transition, branch number, and subsequent flower yield (Pan et al., 2023). This is especially important because manual decapitation has traditionally been used to increase branching but is labor-intensive and can increase disease occurrence, which makes operation timing and method critical traceability points (Zhang et al., 2023).

Process records should also cover flowering regulation, foliar treatments, weed control, harvesting decisions, and batch coding, so that each product lot can be linked to its exact cultivation history. This need is strengthened by evidence that exogenous hormones alter flowering-related gene expression in Hangzhou White Chrysanthemum, and that 6-BA combined with Pro-Ca can increase branch number, yield, and nutritional quality while slightly shifting medicinal-component profiles, all of which means that growth-regulator use must be fully documented in traceability archives (Zhang et al., 2023). Harvest records are equally important because the bud stage has the highest commercial value and the optimal harvest window is short, so traceability should record harvest period, bud maturity, picker or machine identity, batch number, and transfer destination (Wu et al., 2026). With IoT sensors and digital numbering of planting, processing, purchasing, and selling links, whole-process records can improve supervision efficiency, reduce circulation cost, and strengthen confidence in medicinal chrysanthemum quality, which is exactly the operational goal of a green production-base traceability system for Hangzhou White Chrysanthemum (He and Shi, 2021).

4 Quality Traceability in the Harvesting and Processing of Hangzhou White Chrysanthemum

4.1 Harvest timing and production batch management

Harvest timing is the first key control point after field cultivation, because the commercial and medicinal value of chrysanthemum changes with flower developmental stage. Hangzhou White Chrysanthemum has its highest commercial value at the bud stage, but the optimal harvesting window is short, so delayed or non-uniform harvesting can quickly reduce product consistency (Figure 2) (Wu et al., 2026). More broadly, medicinal chrysanthemum studies show that chemical profiles vary significantly across bud, initial flowering, full bloom, and eventual stages, and most active constituents are highest or relatively high at the initial or full-bloom stages rather than at late stages. In cultivated Hangbaiju, fresh flowers harvested at 70% tubiform-flower flowering were used as the defined sampling stage for yield and quality analysis, which indicates that harvest maturity should be operationally standardized in traceability rules rather than left to subjective judgment (Zhang et al., 2023). These two maturity criteria are not interchangeable and should be specified according to product type and quality targets.

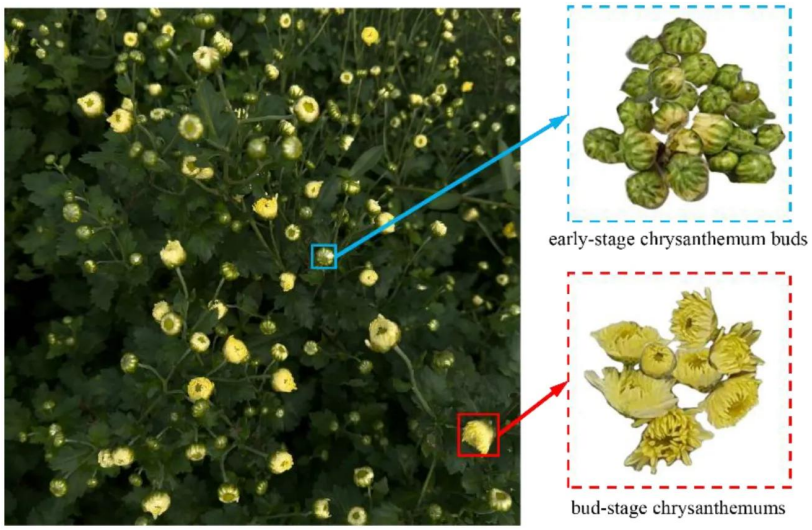


Figure 2 Data augmentation of the bud-stage chrysanthemum images (Adopted from Wu et al., 2026)

Because flowering and harvest timing are influenced by cultivation schedule and plant regulation, batch management should preserve the production history that explains why one lot matures earlier or differs in quality from another. Hangzhou White Chrysanthemum enters rapid reproductive growth after terminal-bud removal around 20 August as temperature declines and daylength shortens, and flowering regulation is also responsive to exogenous hormones, temperature, and photoperiod (Pan et al., 2023). Chrysanthemum studies further show that