introduced, the authenticity of the original uploaded data is still a major constraint, because immutability protects stored records but does not itself guarantee that the source data were correct at entry. Research on agricultural blockchain systems further notes that many proposals remain too general or are still at an early application stage, so real-world deployment, interoperability, and integration across technologies are not yet mature. On the product side, quality variation between batches remains substantial, as shown by unqualified chrysanthemum batches in marker-compound testing and by significant variation in common-peak contents even within the same accession, which means that traceability without synchronized quality standards cannot fully solve market inconsistency.

Future development should move toward smarter, more accurate, and more biologically grounded traceability. IoT, embedded sensing, and machine learning can improve automatic data capture, reduce manual entry errors, and screen abnormal source data, with reported blockchain-IoT-ML systems reaching high verification accuracy for on-chain information. For Hangzhou White Chrysanthemum, this creates a path toward early warning of abnormal cultivation, storage, or circulation conditions, while supporting auditable correction procedures, tamper resistance, and efficient queries. At the source-authentication level, future systems are likely to combine blockchain with DNA barcoding, molecular identification, high-precision localization, and even individual-plant tracking to address counterfeit origin, misreported planting years, and authenticity disputes. Product evaluation should also advance from simple origin or appearance judgment toward Q-marker-based and bioactivity-linked quality control, because current chrysanthemum research shows that chromatogram-effect and spectrum-effect approaches can identify more informative markers for authentication and quality assessment. In addition, objective phenotyping, remote sensing, and digital grading tools can modernize visual evaluation, while alternative cultivation systems such as hydroponics may support greener production with higher yield and higher flavonoid and chlorogenic acid contents. Looking ahead, the most promising direction is a traceability system that not only records the full history of Hangzhou White Chrysanthemum, but also supports brand protection, counterfeit control, quality grading, and the development of higher-value medicinal and functional products.

**Conflict of Interest Disclosure**

The author affirms that this research was conducted without any commercial or financial relationships that could be construed as a potential conflict of interest.

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