elongation, so the visible branch number observed after pinching reflects regulation at multiple developmental stages rather than only a single bud-break event (Figure 1).

This control system is mediated by interacting hormonal and carbohydrate signals. In chrysanthemum, release from apical dominance after floral transition coincided with decreased auxin and increased cytokinin levels in subapical buds, together with altered expression of branching regulators such as CmBRC1, CmDRM1, and CmMAX1. Broader apical-dominance research shows that auxin does not act alone, because sugars can trigger rapid cytokinin increases after decapitation, strigolactones mainly constrain later sustained growth rather than the earliest release step, and branching emerges from a network involving auxin, cytokinin, strigolactones, sugars, and gibberellins (Cao et al., 2023).

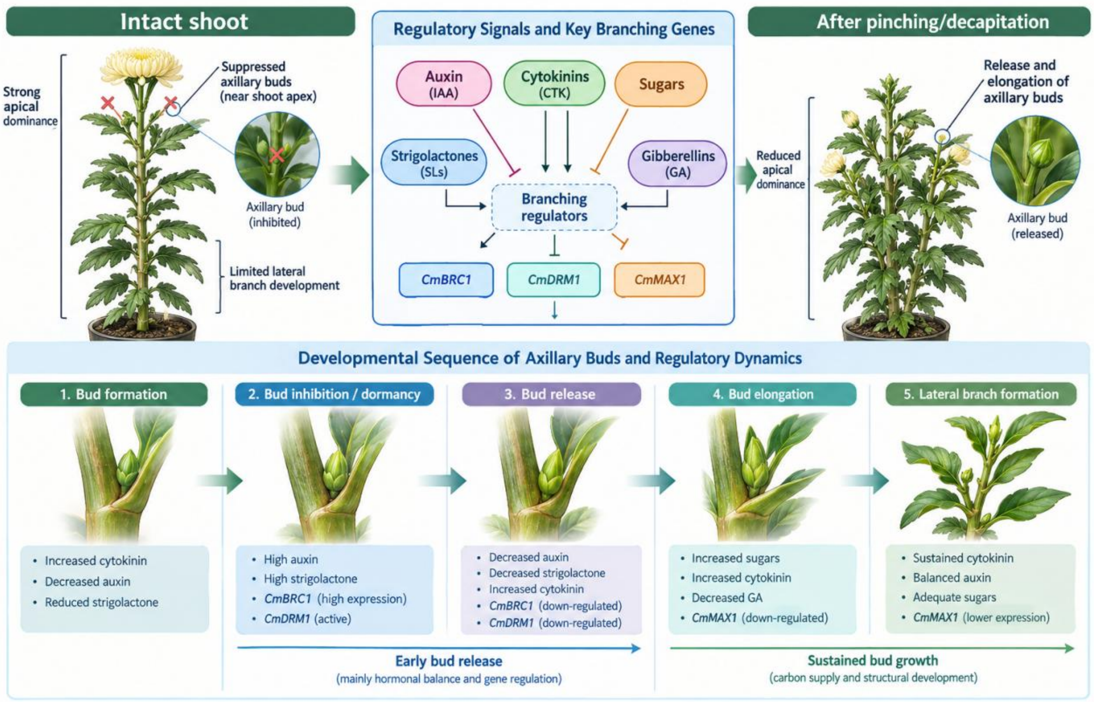

Figure 1 Biological basis of apical dominance release and axillary branch formation in chrysanthemum. The schematic illustrates the transition from shoot-apex-mediated inhibition to axillary bud release and subsequent lateral shoot elongation following pinching or decapitation, with coordinated regulation by auxin, cytokinins, sugars, strigolactones, gibberellins, and chrysanthemum branching-related genes

2.3 Relationship between branch number and inflorescence formation

The number of branches is closely tied to inflorescence formation because chrysanthemum flowers are produced terminally on shoots, making each successful lateral branch a potential flowering unit. In Hangbaiju, the importance of this link is explicit: the number of shoot branches is considered crucial for achieving high flower yield, which is why manual decapitation has traditionally been used to stimulate branching despite its labor cost. Across chrysanthemum production studies, treatments that increase branch number commonly increase flower number per plant as well, confirming that branch proliferation usually expands the population of reproductive sites (Jena et al., 2021).

The relationship is positive but not unlimited, because branch promotion also changes flowering time and the allocation of assimilates among floral units. Pinching studies show that double or repeated pinching increases primary branching and raises flower number and flower yield, but it often delays flowering and can reduce individual flower size compared with unpinched plants (Das and Patra, 2025). Nutrient and light-environment studies add that inflorescence productivity depends on how well branch formation is supported by whole-plant growth conditions, since balanced fertilization can enhance branching and flowering traits, and side lighting can markedly increase branch number while simultaneously promoting flowering and morphophysiological