

Title Innovative production systems for ornamental potted plants: a case study for *Phalaenopsis* orchids

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Abstract

Flowering *Phalaenopsis* orchids and related genera are one of the most valuable potted floriculture crops produced throughout the world. Successful production of high quality finish plants requires young plants that are consistently uniform, reliably available, and free of pathogens including viruses. To facilitate the entry of roots into the growing media, young plants are transplanted into translucent plastic pots that contain a well-drained media consisting of bark, coconut chunks, or sphagnum peat. *Phalaenopsis* are grown at a temperature $\geq 28^{\circ}\text{C}$ to inhibit flowering and promote rapid leaf development. Once plants are mature and have attained a desirable size for their container, plants are transferred to a separate growing environment with a temperature between 18 and 25°C to induce flowering. During both production stages, the maximum light intensity available to plants is controlled to $\approx 300 \mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$. To reliably provide an inductive temperature, some growers located in tropical and subtropical climates transport plants to cooler locations (e.g., a greenhouse at a higher elevation) while more modern operations provide air conditioning inside the greenhouse. Sophisticated commercial orchid producers rely on automation to quantify the size and then sort young plants, to transport plants to different growing environments and staging areas, and to provide fertigation. In addition, light intensity and temperature are controlled by environmental computers that control multiple layers of retractable curtains, supplemental lighting, and staged venting and heating systems. However, there are two production processes that have not yet been fully automated: the transplanting of young plants and the staking of inflorescences. Growers in the Netherlands have the most sophisticated production facilities with the lowest labor inputs; it is estimated that each plant is cumulatively handled less than one minute from the time plants are removed from flasks as tissue-cultured propagules until they are flowering and are placed on carts for transport to market.