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Good Agricultural Practices of Phalaenopsis Orchids

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Abstract

Phalaenopsis consists of 70 species of monopodial orchids distributed in Asia, Philippines, Indonesia, Malayasia, Australia and New Guinea. They are commonly known as 'Moth Orchids'. *Phalaenopsis* is commonly used as pot plants and cut flowers and are suitable in hotel arrangements, hanging arrangements, households, boutique stores, weddings, funerals, birthdays, *etc*. Amongst commercial orchids, *Phalaenopsis* is a shade loving orchids and the plants require optimal management of light, temperature, humidity and nutrition to come into flowering.

Introduction

Phalaenopsis called as 'Moth Orchid' because when the *amabilis* species was first observed in its natural habitat, the long inflorescences of pendulous white flowers that festooned the jungle tree tops were thought to be clusters of moths. This orchid has originated from jungles of South and Southeast Asia, Indonesia, Malayasia and the Philippines.

Botanical Description

Phalaenopsis consists of 70 species of monopodial orchids distributed in Asia, Philippines, Indonesia, Malayasia, Australia and New Guinea. They are commonly known as 'Moth Orchids'. The plants are pseudobulbless with short stems covered by the clasping leaves. The leaves are leathery, thick. The inflorescence arises from the axil of leaves, drooping or erects bearing spikes upto 100 cm length. The flowers are spectacular, long lasting and white, pink, yellow or mottled (De, 2014).

Importance and Uses

Phalaenopsis is commonly used as pot plants and cut flowers and are suitable in hotel arrangements, hanging arrangements, households, boutique stores, weddings, funerals, birthdays, *etc*. The purity and brightness of the *Phalaenopsis* make an especial appeal for weddings and corsages.

Species and Hybrids

Species

Important species used in hanging baskets and pot culture are *Phalaenopsis amabilis, Phalaenopsis aphrodite, Phalaenopsis esmeralda, Phalaenopsis luddemanniana, Phalaenopsis parishii, Phalaenopsis schilleriana, Phalaenopsis lobbii* and *Phalaenopsis mannii*.

Hybrids

Commercial Phalaenopsis hybrids used as cut flower and pot plants are listed below (De and Singh, 2016) (Figure 1).

• **Standard white:** Elisabethe, Doris, Alice Gloria, Cast Iron Monarch, Dos Pueblos, Elinor Shaffer, Gladys Read, Grace Palm, Joseph Hampton, Juanita, Palm Beach, Ramona, Richard Shaffer, Sonja, Taisuco Bright, Taisuco Crane, Taisuco Snow, Cygnus, Brother Sister Windian.

• **Semi-alba Hybrids:** Roselle, Ruby Lips, Sally Lowry, Judy Karleen, Sharon Karleen, Karleen's Wendy, Bright Lights, Devon Michele, Spitfire, Mad Hatter, Rodco's Lady, Lipstick, Career Girl, Show Girl, Miki Wata Nabe, Memoria Francis Hunter, Dtps. Ox Prince Thunder, Dtps. Chian Xen Magpie.

• **Striped Hybrids:** Robert W. Miller, Peppermint, Samba, Barbara Freed Saltzman, Career Girl, Chorus Girl, Ella Freed, Marginata, Kaleidoscope.

• **Spotted White Hybrids:** Elise de Valec, Rouserrole, Dame de Coeur, Snow Leopard, Marry Krull, Ann Krull, Cabrillo Star, Paifang's Queen.

• **Pink Hybrids:** Grand Conde, Versailles, Alger, Reve Rose, Zada, Barbara Bread, Ann Marie Beard, Lipperose, German Pinks, Danse, Ida Fukumura.

• **Standard Yellow:** Bonnie Vasquez, Sogo Manager 'Nina', Brother Lawrence 'Montclair', Brother Oxford, Brother Passat, Brother Stage, Golden Gift, Goldiana, I- Hsin Sunflower, Misty Green, Sogo Lisa, Taida Lawrence, Taipei Gold, Hsin Yang Fortune, Shih Hua Long First Love, Detroit.

• **Standard Orange:** Desert Orange, Carnelian Queen, Orange Glow, Orange Beauty, Tangelo, Cinnamon Glow, Brother Sara Gold 'Peach', Zuma creek, Burnished Copper, lawless Red Peppers, Black Ball, Chen, Peachy, Amber, Ember, Bold Beauty.

• **Red and Purple Hybrids:** Engine Red, Cardinal, Ewing, Red Galaxy, Liberty Hill, Imp's Pride, Red Hot Imp, Venimp, Spirit House, Summer Morn, Red Buddha, Mahalo, Tapestry, Orchidland, Bloody Mary, Dixie Sunset, Peter Lin, Hwa Yuan, Sogo Grape, Taida Salu, Katherine, Ruby Glow, Burgundy Beauty, Purple Gem, Carol, Garnet Beauty, Spotted Beauty, Strawberry, Plum Rose x Ox Black Jack .

• **Harlequins Hybrids:** Golden Peoker 'BL', Golden Peoker 'Nan-Cho', Ever Spring King, Beautiful Dreamer, Ever Spring Prince, Ever Spring Light, Ever Spring Pioneer, Carolina Bronze Meteor Montclair, Montclair, Brother Jungle Cat, Nobby, Peacock, Celebration.

a) Strawberry

b) Chian Xen Magpie'

c) 'Ox Prince Thunder'

d) Maki Watanabe


e) Memoria Francis Hunter'

f) Kaleidoscope'

Figure 1: Continue...

g) Hsing Yang Fortune h) Ox Plum Rose x Ox Black Jack i) Shih Hua Long First Love

j) Manchester k) Vienna l) Casa Blanca

Figure 1: Phalaenopsis hybrids used as pot plants and cut flowers

Climatic Requirements

Light

Healthy Phalaenopsis can be grown indoors in window sills, sun room, and shaded greenhouses and under artificial lights in most temperate climates. The requirement of light is 1,000-1,500 foot candles for winter and 800-1200 foot candles in summer. Phalaenopsis can be grown under artificial light. Phalaenopsis can be grown 9-12 inches under fluorescent lights or 4 to 6 feet under 400 watts high intensity discharge lights or high pressure sodium lights. In greenhouse, 750-1,500 foot candle light is judicious. At flowering, Phalaenopsis can tolerate low light intensity (100 foot candle).

Temperature

The *Phalaenopsis* is a tropical plant, and consequently temperatures lower than 15 °C and 32 °C and above should be avoided. For an appropriate growth endeavors should be made to maintain an average temperature of 26-27 °C during the growing phase and 19-21 °C during the phase of flowering. During winter the temperature should be maintained between 18-20 °C. A temperature of 18 °C is particularly necessary in the event that the induction of buds needs to be enhanced in conditions of inadequate light or high daytime temperatures. Most *Phalaenopsis* species and hybrids require a period of exposure to relatively cool temperatures less than 28 °C to trigger the elongation of the spike (Wang, 1995).

Humidity

Phalaenopsis can perform better with the humidity of 50% or higher. At sufficient humidity plants grow lushly and leave looks healthy. In greenhouses, the humidity can be easily controlled by watering the foot path, benches or by humidifier. Keeping of water in plastic tray below the benches is a good option to maintain the humidity in green house. To increase the humidity level, companion plants like ferns, bromeliads, and other foliage plants can be placed near the *Phalaenopsis* plant in the house.

Ventilation and Air Circulation

It is necessary to provide enough space between plants and to allow air movement to help dry the leaves. Using an electric fan to induce air movement inside greenhouse is common. Fans should be used constantly to reduce temperature on hot days and to dry plants out for cold nights.

Air movement in growing environment ensures good growth and less infestation of diseases and pests.

Propagation

Division/ Cuttings

Phalaenopsis can be propagated asexually by kiekies forming on old flower stalks or on sides of main stem. Top cutting can be practiced on long drooping plants, and after which, new plants will shoot from the remaining stem. Using lanolin paste with Benzyl adenine (BA) on buds in flower stalk to induce kiekies has given successful results. Kiekies can be planted in clay or plastic pots with chopped charcoal and coconut husk. Stem propagation sometimes also involves the application of keiki paste or similar product to dormant nodes of the flower spike as ideal method for non commercial growers. When the keikis have 2-3 roots, it can be removed, by slicing between the stem and the keikis, or cutting the stem above and below keikis attachment point. The new plant can now be potted up and grown on.

Tissue Culture

Phalaenopsis can be propagated by tissue culture technique using shoot tip, nodal flower-stalk, internodal section, leaf tip and root tip in Vacin and Went medium, Murashige-Skoog medium, REM, Knops Solution, Hyponex/ Kyoto medium New Dogashima medium.

Cultivation

Plant Materials

The plants are generally available in flask containing 20-25 plants or in nursery tray containing 40-50 plants. The plants require acclimatization for few weeks to the local growing conditions as soon as received.

Potting

The mature plant with 2 to 3 leaves and healthy roots are generally shifted to nursery tray from the flask. Once they hardened and leaf attains a span of 10-15 cm size in nursery tray, they can be shifted to pot. The plants need to be sorted out in two grade *i.e.*, bigger and smaller plants before planting. Smaller plants can be kept together in community pot. The potting material should be damped and should be packed firmly, watering is required the seedling gently and thoroughly. The community pot needs to cover with plastic with slightly open. This will provide the seedlings with a humid environment and need to keep the plant in partial condition. In few months the seedlings will be ready for transplanting as like bigger plant.

Containers

The most common pots or container is plastic or clay pot. In general, the orchid pot should have more number of holes and larger size, both at in the bottom and sides for better drainage. *Phalaenopsis* pots are shorter and shallow or larger diameter pot with broader base for more stability. Generally, white colored transparent pots of 12-20 cm sizes are preferred for *Phalaenopsis*.

Potting Media

A good potting mix containing coconut husk pieces, charcoal or broken pieces of roofing tile with coconut peat. About 25-30% of the media should be charcoal or brick pieces to ensure adequate drainage. *Phalaenopsis* can be potted on clay or plastic pots, with charcoal and coconut husks, or mounted in wooden slabs. Another alternative medium is a 1:1 mixture of sand and coconut choir dust**.** For miniature *Phalaenopsis* a fine mix consist of 3 parts coco-peat, 1 part fine charcoal and 1 part perlite and 1 part sphagnum moss is filled in 10 cm size pot. However, for standard size plant the growing media consist of one part of each of Cocochips, leaf moulds, brick pieces and green moss.

Repotting

The *Phalaenopsis* are best repotted after flowering in the late spring or early summer. Repotting is done about once a yearly in appropriate sized pot. During repotting, cutting or breaking of the base of the stem is required carefully. Except solid other roots should be cut off and soak the plants and roots in a standard Mancozeb solution for 10 minutes then seal the bottom of the stem with a thick paste of Mancozeb or Thiram. Plants should be air dried before repotting. Growing media is just like initial potting media.

Watering

The pot should not be watered again until very nearly dry. *Phalaenopsis* do not prefer to frequent watering. Younger plants require more watering than matured plants. This can be accomplished by misting the plants instead of water sprinkling. Watering is necessary twice per day during very hot and dry months, and only 2-3 times per week during wet months for matured plants. Water for *Phalaenopsis* should not contain excessive harmful elements like sodium, chlorine and bicarbonate. In absence of good quality of water, deionised water can be used as substitute. However, rainwater is the best for all orchids.

Fertilizers

Phalaenopsis plants need nutrition twice or once a week. Seedlings could be sprayed with very dilute fertilizer every day after watering. Use of balanced foliar fertilizer with trace elements is always beneficial for orchids. Weak fertilizer applied frequently is better than strong application. Reduction of fertilizers is suggested once flower spikes and during low light conditions. Plants grown under lower light and temperature, less water and feed is required. The water soluble 19:19:19 or 20:20:20 NPK @ 1 g l^{-1} at weekly interval is sufficient for growth. At active growth stage the *Phalaenopsis* require more nutrition than in winter or inactive phase. Weekly spray of organic nutrient solution made from Artimissia leaves, cowdung and *Dryopteris sikkimensis* in ratio of 1:10 is also useful.

Flower Production

Mature plant with 5 fully developed expended leaves may be induced to flower. Generally, flower production starts 8 months after planting subject to proper management. *Phalaenopsis* will naturally induce spike when it is fully grown. Flower production can be manipulated by controlling light and temperature regimes. The spikes become ready to harvest when the spike has approximately three unopened buds. New and heavier branch could develop from the plant base after harvesting. These should be at least 12 plants per square metre and the complete growing period approximately 5 years.

Premature Flowering

The premature flowers will need to be removed to boost vegetative growth. At early stage, the flower inflorescence is soft enough and can be pinched off easily.

Training of Spike

Phalaenopsis is a marketable flower and consumers prefer straight flower spikes with better presentable form. The *Phalaenopsis* flower stem are supported with stick made up with plastic or bamboo or metallic at the time when flower buds begin to swell. Tying of spike should be secure and firm with the stake. Use of twist tie, soft cotton string, small green cable ties and loop tape are better than wire, which could damage the stem.

Harvest and Yield

The 40-60 cm long spikes containing at least 8-10 flowers are harvested when all flowers are fully open. Average flower production is 6 to 7 flower spikes plant^{-1} year^{-1}.

Post-Harvest Management

Vase life: 15 to 30 days.

Pulsing

Chemical like Chrysal is added to water to enhance the vase life. In *Phalaenopsis*, pulsing with 0.5 mM STS for 24 hours blocks the deleterious effect of ethylene.

Storage

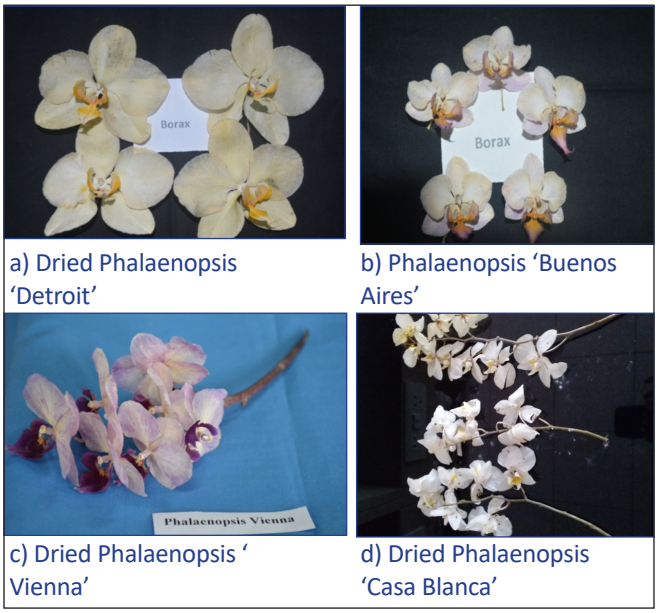
In general, *Phalaenopsis* flowers can be stored at 7 to 10 °C for two weeks. The low temperature helps to slow down respiration and depletion of reserved food materials of petals.

Packaging

The *Phalaenopsis* cut flowers are packed in a single window gift boxes of 100 cm × 15 cm × 11.5 cm. About 25 to 30 flowering stems are packed in a box depending on the number of flowers stem^{-1}. During packing of flower, boxes are cooled at 20 °C. Pre-cooled boxes are efficient than packing a box and then placing in a cooler place, a process that requires hours to bring flowers to the optimum temperature range. It is best to pack in cooled rooms to reduce respiration and condensation build up in the slips.

Drying Florets and Spikes

Embedded drying with borax at 50-60 °C in oven, embedded drying with borax + silica gel at 55 °C in oven, embedded drying with sand at 50 °C in oven and embedded drying with Perlite, Perlite + borax and Perlite + Silica gel under room condition (24-25 °C and 75-79% RH) (Figure 2).



a) Dried Phalaenopsis 'Detroit' b) Phalaenopsis 'Buenos Aires' c) Dried Phalaenopsis ' Vienna' d) Dried Phalaenopsis 'Casa Blanca'

Figure 2: Embedded drying of Phalaenopsis spikes and florets

Conclusion

The orchids have taken a significant position in cut flower industry due to its attractiveness, long shelf life, high productivity, right season of bloom, easy in packing and transportation. Globally, trade on artificially propagated live plants are dominated by orchidaceae hybrids (28.7%), *Cymbidium* species (26.9%), *Orchidaceae* species (18.9), Phalaenopsis hybrids (10.1%), *Phalaenopsis* species (4.4%), *Dendrobium* species (3.4%), Cymbidium hybrids (3.3%), Dendrobium hybrids (2.3%), *Cattleya* species (0.4%) and *Oncidium* species (0.2%). It indicates that Phalaenopsis plays a vital role in international flower trade through production of cut flowers and potted plants.

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