscholtzia californica-200 g; Bellis perennis-100 g.

**Technique 3. Direct sowing of seeds:**

Many flowers are sown directly. For this 15-20 cm wide ridges are prepared by manual or tractors. Three to 4 seeds are sown directly by hand at 15-20 cm apart. After complete sowing light watering should be done. Seeds start germinating after 4-5 days.

**Technique 4. Preparation of land and transplanting of seedlings:**

Before laying out the field, the land should be well prepared by ploughing by harrowing and mixing 15-20 tonnes well rotten farm yard manure/acre. It has been observed that instead of flat planting raised bed method of planting is more useful. Therefore, raised beds with tractor are prepared and keeping the spread of plant seeds long are transplanted on both sides of raised bed or in center.

In general 50 kg urea, 250 kg of single super phosphate and 60 kg of muriate of potash should be well incorporated in the soil. The application of remaining 100 kg urea should be applied in to two equal splits i.e. one and two months of transplanting of seedlings. It is advised that before transplanting light irrigation should be applied which helps in better establishment of seedlings.

The distance for tall annuals, viz., helichrysum; delphinium; gaillardia is kept 60×45 cm, whereas for medium annual, (verbena, petunia, eschscholtzia, phlox, etc.) 45×45 cm and for dwarf annuals (mesembryanthemum, pansy, alyssum, daisy) 25×25 cm is kept, The seedling should be transplanted in cool hours of evening and should be lightly watered immediately.

**Technique 5. Isolation Requirement:**

To produce genetically pure seeds, crop should be isolated with other varieties of same crop as mentioned in Table 1.2.

**Table no. 1.2: General isolation distance for different flower crops**

Self Pollinated	Cross pollinated	Often cross Pollinated
3-25 m	1000 m	50-100 m

Generally no isolation distance is required for strictly self-pollinated crops, whereas a distance of 25 m is beneficial. For often cross pollinated and cross pollinated crops the isolation distance of 100 and 1000 m is kept, respectively. Seed producing companies those are busy in custom seed production, select the farmers in different villages and are given a programme of seed production of one line of single type. This helps in better isolation.

**Technique 6. Management of Annuals:**

Annuals are quite tender and require proper attention through-out their life. Regular water supply is essential for successful raising which should be done according to the requirement of the crop. Sufficient amount of moisture is required till harvesting of seed is done. Depending upon season and soil type frequency of irrigation is decided.

In rainy season generally irrigation is not required except during dry spell. During winter season, irrigation is required at 10-12 days where during summer season it should be done at 4-5 days. Regular weeding and hoeing is essential for the development of seedling in to healthy plants.

**Technique 7. Roguing:**

Seed producer should have a detective eye to examine off type or improved type in the field. He should keep constant vigil from the beginning of the crop to the maturity. It is utmost important to remove and destroy the off types and volunteer plants whereas if any plant exhibits superior trait in terms of vigour earliness, colour, or size of flower, etc., the seed of such plant should be preserved for further testing and utilization.

**Technique 8. Insects, pests and diseases:**

The annuals are commonly attacked by *Helicoverpa* sp., aphids, leaf miner etc. Protective control measure should be taken well in advance to avoid any considerable losses. The *Helicoverpa* sp. attacks mostly

*Antirrhinum coreopsis*, carnation, dianthus, etc. and it can be controlled by spraying @ 30 ml Chlorantraniliprole (Coragen) in 200 L water per acre at near the beginning stage of caterpillar. Aphids commonly attack alyssum, stock, nemasia, calendula etc. Spraying of 50 ml Confidor 17.8 SL in 200 L/acre is effective to control it

Different fungi attack many annuals at different stages such as in nursery or in the field. Seed dressing with Bavistan (1 g/kg) or captan (3 g/kg) or drenching with the infected nursery beds with 0.2% Brassicol or Bavistan (0.1%) is quite effective. The seed virus cannot be controlled by using chemicals and effective control is destroying of the plants or by controlling the vectors by using effective insecticides.

**Technique 9. Harvesting and storage of seeds:**

After vegetative phase, flowering occurs in succession which may last 30-60 days or even more resulting in maturity of individual flowers in succession. Therefore pods are harvested individually before the splitting occurs.

Whereas in many cases to save labour single harvesting with sickle is done at the cost of seed yield e.g. *Coreopsis tinctoria*, *Nasturtium*, *Mesembryanthemum*, *Oenonenthra*, *Verbena tennusecta*, *Phlox*, *Clarkia*, etc. The seeds of *Nasturtium* are very bold and thus it is collected by booming the field.

Similarly the seeds of *Chrysanthemum paludosum* can be collected by shaking the plant over sheet of cloth. The harvested seeds are spread over the tarpauline under shade or in ventilated room for a week but reshuffled daily. In some cases seeds along flower stock are plucked which provides moisture and nutrient to maturing seeds e.g. Daisy. Many

large seed producers using green netlon 12' high to provide shade for drying the seeds.

The seeds are cleaned and sieved with different types of seed machine and seeds are finally cleaned by hand winnowing or using table fan to separate light seeds. In certain

machines brushes are attached to remove the hairs or appendages. The seeds after proper cleaning are packed in muslin bags H.D.P.E. bags with silica gel and are stored in cool and well ventilated room.