

## Characterization of Floral and Leaf Volatile Organic Compounds (VOCs) in Four Asian Annonaceae Species: Insights into Pollination and Stress Responses

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### Abstract text:

Plant volatile organic compounds (VOCs) serve multifaceted roles in plant ecology, acting as attractants for pollinators and defence mechanisms against both biotic and abiotic stressors. Previous studies within the Annonaceae family have highlighted the dynamic and variable nature of floral scents. This study focuses on identifying and analysing VOCs in floral and leaf samples from four distinct Asian Annonaceae species. The primary objective is to isolate and characterize the specific VOCs responsible for the unique scents in these species, elucidating their established functions in pollination and protection mechanisms. Floral scent samples were collected using dynamic head-space sampling techniques in various landscapes of Bangladesh and analysed through Gas Chromatography-Mass Spectrometry (GC-MS) at Ghent University. A total of 69 distinct volatile compounds were identified, with fatty acid esters being the predominant class, followed by sesquiterpenes, monoterpenes, alkanes, phenyl propanoids, aldehydes, ketones, alkenes, and alcohols. Among these floral volatiles, *Cananga odorata* exhibited the highest diversity with 33 compounds, followed by *Artabotrys hexapetalus* (21), *Uvaria hamiltonii* (21), and *Millettia velutina* (18). *Cananga odorata* was primarily characterised by terpenoid compounds, dominated by germacrene D, alpha-farnesene, and beta-caryophyllene, while the other three species were predominantly composed of fatty acid esters, with hexanoic acid methyl ester, acetic acid butyl ester, and butanoic acid butyl ester as major constituents. Leaf volatiles in all species were dominated by fatty acid ester compounds. Fatty acid and phenyl propanoid compounds emit sweet fruity scents, attracting diverse beetles for pollination. Terpenoids lure flies, beetles, and thrips,

offering protection against stressors. Specific compounds such as alpha-pinene, beta-caryophyllene, and alpha-farnesene help combat drought, while monoterpenes and isoprene aid survival in high temperatures. This exploration lays the groundwork for future investigations aimed at unveiling the precise functions of these unique compounds in individual plants.

**Keywords:** Annonaceae ; floral scent; leaf volatiles; plant volatile organic compounds (VOCs)