The Orchid Grower

In the final article of this four-part series, find out how to cash in on orchids, the second hottest potted flowering plant in the United States.

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IN the previous three articles on potted phalaenopsis orchids, we described the many appealing attributes of phalaenopsis and discussed the important production factors involved in producing a flowering crop. In the conclusion of our four part series, we will put this information together and provide a simplified production schedule that can be implemented into your greenhouse operation.

Phalaenopsis production can be divided into three phases:

- Phase 1. Vegetative cultivation at high temperatures of 82°F to 90°F (28°C to 32°C).
- Phase 2. Spike induction at low day temperatures of 63°F to 77°F (17°C to 25°C).
- Phase 3. Finishing at 63°F to 79°F (17°C to 26°C).

Depending on your facilities and climate, the production of flowering potted phalaenopsis can involve all three of these phases or may be limited to only one or two phases. As discussed in the July 2005 issue of *Greenhouse Grower*, one option for growers is to purchase non-flowering, immature plants that require additional vegetative growth before cooling and spike induction. A grower who chooses this option will use all three production phases. Alternatively, the vegetative phase can be omitted by purchasing mature plants of flowering size that are ready for the cooling phase. Growers who adopt this production strategy purchase plants that can be induced to spike soon after arrival and then finished for their market date. In some circumstances, plants with a visible spike that have already received cooling can be purchased. These plants are termed "prespiked" and are finished by the grower for flowering.

Phalaenopsis placed into decorative terra cotta pots and ready for shipping to a retail store.

Table 1.

Temperature °F (°C)	Time from visible spike to flower (days)
57 (14)	266
63 (17)	133
68 (20)	87
73 (23)	68
76 (26)	52

The effect of average daily temperature on the average time from visible spike to flower in several phalaenopsis hybrids grown at Michigan State University.

With these options for purchasing plant material in mind, let's now discuss a simple schedule for producing a crop of flowering phalaenopsis.

Phase 1: Vegetative Cultivation

A grower who purchases young plants will begin production of phalaenopsis with vegetative cultivation. For the large-flowered hybrids and clones, this plant material generally has an average leaf span of ≤ 10 inches (25 centimeters) and will not flower uniformly without additional growth.

Depending on the source, young plants may need to be potted or transplanted into a larger container. Plant material with an average leaf span of 8 inches (20 centimeters) is often transplanted into 5-inch (12-centimeter) pots. Spacing depends on plant size and grower preference, but early in the production phase, plants can be spaced pot-to-pot. Following transplanting, several irrigations may be necessary to sufficiently moisten the substrate, depending on the environmental conditions and medium composition. Due to the low water-holding capacity of fresh bark, newly transplanted material will need to be frequently checked for watering until the medium begins to hold more moisture. Media with high water-

holding capacities need less frequent watering. Some growers place a thin layer of fabric (e.g., remay cloth) over benches for one to two weeks after planting bare-root plants to create diffuse light levels less than 1,000 footcandles (200 µmol·m^{-2}·s^{-1}) and to increase humidity. This strategy helps to minimize plant stress and reduce plant loss after planting.

Young plants are grown at high temperatures in the range of 82°F to 90°F (28°C to 32°C) to promote vegetative growth and inhibit flowering. If environmental conditions are favorable, plants with a leaf span of 4 to 5 inches require approximately 22 to 27 weeks to reach flowering size. This duration depends on temperature, the initial leaf span, fertility and the size desired before the induction of flowering. On average, a new leaf will form every seven to 10 weeks. When importing mature bare-root plant material from overseas, providing four to six weeks of growth in a warm environment after planting will be beneficial for rooting and subsequent flowering.

Remember to monitor light levels and adjust shading to provide between 500 and 1,500 footcandles (100 to 300 µmol·m^{-2}·s^{-1}) of diffused light at canopy level. Plants should be spaced as necessary to minimize leaf overlap and allow for adequate air circulation. During spacing, it is also a good idea to sort plants according to leaf span. Plants with a small leaf span will require additional time before the onset of the cooling phase.

Phase 2: Cooling

When plants have four to six leaves and a minimum leaf span of 10 inches (25 cm), the cooling phase can begin to induce spiking. A grower that purchases mature potted plants may begin with this phase of production. Plants can be cooled at temperatures in the range of 63°F to 77°F (17°C to 25°C) for approximately four to six weeks. In most phalaenopsis hybrids, a spike (the flowering stem) will usually become visible after three or four weeks of cooling. However, longer durations may be required for some

Table 2. **A simplified schedule for the production of flowering potted phalaenopsis orchids in 5-inch (12-cm) pots.**

		Production Phase		
	Units	Vegetative Growth	Cooling	Finishing
Duration	weeks	22 to 27	4 to 6	8 to 15
Temperature	°F	82 to 90	63 to 77	63 to 79
	°C	28 to 32	17 to 25	17 to 26
Light intensity	footcandles	500 to 1,500	500 to 1,500	500 to 1,500
	mol•m^{-2}•s^{-1}	100 to 300	100 to 300	100 to 300
Pot size	inch	5	5	5
	cm	12	12	12

hybrids or when plant material is moderately small.

Cooling may take place in the same greenhouse section as the vegetative phase if all plants in that range are to be induced into flower. When a portion of plants are to be induced into flower, a separate greenhouse section is needed for cooling. Providing low temperatures to young plants can induce variable, premature spiking and slow down vegetative growth, which are undesirable.

Phase 3: Finishing

The finishing phase describes the period from spike emergence through spike development and flowering. After cooling, plants may either be transferred to a separate finishing area for flowering or remain in the same section as that during the cooling phase. Plant spacing is the same as during the cooling phase. Temperatures in the range of 63°F to 79°F (17°C to 26°C) are used during finishing. At the lower end of this temperature range, some hybrids may have increased spike and flower bud number and lateral branching of the inflorescence. It is important to avoid extended exposure to temperatures above 79°F (26°C) during this final phase. High temperature can reduce flower bud number and flower size, and flower buds may abort.

Following spike emergence, the rate of development toward flowering is controlled by average daily temperature. For example, in research conducted at Michigan State University, as constant average daily temperatures increased from 57°F to 76°F (14°C to 26°C), the average time from spike emergence to flowering decreased from 266 to 52 days (Table 1). This time varies somewhat by cultivar, with some flowering earlier and some a few weeks later. Based on this information and grower experience, growers can adjust the temperature to finish a phalaenopsis crop for a particular market date.

Young plants spaced after transplanting into 5-inch (12-cm) pots.

Staking plants is an important step during the finishing phase. Plants can be staked when the lowest flower bud on an inflorescence has reached the size of a marble.

An important component of the finishing phase involves staking and preparing phalaenopsis for sale. Properly staking the inflorescence will affect how the plant is presented at point of sale, thus improving consumer appeal. In addition, staking will also minimize plant damage during packaging and shipping. Plants can be staked when the lowest flower bud on an inflorescence has reached the size of a marble. The stick (bamboo or other materials) used for staking should not be taller than the lowest flower bud and can be attached to the inflorescence using clips or ties. At the time of staking, plants are often sorted based on a predetermined quality grading scale (i.e., number of spikes and flowers or spike length).

Postharvest

When plants have at least one or two open flowers they are ready for sale and

can be packaged for transport. The preparation of plants for shipping and market display is a labor intensive process that can involve many tasks. Phalaenopsis leaves are sometimes cleaned and plants are placed into decorative ceramic or terracotta pots with sphagnum moss on the surface of the growing medium.

A label with care information is often affixed to the support stick and leaf shine may be applied to the foliage before the plant is sleeved. Potted phalaenopsis are perceived by consumers as elegant plants with high ornamental value. As a result, all of these steps can add value to the product and influence how the plant is presented to the consumer.

Flowers of all orchids, including phalaenopsis, are very sensitive to low concentrations of ethylene, and concentrations as low as 0.1 ppm will cause flowers and buds to drop within a few days. Research at Texas A&M University showed that fumigating flowering phalaenopsis with 1-methylcyclopropene (1-MCP, or EthylBloc) at 0.2 ppm for six hours at 77°F (25°C) protects flowers from ethylene concentrations as high as 10 ppm. However, the duration of protection from 1-MCP is short (seven days at 77°F or 25°C) and the duration of protection declines as temperature increases.

In conclusion, growers have many options to produce flowering phalaenopsis orchids. Immature plants will cost less than mature ones, but will require a longer production time and additional expenses. At northern latitudes, one of the largest production expenses is the energy for heating a greenhouse to promote vegetative growth. Growers who wish to reduce production time may choose to purchase more expensive plant material that is of flowering size and can be immediately forced.

A simplified schedule for the production of phalaenopsis in 5-inch pots is provided in Table 2. From this schedule and with the information in our four-part series, you can develop a production schedule to fit your greenhouse operation and produce a crop of flowering potted phalaenopsis orchids. Although this article has focused on environmental control of growth and flowering, cultural factors such as watering, fertility, pest and disease control and selection of an appropriate medium are also highly important for producing a profitable crop. **GG**

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Correction

In article two of "The Orchid Grower," August GG, page 70, the caption for Figure 1 was incorrect. The "coarse sphagnum peat" and the description for the mix were not in the right places. They should have been swapped.