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Value-Addition and Post-Harvest Management in China Aster (*Callistephus chinensis* L.)

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China aster (*Callistephus chinensis* L.) is an economically important ornamental crop widely cultivated for loose and cut flower purposes due to its attractive colours, versatility, and consumer preference. Despite its commercial relevance, large post-harvest losses occur because of rapid senescence, high respiration and transpiration rates, ethylene sensitivity, and inadequate post-harvest infrastructure. Value addition and scientific post-harvest management are therefore essential to enhance vase life, reduce losses, and improve market and export competitiveness. This article reviews key post-harvest interventions from farm to vase, including harvesting stage, pre-cooling, vase life enhancement, grading, packaging, storage, and cold-chain logistics. Opportunities for value addition through dried flowers, tinted blooms, and secondary processing are also discussed. Strengthening post-harvest systems and adopting value-addition strategies can significantly improve quality retention, farmer income, and the export potential of China aster in domestic and international floriculture markets.

Keywords: China aster, post-harvest management, value addition, vase life, cold chain, export

Introduction

Floriculture is a high-value sector of horticulture that generates substantial income and employment while supporting allied industries such as logistics, packaging, and export services. The market value of ornamental crops depends largely on post-harvest quality parameters such as freshness, appearance, and vase life. In cut flowers, post-harvest handling often determines economic success more than field production practices. China aster (*Callistephus chinensis*), a member of the family Asteraceae, is widely cultivated in India and other Asian countries for decorative, landscaping, and ceremonial uses. Although the crop has good yield potential and strong market demand, its post-harvest life is relatively short under improper handling. Post-harvest losses in flowers may reach 30–40% in developing countries due to a lack of pre-cooling, cold storage, and efficient supply chains (Kumar *et al*., 2022). Consequently, integrating value addition with scientific post-harvest management is crucial for improving quality retention and export readiness of China aster.

Economic Importance of China Aster

China aster contributes significantly to the loose and cut flower markets, accounting for nearly 8–12% of loose flower production in India. It is cultivated extensively due to its adaptability, wide colour range, and suitability for bouquets and floral arrangements. The crop generates high returns per unit area and is employed throughout the year (Arora & Singh, 2008). Rising demand during festivals, weddings, and events, coupled with the growth of online flower retailing, has further increased the commercial relevance of China aster.

However, inconsistent quality and limited post-harvest infrastructure restrict access to premium and export markets.

Value Addition in Floriculture

Value addition in floriculture involves enhancing the economic worth of flowers through quality improvement, shelf-life extension, processing, and innovative marketing. In China aster, value addition includes improved post-harvest handling, aesthetic modification, and conversion into secondary products. Non-standard and surplus flowers, which often fetch low prices, can be effectively utilized for dried flowers, pressed flowers, tinted blooms, and floral handicrafts. Such diversification increases profitability, reduces wastage, and stabilizes income for growers (ICAR, 2023).

Post-Harvest Physiology and Constraints

China aster flowers exhibit high respiration rates after harvest, leading to rapid depletion of carbohydrates and early senescence. Thin petals and tender stems cause excessive transpiration and wilting, while moderate ethylene sensitivity accelerates ageing and petal abscission. The crop is also susceptible to fungal infections, particularly Botrytis cinerea, during storage under high humidity (Bhattacharjee & De, 2019). nderstanding these physiological limitations is essential for designing effective post-harvest management strategies.

Harvesting and Pre-Cooling

The harvesting stage significantly influences vase life and transport suitability. Flowers harvested at the tight bud or half-open stage show better longevity and are preferred for distant markets, while fully open flowers are suitable for local sales. Harvesting during early morning or evening reduces field heat and moisture loss. Pre-cooling is a critical step to remove field heat and slow metabolic activity. Storage at 0–2°C effectively reduces respiration and transpiration, thereby extending storage life. Techniques such as hydro-cooling and vacuum pre-cooling provide rapid and uniform cooling, improving post-harvest quality (Reid, 2009).

Vase Life Enhancement

Vase life is a key determinant of consumer satisfaction and market price. Treatments with sucrose, biocides, calcium salts, and growth regulators have been shown to improve water uptake and delay senescence. Application of gamma-aminobutyric acid (GABA) combined with calcium chloride enhances membrane stability and vase life. Ethylene inhibitors such as 1-methylcyclopropene (1-MCP) effectively delay ageing by suppressing ethylene action (Ehsanimehr *et al*., 2024).

Grading, Packaging, and Storage

Grading based on stem length, flower size, and quality ensures uniformity and better price realization. Packaging in ventilated corrugated fibreboard boxes with moisture-retentive liners is commonly used. Modified atmosphere packaging helps reduce respiration rate and water loss, thereby extending shelf life (Reddy *et al*., 2014). Cold storage at 0–2°C with 90–95% relative humidity and minimal ethylene exposure is optimal for maintaining quality and reducing microbial decay.

Cold-Chain Logistics and Export Potential

Maintaining cold-chain continuity from harvest to consumer is essential for quality retention. Inadequate cold-chain infrastructure remains a major constraint in India, limiting vase life and export competitiveness. Strengthening refrigerated transport, storage facilities, and distribution hubs can substantially reduce post-harvest losses. China aster has promising export potential, particularly in regional Asian markets. Compliance with quality standards, phytosanitary requirements, and consistent supply can enhance its presence in the international floriculture trade.

Conclusion

China aster is a high-value ornamental crop whose commercial potential is strongly influenced by post-harvest management and value-addition practices. Scientific harvesting, rapid pre-cooling, vase life enhancement treatments, proper grading, packaging, and cold-chain logistics are essential for minimizing losses and maintaining quality. Value addition through secondary processing not only increases profitability but also promotes sustainable utilization of surplus flowers. Strengthening post-harvest infrastructure and market linkages will be key to improving growers' incomes and positioning China aster as a competitive flower in both domestic and global markets.

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