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Cultivation of Commercial Dendrobium Orchid

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Protected cultivation of high value cut-flowers has become attractive because of more income from unit area. Orchids are attractive flowers with greater diversity and commercial importance. Among different orchids, Dendrobiums can be grown under different climatic conditions even in open ventilated greenhouses in tropics and sub tropics. For production of quality flowers of Dendrobium, suitable package of practices should be adopted which includes choice of cultivars, providing congenial environment, media preparation, planting and establishment, care of crops and harvest and post-harvest technologies.

Keywords: Dendrobium orchid, Protected cultivation, Cut flowers, Orchidaceae, Nutrient management, Greenhouse production, Epiphytic media, Post-harvest technology

Introduction

Production of different high value flowers under protected cultivation is flourishing in tropical climate with partial control of abiotic factors (Maitra et al. 2020). The orchids are flowers with attractive patterns, variety and types which belong to the family Orchidaceae (Fay, 2018; Wraith and Pickering, 2018). These are grown worldwide, but presence is more prominent in tropical and subtropical regions (Hinsley et al. 2018; Ramya et al. 2020). India is reach in variety of native orchid species (nearly 1,300 species in 140 genera). Commercially orchids are grown as high value crop and sold as cut-flowers as well as potted plants. During recent times trade of orchids has been increased in the world. Dendrobium, is the largest genus of Orchids belonging to Orchidaceae having about 1340 species (Baker & Baker, 1996) with thousands of hybrids with a characteristic shape flowers and variety of colours like purple, red, white, yellow and pink. These orchids grow quickly throughout the summer and are dormant during winter. In the spring season new shoots are formed from the base of the main plant and starts flower production.

Hybrids/Variety: There are a number of hybrids within the genus Dendrobium, which are suitable for use as cut flowers. Popular hybrids are Sonia 17, Emma White, Burana Angel, Tangchai Gold, Airang Gold, Sakura Pink etc.

Growing conditions: Dendrobiums are normally grown in shade houses or poly houses with good cross ventilation. In high rainfall areas it is advisable to grow in poly houses with shade. The structures are made to create a congenial environment for crop production particularly for protecting the plants from high light intensity, strong winds, excessive rain and pests.

Bench: Dendrobium can be cultivated in pots and kept in the benches to prevent soil borne biotic agents. Beds can be made on benches. Benches may be made up of iron mesh, concrete and split bamboo is suitable for cultivation of Dendrobiums.

Site Selection: The site suitable for Dendrobium cultivation should be of level topography with the provision of drainage, wind breaks, sufficient light and aeration and availability of water.

Climatic requirements: Dendrobiums are mainly tropical. The most important is requirement of bright light with an intensity required for better growth and flowering is 25 to 30 kilo Lux (ICAR, 2023). In tropics, shade is required from 11am to 3pm, it can be done with 25% of sunlight. Optimum light enables growth and production of quality flowers. However, excess light may cause brown leaf tips or sunburn symptoms. temperature requirements for Dendrobium range between 15-18ºC during night and day temperatures between 23-29ºC (Hew & Yong, 1997). High temperature exposure causes leave discolouration, sunburn. Relative humidity of 55-70% is desired. Moist atmosphere with good air circulation is ideal for Dendrobium orchids.

Media: They are epiphytic by nature and require porous medium. It should provide good drainage and aeration. Media should be reasonably stable. It can be prepared from the locally available materials like coconut husk, brick bits, and pieces of tree bark, stone chips and charcoal pieces (Baker & Baker, 1996). The plants with fine roots require small or medium sized ingredients of around 3-4 cm. These materials generally increase the aeration, porosity and drainage and decrease the water holding capacity of the media. The optimum pH of 5.0 and EC of 0.6 mS/cm for media and it should be sterilized by 4% formaldehyde solution to prevent the diseases. The coconut husk needs to be washed 4 to 5 times to leach out the excess sodium.

Planting & Potting: Dendrobiums can be planted in plastic pots, polythene bags and earthen pots. Large holes to the sides of pots should be kept to ensure good drainage and aeration. Orchids can be planted into beds of medium instead of individual containers. Planting distance depends on the spacing of bed, length and width of the structure, size of the bags, and pots, life span of the plant and plant density. Generally, 50-60 thousand plants/ha are being accommodated. Dendrobium plants should be planted in the corner that is at one side of the pot to ensure better growth by providing space for producing new canes (Baker & Baker, 1996). The procedure for potting orchid is instead of centring the plant; the older portion of the plant should be as close to one edge of the pot, leaving room on the opposite side of the pot for the new growth. The base of the plant or the rhizome should be just a little higher than the potting media so that leaves do not touch the media and the top of the roots are just a little bit exposed.

Repotting and Aftercare: Repotting is done after 2-3 years. The old roots and leaves can be pruned. Plants can be divided with a minimum of 3-4 shoots and a sprouted bud. Repotting should be done after the flowering period. Done using a fresh media. Repotting is a shock to plants. For 3 to 4 weeks the newly re-potted plants must be placed at a location where they will be getting less light than what they usually get. The lower light levels will reduce the stress caused by the repotting shock and will help the plants to recover better and faster. Water lightly until a week after repotting (Hew & Yong, 1997).

Irrigation & Quality of Water: As the growing media are porous and hold little water plants should be irrigated frequently. When the new growth begins in the spring, the Dendrobium orchid likes to have an increase in water and fertilizer. Media must be dried out between waterings. In dry season, frequent irrigation is needed by once in a day. Under watering causes shrivelling of the leaves and canes, drying of root tips and stunted growth. Over watering invites root diseases and partial yellowing of leaves. Application of water through overhead sprinkler encourages the foliar diseases. It is advisable to apply water to the root zone. For providing irrigation to Dendrobium orchids, the water should be neutral and non-saline. If rain water is used and as rain water is slightly acidic, pH of around 5.6 is suitable. The temperature of water should be normal (room temperature).

Nutrient Management: Nutrient management is an essential aspect for flowing and quality of flowers. Flower quality can be improved by proper nutrient management. The high concentration of phosphatic fertilizer, such as 10:20:20 facilitates the blooming in Dendrobium orchids.

A. Growth phase: **First year (for growth of young plant)**

1. 20:10: 10 NPK @ 0.1% (1g/L water) - Foliar application at 15 days interval.

2. Calcium nitrate @ 0.05%; Magnesium sulphate @ 0.1 %; Micronutrient (Ferrous sulphate: 50 ppm Fe, Boric acid: 50 ppm B, Zinc sulphate: 50 ppm Zn) foliar spray at bimonthly interval.

B. Flowering phase: **2nd year onwards February to May (for flowering):**

1. 10:20:20 NPK (@ 2g/L water) foliar application at monthly interval.
2. Calcium nitrate @ 0.05% (0.5g/L water) foliar application at monthly interval.
3. Magnesium sulphate @ 0.1 % (1g/L water) foliar application at monthly interval.
4. Micronutrient (Ferrous sulphate: 50ppm Fe (0.25g/L), Boric acid: 50 ppm B (0.28g/L water), Zinc sulphate: 50 ppm Zn (0.22g/L water) foliar application at monthly interval

June to September (for vegetative growth):

1. 20: 10: 10 NPK @ 0.2% (2g/litre of water) - Foliar application at 15 days interval.
2. Calcium nitrate @ 0.05% (0.5g/litre of water) - foliar application at monthly interval.
3. Magnesium sulphate @ 0.1 % (1g/litre of water) - foliar application at monthly interval.
4. Micronutrient [Ferrous sulphate-50ppm Fe (0.25g/litre of water), Boric acid-50 ppm B (0.28g/litre of water), Zinc sulphate-50 ppm Zn (0.22g/litre of water)] foliar application at monthly interval.

October to January (for vegetative growth and flower bud initiation):

1. 20: 20: 20 NPK @ 0.2 % (2g/L water) foliar application at monthly interval

Growth Regulator: Foliar application of 50 ppm BA increases the growth and flowering. GA3 and BA can be given in combination; it reduces the adverse effect of the BA. Application of GA3 50 ppm and 100 ppm increases the spike length. Drenching the roots with 50 ppm BA solution enhances vegetative growth as well as flowering.

Harvesting and post-harvest care: Flower spikes are generally harvested with four to six unopened buds when 70-75% of the lower flowers fully open. Flowers are harvested in the early morning or late evening by a sharp and sterilized knife. Harvested flowers are placed in clean water with the cut ends submerged about 2-3 inches. Immersing the spikes in warm water at 55°C for 5 seconds extends the post- harvest longevity of flowers. Pre cooling at 4-60°C for 3-4 hours and pulsing improves the vase life. Then the spikes are taken in the cool shaded packing area. In order to improve the quality and vase life of flowers spikes, the cut spikes should be subjected to pulsing with sucrose at the rate of 2-6% for 2- 4 hours. Sucrose in keeping solutions as a carbon source may extend the vase-life of cut orchid flowers. The best pulsing treatment is sucrose 6 % and BA 25 ppm. A combination of biocide, sugar and hormone (8-HQC 100 ppm + sucrose 2 % + BA 25 ppm) remarkably enhances the post-harvest life of the Dendrobium cut flowers.

Grading of Orchids

Grade	Spike Length	No. of opened flower
Small (S)	15cm	2-4
Medium (M)	30cm	4-5
Large (L)	35cm	5-7
Extra Large (XL)	40cm	7-9

Packaging: The flower spikes of Dendrobiums are first sleeved in polyethylene sleeves. Each stem in the box should be placed in the tube containing water or preservative solution. Cotton impregnated / vial with sucrose 6%, BA 25 ppm and 8-HQC 200 ppm plugged to the cut end of inflorescence stalks delays floret fading, shedding and wilting of flowers.

Storage: Dendrobium can be stored at 7-13ºC and 90-95% relative humidity. If it is stored in lower temperature chilling injury may be caused by darkening of labellum. Orchids are sensitive to ethylene and proper ventilation should be there.

Yield: Flower production of Dendrobium starts from 18 months after planting. It can produce 5-6 spikes per plant per year. The number of flower spikes per plant increases as plants age, reaching a maximum at 3-4 years and then decline.

Conclusion

Dendrobiums are attractive orchids can be grown in wide range of climatic conditions and by adoption of proper technologies the orchids can be grown in tropical and sub-tropical environments. For successful raising of Dendrobiums congenial environmental condition may be created to minimize climatic adversities. Further, with adoption of suitable package of practices and intensive management the orchids bloom with quality flower which indicate.

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