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Curcuminoids in *Zingiber zerumbet* Rhizomes: Bioguided Fractionation and Chromatographic Identification of Antimicrobial and Antioxidant Metabolites

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ABSTRACT

Metabolite extraction from *Zingiber zerumbet* rhizomes using solvents of varying polarity index revealed high antimicrobial activity in the isopropanol fraction, whereas higher free-radical scavenging and antioxidant activity were observed in the benzene extract, which also had higher total phenolics and tannins. Chromatographic and spectral analysis of the benzene fraction revealed curcuminoids as the major active component. Fourier transform infrared (FTIR) spectrometry confirmed the presence of alkanes, carboxylic acids, amides, ketones, and aldehydes in the bioactive solvent extract.

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Phytochemicals; solvent fractions

Introduction

Genus *Zingiber* (Zingiberaceae) comprises true gingers distributed widely, with the greatest diversity in Southeast Asia (10). It comprises ~150 species, of which seven species have been reported from South India (8). All *Zingiber* sp. are frequently used as raw material for making traditional medicine formulations (10, 26). The genus constitutes an important natural resource yielding many products used as food, spices, medicines, dyes, perfumes, and aesthetics. Among the various *Zingiber* sp., *Z. zerumbet*, commonly called "shampoo ginger" or "pinecone ginger," is widely cultivated in the tropical countries and is being studied for pharmaceutical activities documented in Ayurvedic, Indian herbal, Chinese, Japanese, African, and British pharmacopoeias (22, 29). Essential oil analysis of the rhizomes, leaves, and flowers of *Z. zerumbet* have documented the presence of terpenoids and phenylpropanoid polyketides (4, 6, 23) that contribute toward its organoleptic and medicinal properties comprising antimicrobial (24), anti-inflammatory (29), antioxidant (10, 19, 22), anticancer, gastro-protectant, and anti-ulcerative (22, 23) activities. Besides the wide range of medicinal uses of *Z. zerumbet*, no major field diseases have been reported in the taxa except for reports of *Z. zerumbet* serving as a minor host for the spiraled whitefly *Aleurodicus*

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