

competitive advantages in regional markets (Nurmalinda et al., 2023). Under current consumption trends, *Phalaenopsis* product development is shifting from single-trait optimization to the integration of trait combinations with market positioning, which has become a key strategy for enhancing industry competitiveness.

## 5 Application in Commercial Horticulture

### 5.1 Cultivar selection and market matching

In commercial horticulture systems, the selection of *Phalaenopsis* cultivars must be precisely aligned with target consumer markets. Different consumer groups exhibit significant variation in aesthetic preferences, usage scenarios, and price sensitivity, thereby imposing distinct requirements on flower color, floral morphology, and plant architecture (Nurmalinda et al., 2023). Consequently, the commercial application of color and morphological traits is not merely an aesthetic decision, but a strategic configuration based on market segmentation and consumer behavior. With the development of data-driven marketing, cultivar selection is gradually shifting from experience-based approaches to more precise matching grounded in consumer preference data and channel-specific demand.

In high-end gift and interior decoration markets, consumers tend to prefer cultivars with pure colors, well-structured flower forms, and clear visual focal points. Such products emphasize ceremonial value and spatial aesthetics, making large-flowered white or light pink *Phalaenopsis* particularly advantageous (Nurmalinda et al., 2023). In contrast, mass-market consumers prioritize cost-effectiveness and spatial adaptability, favoring multifloral, highly branched, and compact cultivars that provide higher visual density within limited space (Gabellini and Scaramuzzi, 2022; Han et al., 2025). These differences highlight the distinct trait combinations required across market segments.

With increasing consumption upgrading and diversification of aesthetic preferences, demand for personalized products continues to grow. Younger consumers and horticultural enthusiasts are more inclined to select cultivars with complex color patterns, such as bicolored, spotted, or harlequin types, which enhance visual distinctiveness and command premium prices in niche markets (Badriah et al., 2024; Chen et al., 2024). As a result, modern cultivar selection has evolved from simple visual evaluation to a multidimensional decision-making process that integrates consumer demand, market positioning, and distribution channel characteristics (Gabellini and Scaramuzzi, 2022; Wei et al., 2022).

### 5.2 Production management and commercialization strategies

Production management is the key process through which the genetic potential of *Phalaenopsis* cultivars is translated into stable commercial value. The inherent advantages of a cultivar can only be fully realized under appropriate production systems that ensure uniformity and marketable quality (Han et al., 2025). Therefore, modern production management focuses on regulating plant development throughout the entire growth cycle—from vegetative growth to flowering—by controlling standards, uniformity, and floral quality.

Different cultivars require differentiated management strategies. Large-flowered cultivars typically demand enhanced nutrient supply and structural support to ensure flower size and integrity, whereas multifloral or highly branched cultivars require careful regulation of branching and flowering synchronization to maintain visual balance. Precise control of light, temperature, and nutrient conditions can significantly influence spike number, flower count, and plant uniformity. Additionally, leaf number and plant biomass can serve as reliable predictors of flowering performance, indicating that production management is not only a cultivation practice but also a tool for targeted optimization of trait expression.

At the commercialization level, efficient tissue culture systems ensure large-scale propagation and genetic uniformity of elite cultivars (Han et al., 2025), while flowering control technologies determine whether products can meet seasonal and festive market demands. Meanwhile, commercialization strategies increasingly depend on channel differentiation, with different distribution channels imposing varying requirements on plant uniformity, transport stability, and visual quality (Gabellini and Scaramuzzi, 2022; Wei et al., 2022). Therefore, production