CULTURE OF PHALAENOPSIS SPECIES – AN OVERVIEW

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TO UNDERSTAND WHY THE CULTURE of *Phalaenopsis* species may differ from those of *Phalaenopsis* hybrids, let's look at the differences between these two groups. The distinction between species adapted to their natural habitat and hybrids with mixed gene pools that are adapted to the greenhouse is the most notable factor contributing to different cultural requirements. The commonly available commercial plants that we see in stores are hybrids. In the case of commercial plants, hybrids involve crossing different species, and then with other hybrids in order to select larger and fuller flowers than found in the wild. Continued tinkering has introduced unique color combinations and patterns along with increased floriferousness and ease of culture. Commercial growers apply intense selective pressure for the following characteristics.

- Must be a strong fast growing plant
- Must bloom quickly and dependably
- Adapted to greenhouse conditions

These are all desirable qualities in culture and plants that do not meet these criteria are culled in order to provide more growing space. These plants are **not** selected for their ability to naturally reproduce, attract pollinators, or survive the climatic extremes experienced in nature.

Species, on the other hand, are naturally occurring populations that have the potential to exchange genes. The sum of the populations represents the overall species characteristics and its potential to adapt. Selective pressure in nature is quite different than in the commercial greenhouse.

- Ability to attract insect pollinators
- Growth/bloom tied to climate/pollinator
- Preferred substrate based on competition with other epiphytes
- Ability to reproduce sexually

As a result, some *Phalaenopsis* species can be temperamental in culture and more difficult to bloom when compared to hybrids. Line breeding within a species has improved the shape, increased the flower size, and through the selection process in the greenhouse, some species have become easier to grow than 'jungle' plants. But in reality, only a few *Phalaenopsis* species valued by hybridizers have been cultivated in this manner. *Phalaenopsis aphrodite*, *amabilis*, *schilleriana*, *stuartiana*, *bellina*, *violacea*, *equestris*, *venosa*, and *amboinensis* meet the criteria for domestication, i.e., they have become greenhouse adapted. Even so, they still demonstrate some stubborn traits and not all of the plants available represent lengthy line breeding efforts.

Culture of Species Phalaenopsis

Based on our experience with nearly all of the described species, we use three different models for the culture of the species. All plants benefit from a warm, moist summer with highs between 80 and 90°F (27-32°C) and night time lows between 65 and 80°F (18-27°C). In our opinion, it is the winter conditions in temperate and cold regions that are the limiting factors for hobbyists. The three types of winter conditions provided in our greenhouse are for (1) phalaenopsis adapted to cool dry winters (2) plants adapted to lightly moist moderate winters and (3) plants adapted to warm moist winters. These will be discussed in more detail with the species that fit in each category.

Paying attention to the winter needs will not only save many plants but can significantly reduce the cost of heating the greenhouse.

Phalaenopsis Adapted to Cool Dry Winters (Group 1)

The majority of these plants come from the mountains of NE India and east into the mountains of south-

Group 1: *parishii*

Group 2: *mannii*

Group 2: *amabilis*

Group 2: *aphrodite*

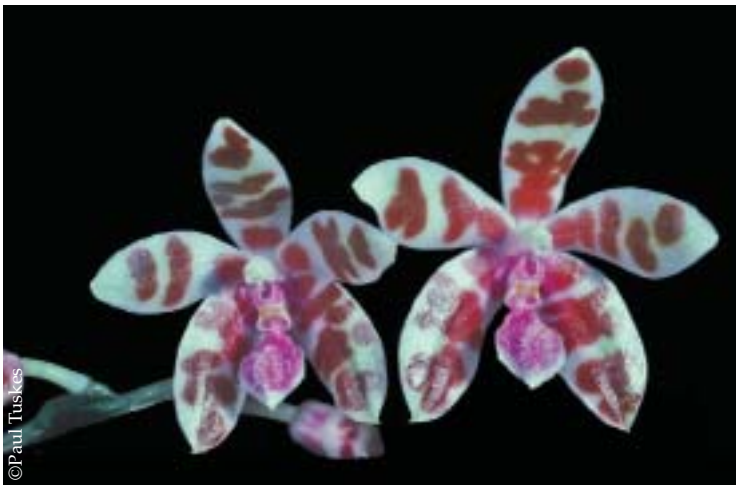
ern China. Night time temps to 45°F (7°C) are not a problem, if the leaves are kept dry at night. Most are small deciduous species that do well either mounted or in small pots. Examples include *braceana*, *hainanensis*, *honghenensis*, *minus*, *stobartiana*, *taenialis*, *wilsonii*, *gibbosa*, *lobbii*, and *parishii*.

Our preference is to grow these plants mounted as we can better judge the condition of the plant if it drops all of its leaves. During the winter, we water the plants frequently enough to keep the major roots from becoming dehydrated. If the plant retains its leaves during the winter, a balance between slightly dehydrated leaves but hydrated roots are an ideal condition. Imported plants that are kept lush and green during the winter tend to bloom infrequently by the end of the second winter while plants with a winter rest continued to bloom well for many years. We have had difficulty maintaining individual plants longer than ten years. Line bred plants of *lobbii* and *parishii* are available and are less sensitive to the need for a winter rest.

Phalaenopsis Adapted to Lightly Moist Moderate Winters (Group 2)

Ideal winter night time lows would be 50-60°F (10-15°C) with only moderate amounts of water but increased light. Although not recommended, many plants in this group will tolerate periodic night time lows of 40-45°F (4-7°C) but only if the leaves are dry and roots are only slightly moist. The larger plants in this cultural group are generally potted in medium or large bark. The inflorescences are usually staked. If the inflorescence remains green after blooming, it may produce flowers again during the next season or a keiki. Examples include *amabilis*, *aphrodite*, *philippinensis*, *sanderiana*, *schilleriana*, and *stuartiana*. The center of distribution for this group is the Philippine Islands. Daytime winter temps of 75-85°F (24-29°C), with adequate light, may help trigger the formation of the inflorescence. Mature plants can be quite large, and may generate additional leads from the lower axial of the main plant thereby producing outstanding specimen plants.

The smaller plants in this cultural group from the Philippines include *celebensis*, *lindenii*, *equestris*, *pulchra*, *fasciata*, *lueddemanniana*, *hieroglyphica*, *bastianii*, *pallens*, *mariae*, *micholitzii*, and *reichenbachiana*. *Phalaenopsis lindenii* and *celebensis* do very well mounted and mature plants of both species have generated new plants from active roots. Although *Phal. equestris* has been line bred and a wide array of flower shapes and colors produced, it remains very sensitive to repotting and the effects of mealy bugs.



Group 2: *mariae*

Group 2: *sanderiana*

Group 2: *philippinensis*

Group 2: *equestris*

Many, but not all of the plants in this group readily keiki. If you wish to keep the keiki on the plant, the inflorescence may be staked to support the added weight as the keiki grows. Once the keiki matures and starts to bloom the number of inflorescences and flowers produced annually can be remarkable. If you intend to give the keiki away, please test the plant for virus first. If the plant is virus free, stake the inflorescence and do not remove the keiki until it has three-four roots approximately two-three inches long. Another option is to bend the inflorescence with the developing keiki over so that it rests on the surface of a new pot with fresh media. The keiki will grow into the proper orientation and the developing roots will move right into the mix. Label the pot and when the keiki is well-rooted, simply cut the inflorescence it is attached to.

The last members of this cultural group, *cornu-cervi*, *mannii*, *borneensis*, and *pantherina* appreciate the summer heat and moisture of group three, while c*ornu-cervi* and *mannii* do well with lower winter temperatures and less water. These plants are ideal for baskets or pots. The cross-section of the inflorescence starts out round and then flattens, except *mannii* which stays round. Each inflorescence will continue to grow, branch, and re-bloom for many years. As the inflorescences lengthen over time they become pendent, and are quite attractive in baskets.

Phalaenopsis Adapted to Moist Warm Winters (Group 3)

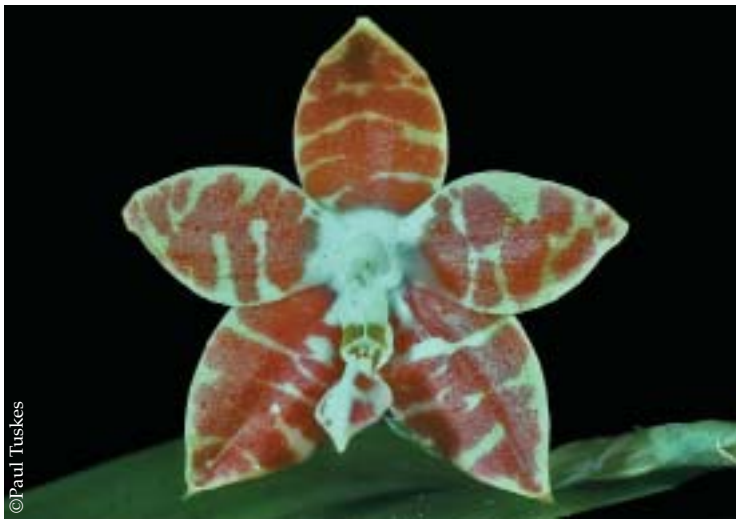
Plants in the third group thrive with warmer night time winter temperatures between 60-75°F (16-24°C) and extra moisture on the roots but not the leaves. They may be kept cooler and less moist during the winter (45-55°F (7-13°C) but they are (1) more susceptible to significant bacterial infections and loss of roots (2) growth is significantly reduced or halted and (3) the likelihood of blooming is greatly reduced. Examples of plants in this group include: *amboinensis*, *bellina*, *doweryensis*, *fimbriata*, *floresensis*, *gigantea*, *javanica*, *luteola*, *maculata*, *modesta*, *robinsonii*, *venosa*, *violacae*, *coringiana*, *inscriptiosinensis*, *speciosa*, *sumatrana*, *tetraspis*, *cochlearis*, *fuscata*, *kunstleri*, *viridis.*

Many of these plants have short inflorescences that should be guided out from under the leaves if the flowers are to be seen; j*avanica*, *modesta* and some *bellina* exhibit this characteristic. The following species have

Group 2: *bastianii*

Group 3: *fuscata*

Group 3: *cochlearis*



Group 3: *amboinensis*

been line bred and are readily available: *amboinensis*, *bellina*, *violacae*, and *venosa*.

Light, Water and Humidity

Light requirements are in the range of 800-1200 foot candles during the summer and 1000-1500 fc during the winter. You don't need a meter to measure light if you are familiar with other orchid genera. Use winter levels similar to laelias and cattleyas and summer levels similar to paphiopedilums, i.e., more light during the winter and a little less light during the summer.

Our city water is 360 ppm dissolved solids. We use tap water 1-2 times a month to water the greenhouse to add salts and trace elements; otherwise we use deionized water (DI). We do not add fertilizer to our tap water as that would take the levels to at least 500 ppm and cause rapid salt build up on leaves and roots. In areas with hard water, we suggest using rain water, reverse osmosis, or deionized water on a regular basis and then adding fertilizer to bring it up to your desired parts per million. How often should you water? You should water more in the summer and less in the winter. The frequency depends on the type and size of the pot, the nature of the potting mix, temperature, humidity, and amount of air flow.

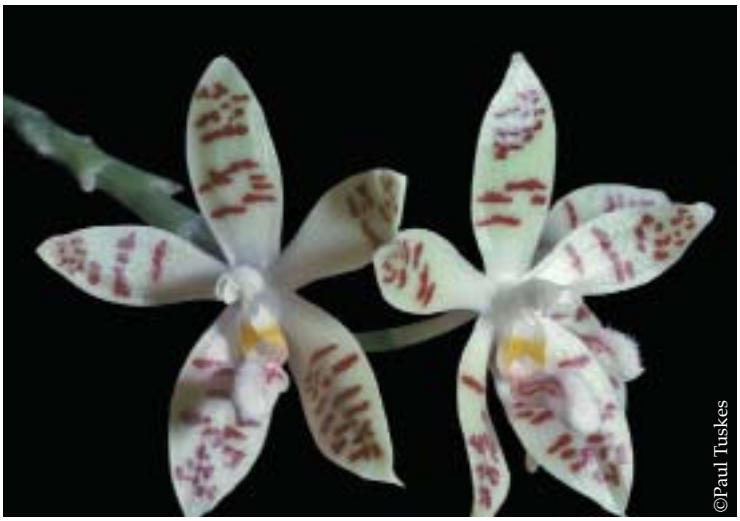
We have a recording hydrothermograph, but after reviewing the charts for a few months, a clear pattern developed. As temperatures drop in the evening the humidity will typically reach its maximum, and as the air warms during the day the humidity tends to decrease. When temperatures in the greenhouse reach 80°F (27°C) the roof vents open automatically and close at approximately 75°F (2°C). We are not concerned about greenhouse temperatures below 90-95°F (32-35°C) unless it is a prolonged event. To bring down the temperature, we can use the DI water in misters that inject into the fan exhaust. Misters can be automated and activated by thermostats or humidistats. No matter the system, make sure that it is turned off in time so that the leaves are dry during the night.

Selecting the Best Location in the Greenhouse

Figure 1 illustrates the airflow pattern and temperate range of our greenhouse during winter nights. With mild coastal southern California winters we are able to

Group 3: *venosa*

Group 3: *violacea*



Group 3: *sumatrana*

Group 3: *tetraspis*

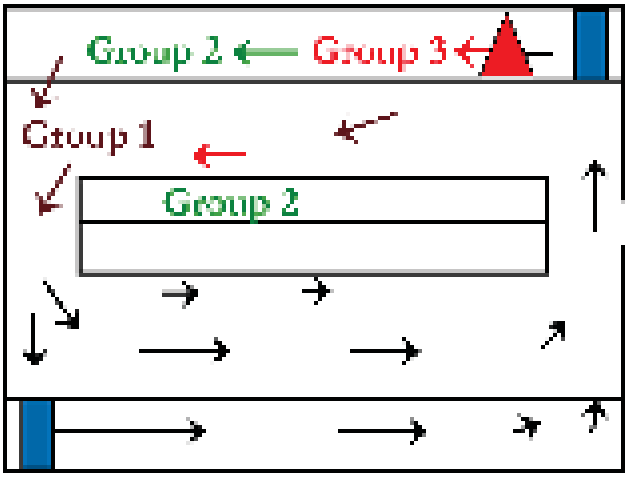


Figure 1. A circular air flow pattern is produced by two large box fans on opposite ends and side of the greenhouse. The hanging partition in the center of the greenhouse for mounted plants also separates the air columns. When the heater is on (red triangle) air moves from the front of the greenhouse toward the back and becomes progressively cooler. Based on the size and make up of our collection there is no need to evenly heat the entire greenhouse.

use a single small electric heater when night temperatures drop below 55°F (13°C). Our group three plants (warm winter) are nearest the diffuse heat source (60-70°F (16-21°C)), followed by group two plants (50-60°F (10-16°C)). Group one plants can be grown anywhere in the greenhouse. The small heater meets the needs of phalaenopsis that require warmer winter conditions while the temperature in the rest of the greenhouse is adequate for the *Cattelya*, *Laelia*, *Encyclia*, *Brassavola*, *Broughtonia*, *Leptotes* species, etc.

Finding Species Phalaenopsis

Unusual *Phalaenopsis* species are seldom seen at shows, probably due to the difficulty of successfully maintaining the plants year after year. Most of the plants in group two are from the Philippines and with rare exceptions are the easiest to grow and maintain. Many individual plants of *Phal. amabalis*, *schilleriana*, *sandariana*, *stuartiana*, *equestris*, and *aphrodite*, have been in our collection for 20-25 years and these are among the easiest to find. Other species commonly used in hybridizing, such as *amboinensis*, *bellina*, *violacea*, and *venosa*, are also readily available. In general, the remain-

Group 3: *bellina*

Group 3: *viridis*

Fig 2: dead roots.

Fig 3: base of the plant in moist sphagnum moss.

Fig 4: plant in a clear plastic bag.

Fig 5: new roots.

der of the species may occasionally be found, and an internet search would help to find growers that are currently importing or propagating plants. Unfortunately, imported plants can be misidentified, and accurate identification made only when they bloom. Of course, direct importation with its assorted difficulties, frustrations, and paperwork may be the only way to acquire some species. Seed grown plants that are well established have already gone through a selective process by growers for ease of culture. Imported plants are typically bare root and dehydrated by the time they arrive. A special effort is needed to re-hydrate these plants and establish new roots without causing the existing roots and leaves to become infected with bacteria. Number one below outlines practical methods for dealing with bare roots no matter the source.

Problem Plants

1. The leaves are limp and dull green. The plant is dehydrated. Check the condition of the roots before increasing the amount of water given.

   (a) If the roots are dead more water is not the solution. Remove the plant from the pot and clean the plant and discard any flowers and dead roots (Fig 2). Place the base of the plant in moist sphagnum moss (Fig 3) in a small plastic pot and then slide the pot and plant into a clear plastic sleeve/bag and treat with a fungicide/bacteriacide (Fig 4). Then close the bag and place it in a shaded area of the bench, or under the bench until roots develop. This may take many months. When the new roots are a few inches long (Fig 5), remove the plant from the bag and repot. Before repotting, we often open the top of the bag for about two weeks to give the plant an opportunity to get accustomed to the drier conditions.

   (b) Mealy bugs can cause dehydration. Check the underside of the leaves and the axial area where the leaves join the short stem and look for signs of white mealy bug. Mealy bugs are best treated with a systemic pesticide absorbed through the roots and leaves. Mealy bugs have a waxy coating that repels water, and they may also live in the potting mix on or near the roots. Therefore, a contact pesticide may not be very effective for control. A systemic pesticide that enters the plants will kill mealy bug and scale in locations not reached by a contact pesticide. Your local garden shop can help with selection of pesticides.

2. The flowers are floppy and dehydrated but the leaves look good. Plants may need more water when in flower. Slightly increase the amount of water while the plant is in bloom. Increasing humidity may help but it can also contribute to fungal spotting.

3. New growth and buds are being eaten by small green caterpillars. You can kill them by hand but by the time they are that large they will have done quite a bit of damage. You can treat with safer soap type material, spray the plants with the bacterial *Bacillus thuringiensis* (BT) which kills both caterpillars and fly larvae, or treat with a pesticide.

4. The leaves are developing moist brown spots that can grow larger rapidly. This is a bacterial infection and is best treated by removing the infected area of the leaf or the entire leaf as soon as it is noted. Bacterial infections can spread by water splashing on the infected area and then hitting adjacent plants.

5. Leaves are developing dry brown spots. This is most likely a fungal infection that does not grow as rapidly as a bacterial infection. Remove the infected area of the leaf or the leaf and treat with a systemic fungicide.

6. Bacterial, fungal and viral infections can be spread by contaminated tools or hands. Make sure to sterilize tools before working on the next plant.

For more details on the culture and identification of species *Phalaenopsis*, see Culture of Phalaenopsis Species in *Orchid Digest*, Vol.66 (4) 2002, pages 165-193.✾

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