Unlocking the Therapeutic Potential: Comparative Enzyme Inhibition by Five Malaysian Piper Species

Agriculturae Conspectus Scientificus • Article • 2025

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Abstract

The genus Piper, belonging to the Piperaceae family, includes over 2,000 species, many of which are widely recognized for their significant economic and medicinal importance. In recent years, research on Piper species has advanced, with numerous studies highlighting their intriguing pharmacological properties. The enzyme inhibitory effects of plant-derived compounds play a significant role in addressing various diseases, including neurodegenerative disorders, hyperpigmentation, and diabetes. This study evaluates the acetylcholinesterase (AChE), tyrosinase, and α-glucosidase inhibitory activities of ethanolic leaf extracts from five Malaysian Piper species: Piper rostratum, P. frustratum, P. penangense, P. baccatum, and P. crassipes. The extracts demonstrated varying degrees of enzyme inhibition, with P. baccatum exhibiting the strongest AChE inhibition (IC_{50} value of 21.5 $\mu g \cdot mL^{-1}$), P. frustratum the highest tyrosinase inhibition (IC_{50} value of 12.6 $\mu g \cdot mL^{-1}$), and P. rostratum the most potent α-glucosidase inhibition (IC_{50} value of 12.1 $\mu g \cdot mL^{-1}$). These activities are attributed to the bioactive phytochemicals, including alkaloids, flavonoids, and phenolic compounds, known for their enzyme-inhibitory and antioxidant properties. This is the first study to report these specific activities for these Piper species, highlighting their potential as natural therapeutic agents and offering insights into their medicinal applications

Author keywords

acetylcholinesterase; antityrosinase; glucosidase; Piper; Piperaceae

Indexed keywords

GEOBASE Subject Index

alkaloid; angiosperm; antibiotics; antioxidant; diabetes; enzyme activity; inhibition; inhibitor; phenolic compound; plant extract; secondary metabolite; skin

Funding details

Details about financial support for research, including funding sources and grant numbers as provided in academic publications.

Funding sponsor	Funding number	Acronym
Universiti Pendidikan Sultan Idris See opportunities		
Geran Penyelidikan Universiti	2025-0012-103-01	

Funding text

This research was supported by the Geran Penyelidikan Universiti (Kecemerlangan@UPSI) under grant number 2025-0012-103-01, funded by Universiti Pendidikan Sultan Idris.

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