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Integrated Pest Management in Chrysanthemum

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Chrysanthemum, a globally cherished ornamental and medicinal plant, faces significant threats from various pests that can severely impact its quality and yield (Manideep et al 2025). While chrysanthemum cultivation is prominent in many regions, including parts of Tamil Nadu, detailed, peer-reviewed entomological surveys specifically focused on chrysanthemum pests in the Dindigul district are not readily available in the scientific literature.

General Pest Identification

However, based on broader scientific understanding and reports from other regions with similar agricultural contexts, including West Bengal, India, and general chrysanthemum cultivation areas, several key insect pests commonly infest chrysanthemum crops. These include aphids (Aphididae), thrips (Thysanoptera), and spider mites (Tetranychidae) (Harsha et al 2023; Pratiwi et al 2022; Xia et al 2023 and Zhong et al 2022b). Other issues such as whiteflies and leaf miners have also been observed.

The Impact of Aphids on Chrysanthemum Health

Aphids, particularly the chrysanthemum aphid (*Macrosiphoniella sanborni*), are destructive oligophagous pests that severely restrict the sustainable development of the chrysanthemum industry. They not only reduce ornamental value through feeding and reproduction but also transmit numerous plant viruses, causing irreversible damage. Studies have explored the chemosensory mechanisms of *M. sanborni* to better understand their environmental perception (Zhong 2022a and Manideep 2025). Volatiles inheriting from certain plants like *Crossostephium chinense* have shown repellent effects against aphids in chrysanthemum cultivars, suggesting potential breeding strategies for aphid resistance.

Challenges Posed by Thrips and Invasive Species

Thrips, such as the invasive *Thrips parvispinus* (Karny) and Western flower thrips (*Frankliniella occidentalis*), pose a significant threat to chrysanthemum cultivation by causing substantial qualitative and quantitative losses (Khan 2021; Chen 2020; Siebert 2020). *Thrips parvispinus* is a relatively new invasive pest in various regions, and effective integrated pest management (IPM) strategies specifically targeting this species are still being evaluated. Research has also explored host plant resistance in chrysanthemum against Western flower thrips, investigating factors like flavonols, flower color, and flower shape, though constitutive and inducible resistance to thrips do not always correlate with trichome density or enzymatic defenses.

Spider Mite Infestations and Host Plant Interactions

Spider mites, particularly *Tetranychus urticae* (two-spotted spider mite), are also major piercing-sucking arthropod pests of chrysanthemum. These mites cause damage by feeding on plant tissues, leading to reduced photosynthetic performance and overall plant vigor.

Population fluctuations of *T. urticae* have been studied in different chrysanthemum varieties in greenhouses, revealing variations in infestation levels among cultivars like Convington, Kalamazoo, White diamond, and Royal Time, indicating potential for cultivar-specific resistance. The feeding by *T. urticae* also induces distinct volatile emissions from chrysanthemum foliage, differing from those induced by chewing insects, which underscores complex plant-pest interactions.

Fungal and Viral Pathogens Affecting Yield

Beyond these primary arthropod pests, chrysanthemums are also susceptible to a range of diseases that can significantly impact their health and productivity. Fungal pathogens, such as *Fusarium incarnatum* causing Fusarium wilt, are a major concern, often exacerbated by monoculture practices. Other fungal diseases like leaf blight caused by *Alternaria alternata* and leaf spot disease attributed to *Nigrospora oryzae* have also been identified. Viral infections, notably Tomato Spotted Wilt Virus (TSWV) and Chrysanthemum Virus B (CVB), are globally destructive, causing considerable losses in yield and quality. Phytoplasma infections, manifesting as symptoms like phyllody and witches' broom, have been documented in Indian chrysanthemum varieties (Pratiwi 2022).

Integrated Pest Management (IPM) Strategies

Effective management of these diverse pests and diseases necessitates the implementation of Integrated Pest Management (IPM) strategies. IPM integrates multiple approaches, including cultural practices, biological controls, and judicious chemical applications, to achieve long-term pest prevention and keep pest populations below economically damaging thresholds. Key components of IPM include continuous monitoring of pest populations, the strategic use of pest-tolerant cultivars, and the promotion of natural enemies. For instance, screening chrysanthemum cultivars for their inherent tolerance to sucking pests is a cost-effective and sustainable management tactic.

Cultural Practices and Innovative Resistance Methods

Cultural methods like optimizing planting schedules and employing appropriate fertilizer regimes are vital for enhancing crop yield and improving soil health, which can indirectly bolster plant resistance to pests. The application of silicon, particularly potassium silicate, has also shown promise in reducing insect damage and extending the shelf life of chrysanthemum plants, thus offering another avenue for improving pest resistance.

Pesticide Residue Concerns and Food Safety

The prevalence of pesticide use, especially in greenhouse chrysanthemum cultivation, has led to concerns regarding pesticide residues. Neonicotinoids, for example, have been detected in chrysanthemum plants and the surrounding soil.

Conclusion

Chrysanthemum flowers are frequently consumed as herbal tea, monitoring and analyzing these residues are critical to ensure food safety, as chemical residues can transfer into tea infusions. IPM strategies are designed to minimize reliance on synthetic pesticides, thereby mitigating associated environmental and health risks (Manideep 2025).

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