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Construction of a Quality Traceability System for Green Production Bases of Hangzhou White Chrysanthemum

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Abstract The quality of Hangzhou White Chrysanthemum is jointly affected by multiple factors, including production environment, seedling source, water and fertilizer management, pest and disease control, harvest timing, processing methods, and storage conditions. Therefore, end-product testing alone cannot fully reflect the process of quality formation. Based on the production characteristics and quality management requirements of green production bases, this paper proposes a whole-process quality traceability framework covering cultivation, harvesting, processing, storage, circulation, and supervision. Taking production batches as the main traceability line, the system links information on production-base environment, seedlings and field management, water and fertilizer inputs, pest and disease control, harvest maturity, processing parameters, packaging and storage, and quality testing, while unified coding, QR codes, the Internet of Things, and blockchain technologies are introduced to support information collection, storage, and inquiry. For quality evaluation, appearance traits, basic physicochemical indicators, functional components such as chlorogenic acid, luteolin-7-O-glucoside, and 3,5-O-dicaffeoylquinic acid, as well as safety indicators are incorporated into the key quality control system. The proposed evaluation scheme further integrates geographical-origin authenticity, fingerprint profiles, and batch consistency. The proposed framework could improve information continuity throughout Hangzhou White Chrysanthemum production and enhance the ability to identify the sources of quality problems, while also providing support for product grading, green certification, brand protection, and market supervision. In the future, intelligent sensing, molecular identification, and digital evaluation technologies can be further integrated to improve the authenticity, real-time performance, and practical value of traceability data, thereby promoting the development of Hangzhou White Chrysanthemum production toward standardization, digitalization, and whole-process quality management.

Keywords Hangzhou white Chrysanthemum; Green cultivation; Quality traceability; Quality control; Digital management

1 Introduction

Hangzhou White Chrysanthemum is a well-known medicinal chrysanthemum and one of the “Zhejiang eight flavors,” with distinct production rhythms and quality traits that make source-oriented quality control especially important. Its cultivation is strongly shaped by seasonal and biological characteristics: branch pressing is commonly carried out from April to May, terminal buds are removed around late August, and the transition from vegetative to reproductive growth accelerates as temperature declines and daylength shortens (Zhang et al., 2023). Because it is usually planted in open-air environments rather than highly controlled ornamental systems, its growth, flowering, and final product quality are especially sensitive to external ecological conditions and field management. Existing studies show that quality formation in chrysanthemum is a combined result of genotype, environment, and cultivation measures. Variety selection matters because different genotypes express different growth, flowering, yield, and post-harvest traits under particular environments. Water and fertilizer regulation also directly affect floral traits and output: optimized irrigation and fertigation improved flower yield and quality in chrysanthemum, while excessive fertilizer concentration inhibited plant growth (Lu et al., 2024). Production system differences further influence quality-related compounds, since hydroponic cultivation increased flower yield, total flavonoids, and chlorogenic acid relative to soil culture in tea chrysanthemum. At the physiological level, flowering and floral organ development are co-regulated by photoperiod, temperature, and endogenous hormones, and gene-expression evidence in Hangzhou White Chrysanthemum confirms differential responses to