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Orchids: Potential Ornamental Crop in North India

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Abstract

In recent years, Indian floriculture industry had gained a momentum in exports of cut flowers. Adoption of new and advance technologies in production, post harvest and marketing techniques has resulted in growth of production of crops like gerbera, gladiolus, tuberoses, roses, carnation etc. Likewise, Orchids are potential ornamental crop which are yet to be fully exploited. Demands for orchids in North India market are extremely high and these demands are met by import of cut flowers from International market like Bangkok. Development of technologies for mass production, scientific cultivation, post harvest techniques and marketing strategies are need of the hour. The paper highlights the potential of orchids in floriculture trade and technologies for production in North Indian climatic zone.

Keywords: Orchids, North India, Floriculture

INTRODUCTION

Orchids are one of nature's most beautiful creations and represent royalty and aristocracy in floriculture (NRCO, 2015). They are among the most evolved families of plants and are represented by 20,000-30,000 species (Dressler, 1993; Tremblay *et al.*, 2005). Orchids are most highly prized ornamental plants. Orchid accounts for a large share of global floriculture trade both as cut flowers and as potted plants and is estimated around 10% of the international fresh cut flower trade (De *et al*., 2014). With their uniqueness of shape, breathtaking colors, and exceptionally long shelf life provide a source of profound aesthetic value. These qualities have made orchids growing a highly profitable industry all-over the world. More than 1,00,000 hybrids are known globally and cultivated (NRCO, 2015). Orchids are excellent item in pots,

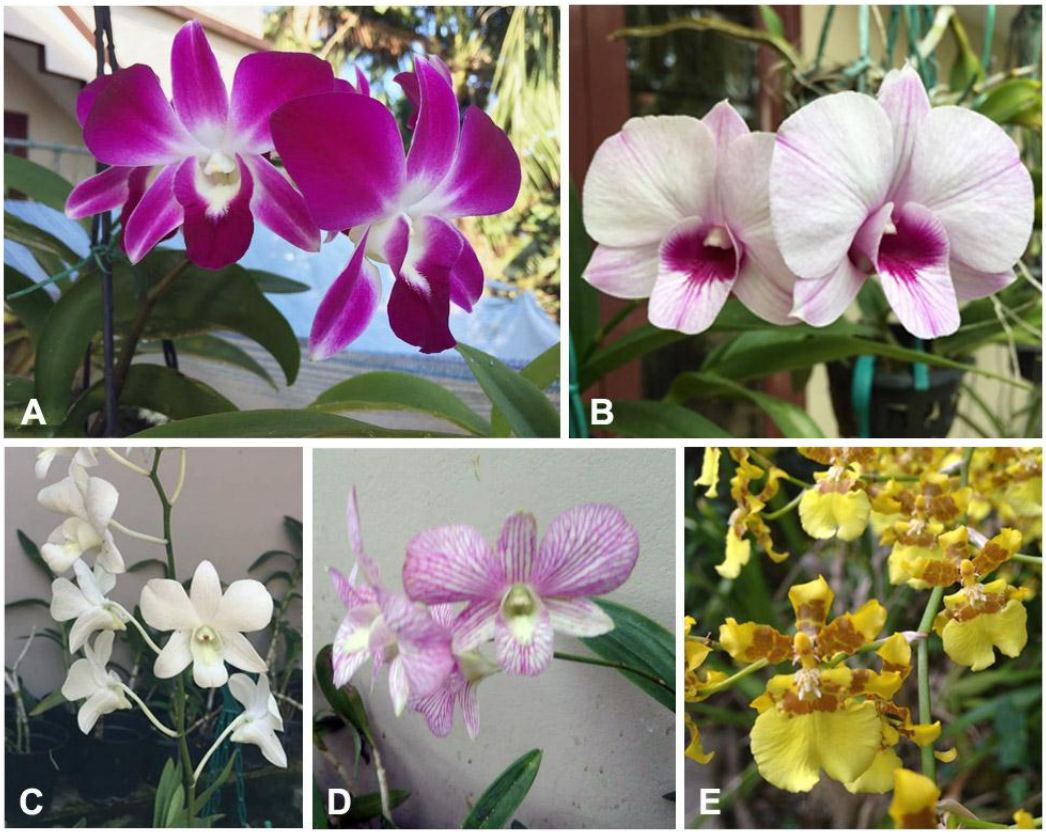

Figure 1. Some of the potential Orchids recommended for cultivation in North India: A. *Dendrobium* 'Sonia', B. *Dendrobium* 'Burana Stripe', C. *Dendrobium* 'Emma White', D. *Dendrobium* 'Pink Stripe' (Photos: Heji Alan), E. *Oncidium sphacelatum* (Photo: Alan Merrow).

baskets and very attractive cut flowers. The total orchid cut flower trade of the world mostly consists of 85% *Dendrobium* species and 15% *Phalaenopsis* and *Cymbidium* species and Asia is the main source of orchid (De *et al*., 2014).

Around 1300 species of orchids are found in India distributed in different part of the country especially in Himalayan region and Western Ghats. Several Indian species like the exotic species have commercial potential and need to be fully exploited in floriculture industry. Development of agro-technology for its large scale production in different climatic regions of the country is required. North-eastern states and southern states are idle place for orchid growing however the demand of orchids all over the country has increased several folds in last few years. Selection of warm growing orchids yet beautiful is important for starting orchid industry in warmer region of

Indo-Gangetic plants and Central India. Development of scientific and affordable technology for production of orchids in the region will help in reducing the demand of import of cut flowers from Southeast Asian Countries.

Orchids in Floriculture Trade

Orchids are the highest selling flower in Indian cut flower industry. They are most sought for interior as well as outdoor decorations as cut flowers and potted plants. Orchids in Indian flower markets are imported and the main import cities are Mumbai, Delhi, Bangalore and Kolkata. *Dendrobium*, *Phalaenopsis, Oncidium* and *Cymbidium* varieties are the most popular considering their beautiful, unique, colourful and lasting flowers. They come in different bright colours ranging from red, purple, violet, yellow, pink and white.

Due to a booming tourism industry and change in lifestyles, there is a huge demand for flowers in Northern India. There are two types of demand for orchids in the market. Cut flowers for decoration purpose for special occasion or festivals, offices and potted plants for its aesthetic values in houses and gardens. Every year, flowers worth crores are imported from Netherlands and Thailand to meet this demand. In festive seasons, import of flowers increases several fold. The import of orchid cut flowers has increased from 299.09 in 2008-09 to Rs. 3402.36 lakhs in 2014-15 (NRCO, 2015). Though India has the potential to develop a successful orchid industry, many orchids are still being imported. Lack of knowledge, proper plant material and techniques to grow high quality orchids on a commercial scale among the farmers and nurseries are the main hindrances in orchid industry in India especially in Northern India. Orchids are grown according to their requirement of light, humidity and tolerable temperature. All tropical orchids can be grown in India. Warming growing orchids can be easily grown under shade nets. Bright coloured and commercially significant *Dendrobium* varieties such as ‘Sonia’, ‘Emma White’, ‘Thongchai Yellow’ are best suited for Northern India climates. A single cut flower of imported *Dendrobium* ‘Sonia’ cost Rs. 50 in market and cost of one plant ranges from Rs. 500-1000.

Orchid Production in North India

North India is one of the most climatically diversed regions where the temperature often rises above 35°C across in summer and dips to below 5°C in winter. Even though Indo-Gangetic plains are one of the most fertile plains in India, it remains hot and dry for many months. Adopting modern technology will be able to produce healthy orchid plants with high productivity of flowers and plants with less water and resources.

Propagation

Like most plants, orchids are able to reproduce themselves in two different ways: a) sexually by seed, and b) asexually by vegetative propagation. Vegetative propagation is the easiest and commonly used methods. Vegetative propagation can be accomplished in five ways by division, back bulbs, keikis, aerial cuttings and tissue culture. Propagation through division involves splitting of plants into two or more parts each with at least one new shoot. This process is one of the simplest methods of producing more plants of the same variety or species. Splitting a plant encourages the plant to produce more shoots of a better quality and with much more vigor. Each division should have at least three back bulbs and atleast one new growth. The best time for division of plants is the early spring just as new growth starts, this will ensure that each division has a full growing season to establish itself so that it can flower the following season. Back bulb propagation is a method of producing a new plant from previously flowered or unflowered back pseudobulbs which are usually leafless, plants grown this way may take 2 to 3 years or more to reach flowering size. In this process, older back bulbs are removed at the time of repotting and place them in growing conditions to induce rooting. It is important to remember though when removing back bulbs that in order to keep the parent plant at flowering size that it, or any divisions should still have at least two good back bulbs and a growth. Orchids, such as *Dendrobiums* and *Phalaenopsis*, develop offshoots along the stem which appear to be, and are, small but individual plants. These may be allowed to grow to maturity and then carefully cut from the parent plant. The young offshoot, or "keiki" as it is often called, can be potted up similarly to a back bulb. Aerial cuttings are very common on many of the Dendrobiums. If placed under stressful growing conditions then some Dendrobiums will instead of developing flower buds will produce small plants in their place. Aerial cuttings are very easy to take as the plant is almost fully grown before being removed from the parent plant. Production through advanced technologies like tissue culture propagation can be resort for high-end skilled farmers which will permits year-round production, less labour and efficient post harvest handling.

Cultivation

Cultivation of Orchids in the region requires special care, knowledge and skills considering the hot and dry conditions. Selection of species, growing medium, pots, cultivation techniques, and type of shade house or polyhouse is very important for cultivation of orchids at home and for commercial purpose. The best species that suits for the region is *Dendrobium* and *Phalaenopsis* varieties. However, they will require shade set with high humidity 60-80%. Best growing medium are bark of trees, charcoal and rice hull/husk. Bark and Charcoal are commonly used however adding rice hull/husk in the growing medium will reduce fungal or mold infection. Rice hulls allow drainage and retain less water. Rice hulls are also cost effective and easily

available than coconut husk. Perforated six and eight inches earthen pots are idle for growing orchids. One inch diameter side holes/perforations will help in aeration as well as for hanging of aerial roots for absorption of moisture from the air. Two types of shade house can be used viz, doom shaped and flat roofs. Height of the doom house should atleast 9m and width of the house depends on the number of benches to be constructed for keeping the orchid pots. The benches should be 3 ft from the ground and can be made of iron, bamboo or wood. Flat roofed shade house require less maintenance and easy to make. Net (75%) with a width of 4 metres is used consisting of two tiers of roofs, one higher (1-2 ft) above the other, to ensure adequate ventilation. Concrete poles with strings of wires are used to spread the net. The houses should be fitted with mist or overhead sprinklers to provide water and to maintain humidity.

Fertilizers

In their native habitat, orchids scavenge nutrients from whatever happens to be nearby such decomposing leaves, bird or animal droppings, or minerals borne in rainwater. Growing orchids in shade nets or green house need regular feeding and the right fertilizers to grow faster and bloom sooner. Orchid fertilizers should contain nitrogen (N), phosphorus (P), and potassium (K), along with trace elements such as iron. Potassium (K) is mainly responsible for the control of flower, and fruit development. Phosphorous (P) for flower production, and Nitrogen (N) for healthy vegetative growth. The amount of feeding depends on the plant concerned, the time of year and general health of the plant. Ideal fertilizer of orchid for growth is NPK 30:10:10 while for flowering is NPK 10:30:30 along with traces of iron, magnesium, manganese, copper, zinc, boron, molybdenum. Fertilizer should be sprayed in the morning once every 7 to 10 days. During heavy rainfall fertilizer should not be used. It also should never be mixed with insecticides or fungicides.

Pests & Diseases Control

Pests are the major problem that causes damage to plant parts which sometime lead to death of plants. Some of the important pests are Scales, Mealybugs, Thrips, Spider mites, Aphids, Cockroaches and grasshopper. These insects can be easily controlled by using insecticides. Spraying insecticides once every 7 to 10 days between 4 pm and 5 pm on a sunny day will protect the plants from these pests.

Orchids can fall foul of leaf rot, mildew, botrytis and many other pathogens. Bacterial soft and brown rot is one such disease where small water-soaked spots appear on the leaves and often are surrounded by yellow halos. If unchecked, the infection will rapidly rot the leaves and roots and spread more slowly into the rhizomes or pseudobulbs. This wet rot may have a foul odor and has a water soaked appearance. Another disease is bacterial brown spot which is the most common and severe disease

that affects leaf as a small, soft, water soaked blister. Initially dirty green in color, the infected spot enlarges, coalesces and eventually becomes brown or black, dried up and sunken. It oozes bacteria-laden liquid, particularly when the disease reaches the tip of the leaf. It is most prevalent during the warmer weather. Both the diseases can be treated by removing infected tissue and spray bactericides.

Harvest

Flowers of Orchids should be harvested in mild temperature because high temperature causes rapid respiration rates and excessive water loss (De, 2015). Flowers should be harvested in the early morning or in the evening. In the early morning, flowers remained turgid due to transpiration at night and higher sugar levels. Similarly, flowering stems retain a higher amount of stored carbohydrates if cut in the afternoon and retained more vase life. Sharp tools or secateurs were always used to detach the stem of flowers from the mother plant. The angle of the cut was given in slanting position and the stem was not crushed during harvesting, especially hard wood stems. The spikes were dipped in a bucket containing water immediately after harvest.

Post harvest

Vase life or longevity of a cut flower are determined by diameter and length of florets, opening of flowers, changes in fresh weight, diameter or length of stem or pedicel, senescence pattern, color of petals, total longevity and foliage burning (De & Singh, 2016, De *et al*., 2014). A good quality cut flower of an orchid should have minimum eight standard blooms per stem, flowers must be cleaned, evenly colored and free from physiological disorders, stem must have flowers evenly arranged and around the stem, two third of the stem should be covered with the flowers, flowers must have a firm texture and a luminescent sheen. Stems must be firm when held up and the minimum base diameter of the stem should be of 10mm (De *et al*., 2014).

Improving longevity of cut flowers

Post-harvest handling and transport of cut flowers are important steps that are need special care. Cut flowers are pre-cooled immediately after harvest by placing them in cold storage without packing or in open boxes until they reach the desired temperature (Bhattacharjee, 1997). Next step is hardening where flowers were kept standing loosely in a big container so that air can circulate around the stems. The purpose of the treatment was to restore the turgidity of cut flowers with water stress during storage and transport. In the next process, the water vessels in the stem are protected from microbial growth and stem decay by impregnation of cut bases of flowers with high concentration (1000 ppm-1500 ppm) of silver nitrate, nickel chloride or cobalt chloride for 10-15 minutes. This improved the longevity of several flowers. In order to enhance the cut flowers subsequent vase life in water, orchids growers, wholesalers or retail florists used a technique called pulsing where the solutions containing sugars

and germicides are absorbed through the lower cut bases of flower stems. Sometimes, the flowers are harvested at a stage earlier than normally considered as the cutting stage and then opening the buds off the plant. Opening the buds increases the longevity of cut flowers by reducing the sensitivity of flowers to extreme temperatures, low humidity and ethylene, saving space during shipment and extending the useful storage life. Preservatives such as sugars, biocide and growth regulators can be used for opening of bud cut flowers (De & Singh, 2016).

CONCLUSION

Demands of orchids in floriculture market are increasing at very fast rate. Due to lack of knowledge and unavailability of technology for its production in northern India, the region is dependent for imports especially cut flowers. The development of technology for mass production and post harvesting will help the local farmers, nurseries and entrepreneurs in growing orchids thereby reducing the import demands from outside the country. Skilled farmers with modern technology strategies will play an important role in increasing production and productivity of different kinds of orchids for meeting domestic demands, curtailing imports and earnings in domestic markets.

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